Vegetation Inventory and Mapping of Tryon Creek State Natural Area

Pacific Biodiversity Institute

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November 2007

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Recommended Citation

Smith, H.M. IV, Morrison, P.H. 2007. Vegetation Inventory and Mapping of Tryon Creek State Natural Area. Pacific Biodiversity Institute, Winthrop, Washington. 37 p.

Acknowledgements

George Wooten, Sarah Schrock, Tobias Policha, and Stephanie Schroeder assisted with the field surveys for this project. Juliet Rhodes and Lin Kyan helped manage the large amount of data collected during these surveys. Photos were taken by Hans Smith, Peter Morrison, George Wooten and Sarah Schrock.

Project Funding

This project was completed under contract with the Oregon Parks and Recreation Department (Personal Services Contract #07-400).

Table of Contents

Executive Summary

Tryon Creek State Natural Area (629 acres) is the project area covered in this report.

Vegetation surveys took place during July, August, October and November 2007. This report summarizes the following findings from the surveys:

- Changes from historical vegetation patterns
- Distribution and condition of current vegetation patterns
- Occurrence of all vascular plant species within the project area
- Occurrence and distribution of at-risk plant species
- Occurrence and distribution of key exotic species
- Recommendations for restoration projects and managing key exotics

We conducted preliminary investigations into historical vegetation patterns for the project area but were generally unsuccessful in finding discreet maps or data that could be used to directly compare historical conditions from the contemporary. However, forensic evidence of historical conditions and disturbance patterns exists on the ground within the park, and such evidence provides information to speculate about historic trends. The park most likely possessed classic low-elevation mixed conifer late-successional forests dominated by Douglas-fir, western red cedar, and western hemlock. These original forests were removed via post-European settlement logging and fire (perhaps intentional burning after logging) so that the park's current forests are quite different from historical conditions. Eventual residential development within the last century around the park's exterior has worked to increase edge effects on the forest and created an ideal vector for exotic plant spread into the park's interior.

Current vegetation patterns reflect the park landscapes' recent history of logging and development. Mid-successional deciduous tree dominated stands now compose the matrix forest type. English ivy (a vine) is the dominant understory plant in much of the park's upland forests. The main Tryon Creek riparian zone has been colonized by exotic wetland invaders taking advantage of the disturbance caused by public works projects such as sewer and storm water line installation. While some small patches of native vegetation loosely resembling historic vegetation conditions exist within the park, these areas are being maintained through the dedicated assistance of restoration volunteers and would quickly succumb to noxious weed invasion without significant control activities.

Overall vascular plant diversity is relatively low in the park. 166 plant species were identified during field surveys, with 42% of identified plants being known exotics.

Euonymus occidentale, a S3 ranked at-risk plant (see Appendix C), was found throughout the park's landscape. Its abundance in a diversity of forest types and conditions warrant the entire park property to be classified as potential habitat. Similarly, all of the upland forests within the park should be considered potential habitat for *Actaea elata* (*Cimicifuga elata*), another S3 ranked at-risk plant being considered for

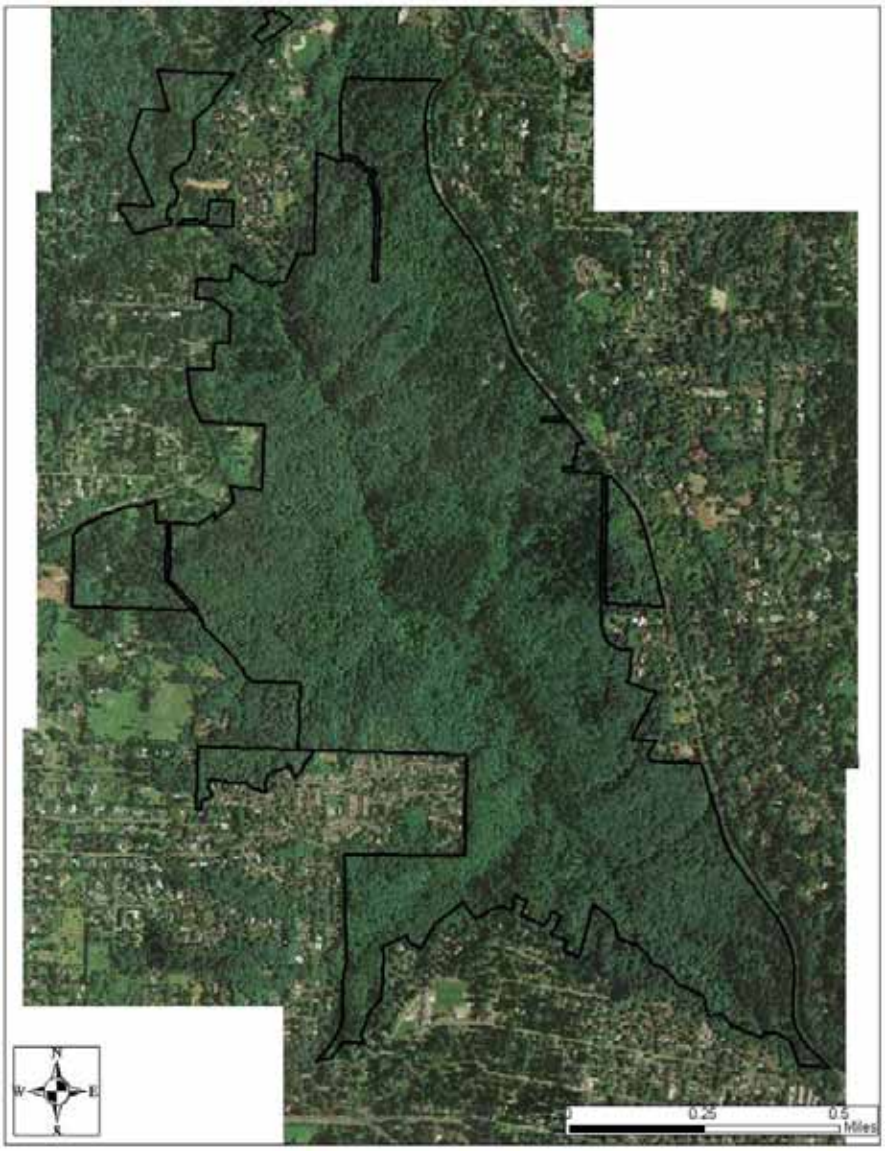
state listing by the Oregon Department of Agriculture. No *Actaea elata* was found during the 2007 field surveys.

Many exotic and invasive plants have found a home in Tryon Creek State Natural Area. English ivy infestations are rampant and encompass most of the entire park landscape. Infestations of Himalayan blackberry, evergreen clematis, and English holly are extensive in more limited areas, and these plants (along with ivy) are effectively replacing native vegetation in some area. Other exotic plants slated for control efforts by the Oregon Department of Agriculture, such as garlic mustard and Japanese knotweed, exist in small patches throughout the park. Canary reedgrass, creeping buttercup, Himalayan blackberry, and Japanese knotweed are having negative impacts on the natural community conditions of Tryon Creek's wetland and riparian areas.

To combat the extensive exotic plant problems within Tryon Creek State Natural Area, many restoration activities are already underway to reduce exotic plant cover and preserve and recruit native plants. Across large areas of the park tree and shrub planting activities coupled with the cutting back of large patches of exotic plants is the principal restoration strategy. Cutting ivy vines climbing up trees is an important control strategy being employed that can help to preserve native trees. Continuation of these restoration activities needs to be maintained and increased to effectively restore healthy native plant communities in the park's landscape. Annually targeting garlic mustard populations along the trail system for removal may be a successful way to limit its spread in the park.

Study Area

Tryon Creek State Natural Area (TCSNA) is a 629-acre forested preserve near Lake Oswego in the greater Portland metro area. The Natural Area contains a vast network of trails used by hikers, bikers, and equestrian users. The landscape of TCSNA is made up of a series of small, forested ravines connected to the greater Tryon Creek drainage, which bisects the park from north to south. Topography within the park ranges from generally flat benches and ridges to moderately steep hillsides and low gradient stream channels in the bottom of the ravines. Tectonic uplift of an old oceanic plate and influence from the Missoula Floods helped shape the general geology of the area. The erosive effects of Tryon Creek and other small surface streams have created dissected topography, laden with small ravines, that we find today. The substrate within the project area is typically made up of deep silt loam with little to no bedrock outcrops at the soil surface. Due to the relatively high annual precipitation of Portland area, much of the TCSNA contains small wetland patches mixed in with the larger mesic upland forest complex. Forested wetland communities often dominate riparian zones within the project area.



Most of the TCSNA is surrounded by moderately dense residential development. Roads, driveways, and housing lots disrupt the continuity of natural forest cover along many edges of the Natural Area. Figure 1 illustrates the layout of Tryon Creek State Natural Area. The impervious surfaces of the surrounding developments cause unnatural runoff during storm events in many of the stream channels within the park. This excessive runoff has caused significiant downcutting of most of the stream channels.

Figure 1. A map showing the boundaries of the Tryon Creek State Natural Area overlaying a recent color aerial photograph.

Tasks and Methods

We performed our data mapping, data gathering, and data creation procedures in accordance with the guidelines and protocols stated in the Statement of Work section of Personal/Professional Services Contract #07-400. Appendix D contains the language used in the Statement of Work.

During the field survey portion of this project, more data was gathered on each vegetation polygon's current vegetation community composition than could be used in the resulting GIS data deliverables as stated by the Statement of Work. In order to retain the higher level of detailed data we collected on existing vegetation communities we created additional items in the vegetation polygons attribute table which express our more detailed data while preserving the original attribute structure to meet the demands of the Statement of Work. These additional items and attributes are described in various places within this report and within the metadata associated with this report and the GIS data deliverables.

Figure 2. Field survey routes, July and August.

We created an initial vegetation map based on aerial photography and topographic information. We conducted fieldwork in the park during July, August, October and November 2007. Figures 2 and 3 illustrate our approximate survey routes. We produced a draft map report and geodatabase of our findings at the end of August, then revised the of mapping of vegetation communites based on further analysis of aerial photography, ASTER and Landsat TM satellite imagery and digital terrain products derived from LIDAR imagery in November. This map was further refined through fieldwork conducted in October and November. We revised the draft report to reflect the improved vegetation mapping and further fieldwork.

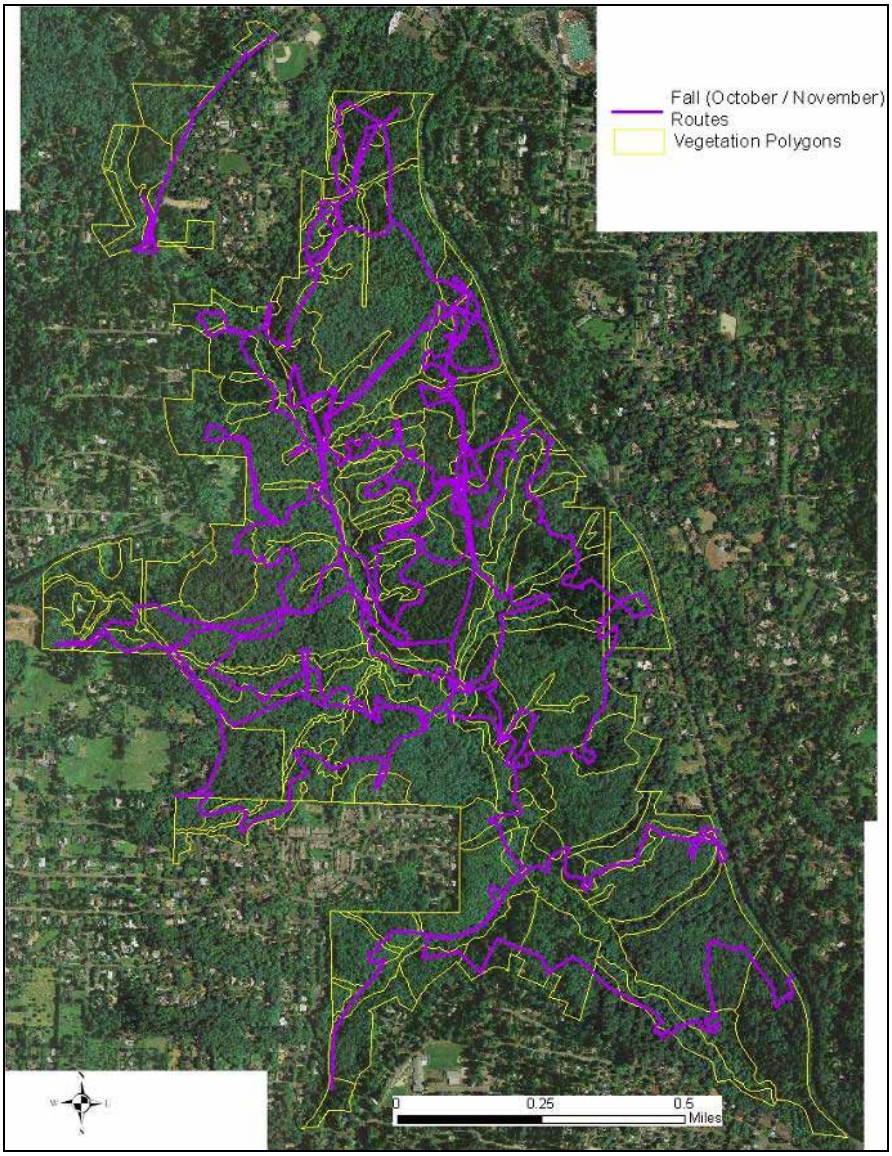


Figure 3. Field survey routes, October and November.

Our assessment of historic vegetation included a review of existing historic vegetation maps and an analysis of a chronosequence of 6 Landsat MSS and TM satellite images ranging in date from 1972 to 1999. Several areas of recent forest cutting within the current park boundary and adjacent to private land are visible in the 1972 satellite images. These areas are covered by young forests today.

Results

Historical Vegetation Patterns

According to Oregon Natural Heritage and Information Center's map of pre-settlement vegetation (Figure 4), most of the area within and surrounding Tryon Creek State Natural Area was a Douglas-fir dominated conifer forest. In pre-settlement times these forests probably had late-successional / old-growth characteristics, with many giant mixed conifer trees including western red cedar, western hemlock, and grand fir dominating the forest canopy.

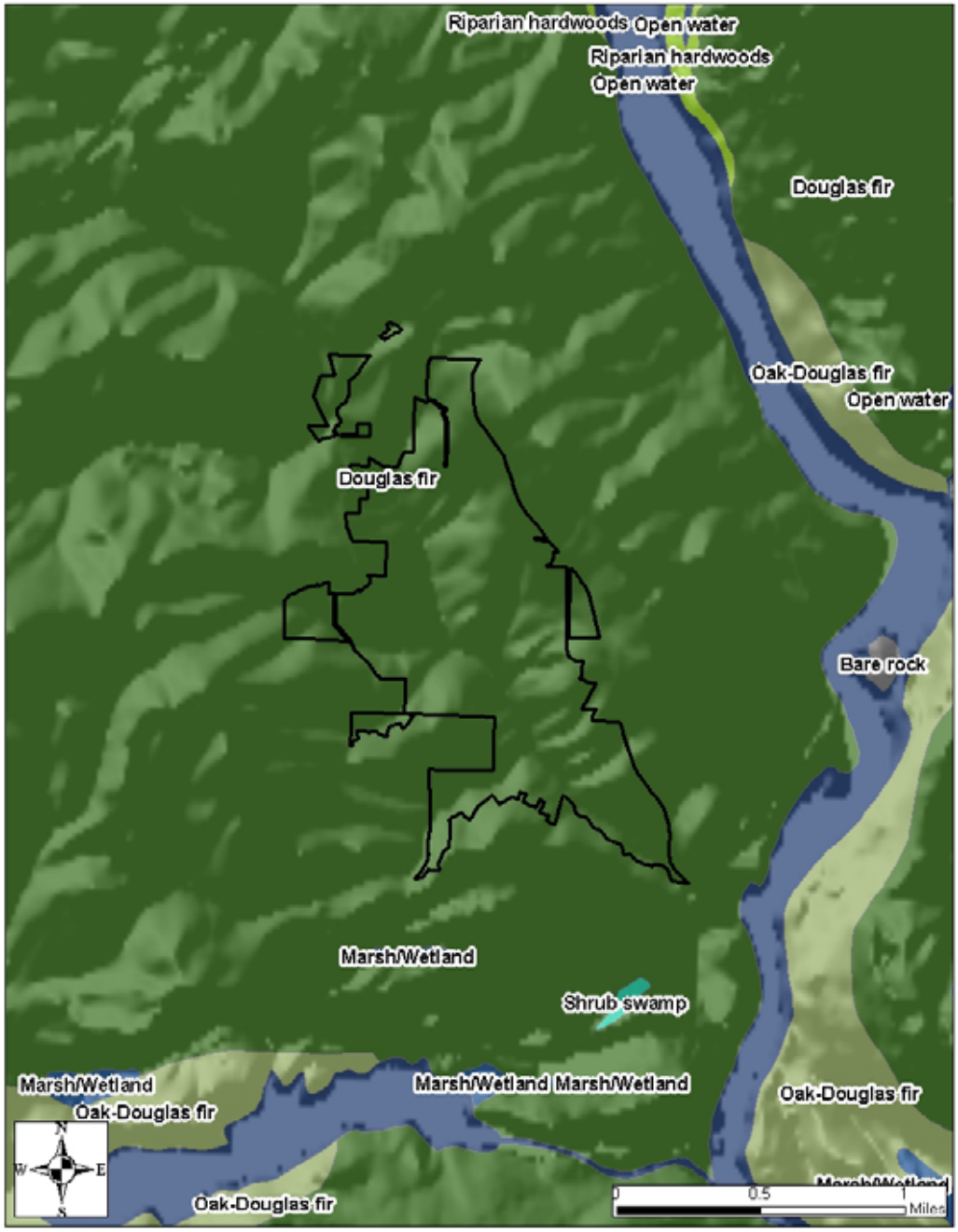


Figure 4. Pre-settlement vegetation in the Tryon Creek area according to a GIS data layer created by Tobalske, 2002.

Pioneer and industrial logging practices eventually removed nearly all of the old-growth forests in the area, and some evidence of post-logging fire exists on some old stumps and logs within the natural area (Figure 5). The old-growth conifer forests were replaced in the last century by deciduous and mixed conifer forests which remain the dominant vegetation today, although a few remnant old-growth trees remain in the park (Figure 6). Residential development and associated roads and utilities over the past century around the park's boundaries have increased the edge / interior ratio of the park's forests and provided ideal vectors of spread for exotic invaders.

Figure 5. An old charred snag is evidence of a historic fire that occurred in the project area.

Figure 6. Residual old-growth trees are scattered through some sections of the park.

Current Vegetation Patterns and Conditions

The landscape of Tryon Creek State Natural Area is dominated by mid-successional deciduous and mixed conifer forests. However, the high diversity of topographical conditions associated with the park's network of large and small ravines, as well as an abundance of past human disturbances including logging, restoration activities, and development, combine to produce many small vegetation patches. These small patches vary significantly in overstory and sub-canopy species dominance and comprise distinct vegetation communities. 143 vegetation community polygons were mapped and surveyed within the project area for this project (Figure 7), and 148 different assortments of dominant vegetation composition were noted in our field data (there can be more than one vegetation community patch within a given polygon).

However, when looked at through the lense of predicted climax vegetation associations, the seemingly high amounts of vegetation community diversity do not endure. Only 10 equivalent published plant association classes were recorded for the park, and as required by the Statement of Work governing this project, we were able to effectively reduce the original 148 current vegetation descriptions down to 21 condensed vegetation types that adequately depict existing dominant species composition of the park's vegetation communities. The disparity between the complexity recorded in our field notes and the resulting simplification of the10 plant associations and 21 existing vegetation community classes can be reasoned by the fact that many of the same plants were described as dominant between each vegetation polygon, the descriptions just differ on what plant is most dominant from site to site. For instance, there are many forest patches with significant amounts of red alder (*Alnus rubra*), Douglas-fir (*Pseudotsuga menziesii*), and bigleaf maple (*Acer macrophyllum*) sharing the canopy, but some might have more maple and others more Douglas-fir. We classified these forest patches (assuming similar understory composition) as the same resulting plant association considering forest successional direction. Table 1 depicts how the 21 existing vegetation classes relate to the 10 published plant association classes. A larger table depicting how the 148 current vegetation descriptions were condensed into the 21 existing vegetation classes is included as Appendix B (and is not included here due to its considerable size).

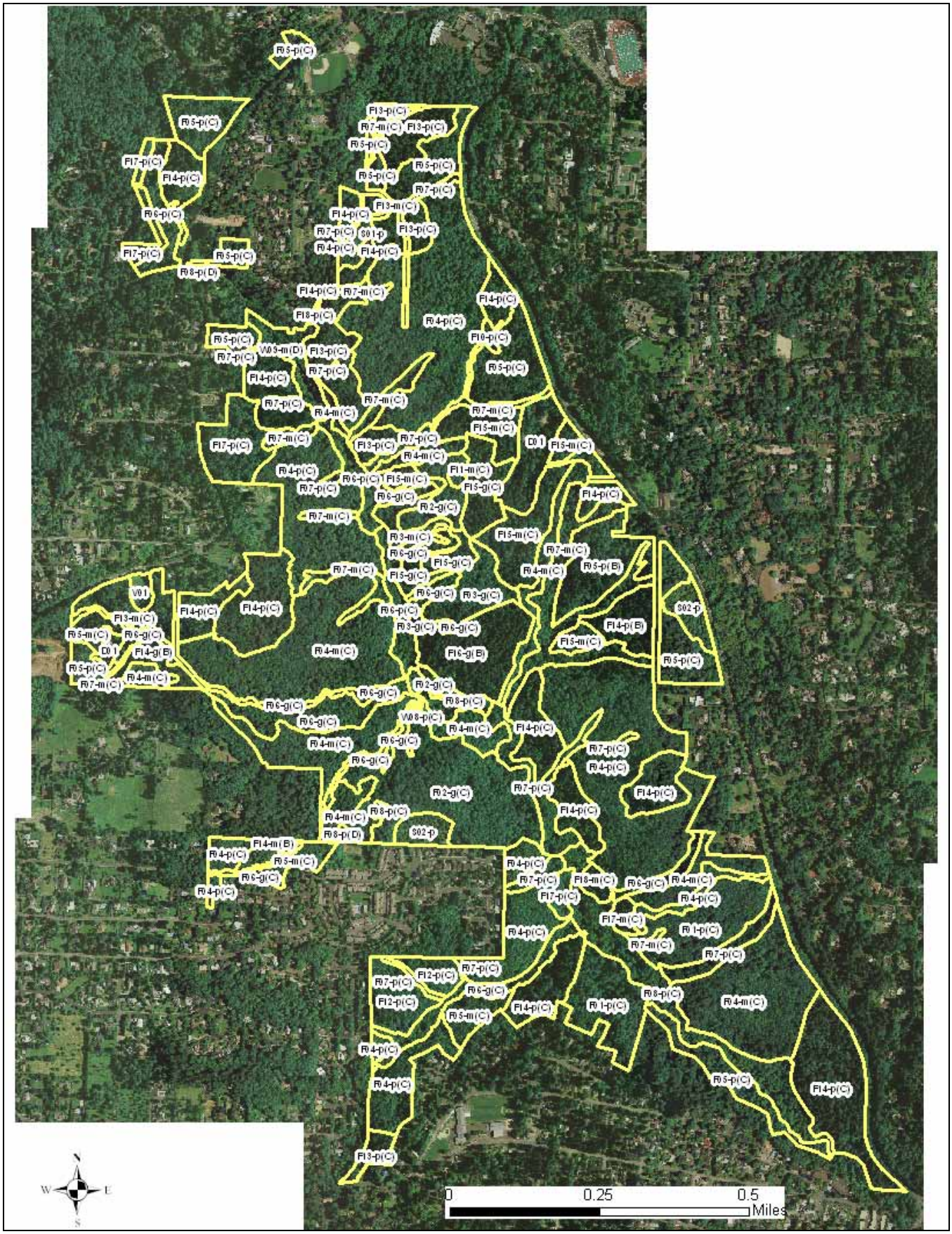


Figure 7. Map depicting the layout of the 143 digitized vegetation community polygons within the park.

Table 1. Table showing how the 21 Existing Vegetation Classes relate to the OPRD codes and the Published Equivalent Plant Associations (see Appendix D for definitions of conservation ranks).

OPRD Code	Existing Vegetation Community Class	Published Equivalent Plant Association	Rank
F01	ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN	ACEMAC-PSEMEN/ACECIR/POLMUN (Kagan, 2004)	~G4S4
F02	ACEMAC-ALNRUB-PSEMEN/mixed shrub-MAHNER/POLMUN	ACEMAC-PSEMEN/ACECIR/POLMUN (Kagan, 2004)	~G4S4
F03	ACEMAC-ALNRUB-THUPLI/mixed shrub/POLMUN	ACEMAC-THUPLI/OEMCER (Kagan, 2004)	~G2SU
F04	ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN	ACEMAC-THUPLI/OEMCER (Kagan, 2004)	~G2SU
F05	ACEMAC-mixed conifer-(ALNRUB)/mixed shrub-HEDHEL/POLMUN	ACEMAC-PSEMEN/ACECIR/POLMUN (Kagan, 2004)	~G4S4
F06	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	ALNRUB/RUBSPE (Kagan, 2004) and ACECIR/ATHFIL-TOLMEN (Kagan 2004)	~G5S4
F07	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	ALNRUB/RUBSPE (Kagan, 2004) and ACECIR/ATHFIL-TOLMEN (Kagan 2004)	~G5S4
F08 or W08	ALNRUB/RUBARM-(RUBSPE-mixed shrub)/URTDIO-(PHAARU-ATHFIL)	ALNRUB/RUBSPE (Kagan, 2004) and ACECIR/ATHFIL-TOLMEN (Kagan 2004)	~G5S4
W09	ALNRUB/RUBSPE-SAMRAC/BROVUL-RANREP-URTDIO	ALNRUB/RUBSPE (Kagan, 2004) and ACECIR/ATHFIL-TOLMEN (Kagan 2004)	~G5S4
F10	FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN	FRALAT-POPBALT/ACECIR (Kagan, 2004)	~G3S3
F11	FRALAT-ACEMAC-THUPLI/RUBURS-VIBEDU-SPIDOU/TOLMEN-CARDEW-URTDIO	FRALAT/SPIDOU (Kagan, 2004)	~G3S3
F12	POPBALT-ALNRUB-ACEMAC/mixed shrub-HEDHEL/POLMUN	ACEMAC-THUPLI/OEMCER (Kagan, 2004)	~G2SU
F13	PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN	THUPLI-TSUHET/MAHNER (Kagan, 2004)	~G3S1
F14	PSEMEN-ACEMAC-THUPLI/mixed shrub-HEDHEL/POLMUN	THUPLI-TSUHET/CORCOR/POLMUN (Kagan, 2004)	~G2S1
F15	PSEMEN-ACEMAC-THUPLI/mixed shrub-MAHNER/POLMUN	THUPLI-TSUHET/MAHNER (Kagan, 2004)	~G3S1
F16	PSEMEN-TSUHET/ACECIR-CORCOR-MAHNER/POLMUN	THUPLI-TSUHET/MAHNER (Kagan, 2004)	~G3S1
F17	THUPLI-ACEMAC-ALNRUB/mixed shrub-HEDHEL-(RUBARM)/POLMUN	THUPLI-TSUHET/CORCOR/POLMUN (Kagan, 2004)	~G2S1
F18	THUPLI-ALNRUB-ACEMAC/RUBSPE-(HEDHEL)/ATHFIL-URTDIO-TOLMEN	THUPLI-(ALNRUB)/RUBSPE/OXAORE (Kagan, 2004)	~G3S2
S01	SALSIT-HEDHEL-RUBARM	SALSIT (Kagan, 2004)	~G4S4
S02	CRAMON/HEDHEL-RUBURS-ILEAQU/POLMUN-POAPRA	NONE	
V01 or D01	Developed/Disturbed	NONE	

Of course, not all of the 21 existing vegetation communities or 10 published plant association classes are equally common over the park's landscape. Summarizing the area of polygons containing identical existing vegetation classes as the dominant community type in the polygon yields insights as to the abundance of each vegetation community across the park's landscape (Table 2). Similarly, summarizing the area of polygons containing identical published plant association classes as the dominant association in the polygon is also revealing (Table 3).

Table 2. Table illustrating the summation of the amount of area and number of polygons each existing plant community class possesses as the dominant existing plant community type in a polygon.

OPRD_CODE	Existing Vegetation Community Class	Acres	Polygons	Percent of Area
F01	ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN	22.74	2	4%
F02	ACEMAC-ALNRUB-PSEMEN/mixed shrub-MAHNER/POLMUN	32.94	3	5%
F03	ACEMAC-ALNRUB-THUPLI/mixed shrub/POLMUN	12.51	4	2%
F04	ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN	203.53	21	32%
F05	ACEMAC-mixed conifer-(ALNRUB)/mixed shrub-HEDHEL/POLMUN	61.62	15	10%
F06	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	37.27	16	6%
F07	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	39.33	23	6%
F08 or W08	ALNRUB/RUBARM-(RUBSPE-mixed shrub)/URTDIO-(PHAARU-ATHFIL)	19.44	6	3%
W09	ALNRUB/RUBSPE-SAMRAC/BROVUL-RANREP-URTDIO	4.98	1	1%
F10	FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN	0.67	1	0%
F11	FRALAT-ACEMAC-THUPLI/RUBURS-VIBEDU-SPIDOU/TOLMEN-CARDEW-URTDIO	0.39	1	0%
F12	POPBALT-ALNRUB-ACEMAC/mixed shrub-HEDHEL/POLMUN	8.91	2	1%
F13	PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN	27.73	8	4%
F14	PSEMEN-ACEMAC-THUPLI/mixed shrub-HEDHEL/POLMUN	83.07	18	13%
F15	PSEMEN-ACEMAC-THUPLI/mixed shrub-MAHNER/POLMUN	28.60	8	5%
F16	PSEMEN-TSUHET/ACECIR-CORCOR-MAHNER/POLMUN	12.78	1	2%
F17	THUPLI-ACEMAC-ALNRUB/mixed shrub-HEDHEL-(RUBARM)/POLMUN	13.26	5	2%
F18	THUPLI-ALNRUB-ACEMAC/RUBSPE-(HEDHEL)/ATHFIL-URTDIO-TOLMEN	1.66	2	0%
S01	SALSIT-HEDHEL-RUBARM	0.41	1	0%
S02	CRAMON/HEDHEL-RUBURS-ILEAQU/POLMUN-POAPRA	6.05	2	1%
V01 or D01	Developed/Disturbed	10.97	3	2%

Table 3. Table illustrating the summation of the amount of area and number of polygons each published plant association class possesses as the dominant plant association of a polygon

Published Plant Association	Acres	Polygons	Percent of Area
ACEMAC-PSEMEN/ACECIR/POLMUN (Kagan, 2004)	117.29	20	19%
ACEMAC-THUPLI/OEMCER (Kagan, 2004)	224.94	27	36%
ALNRUB/RUBSPE (Kagan, 2004)	101.02	46	16%
FRALAT/SPIDOU (Kagan, 2004)	0.39	1	0%
FRALAT-POPBALT/ACECIR (Kagan, 2004)	0.67	1	0%
NONE	17.03	5	3%
SALSIT (Kagan, 2004)	0.41	1	0%
THUPLI-(ALNRUB)/RUBSPE/OXAORE (Kagan, 2004)	1.66	2	0%
THUPLI-TSUHET/CORCOR/POLMUN (Kagan, 2004)	96.33	23	15%
THUPLI-TSUHET/MAHNER (Kagan, 2004)	69.3	17	11%

From these two tables it becomes apparent that the ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN forest community and the ACEMAC-PSEMEN/ACECIR/POLMUN and ACEMAC-THUPLI/OEMCER plant associations are vastly more abundant across the park's landscape than the other vegetation classes. Similarly, these tables tell us that four existing vegetation community classes and four published plant association classes are each limited to less than 1% of the park's landscape as matrix community types. These tables are spatially expressed in the following maps (Figures 8 – 10).

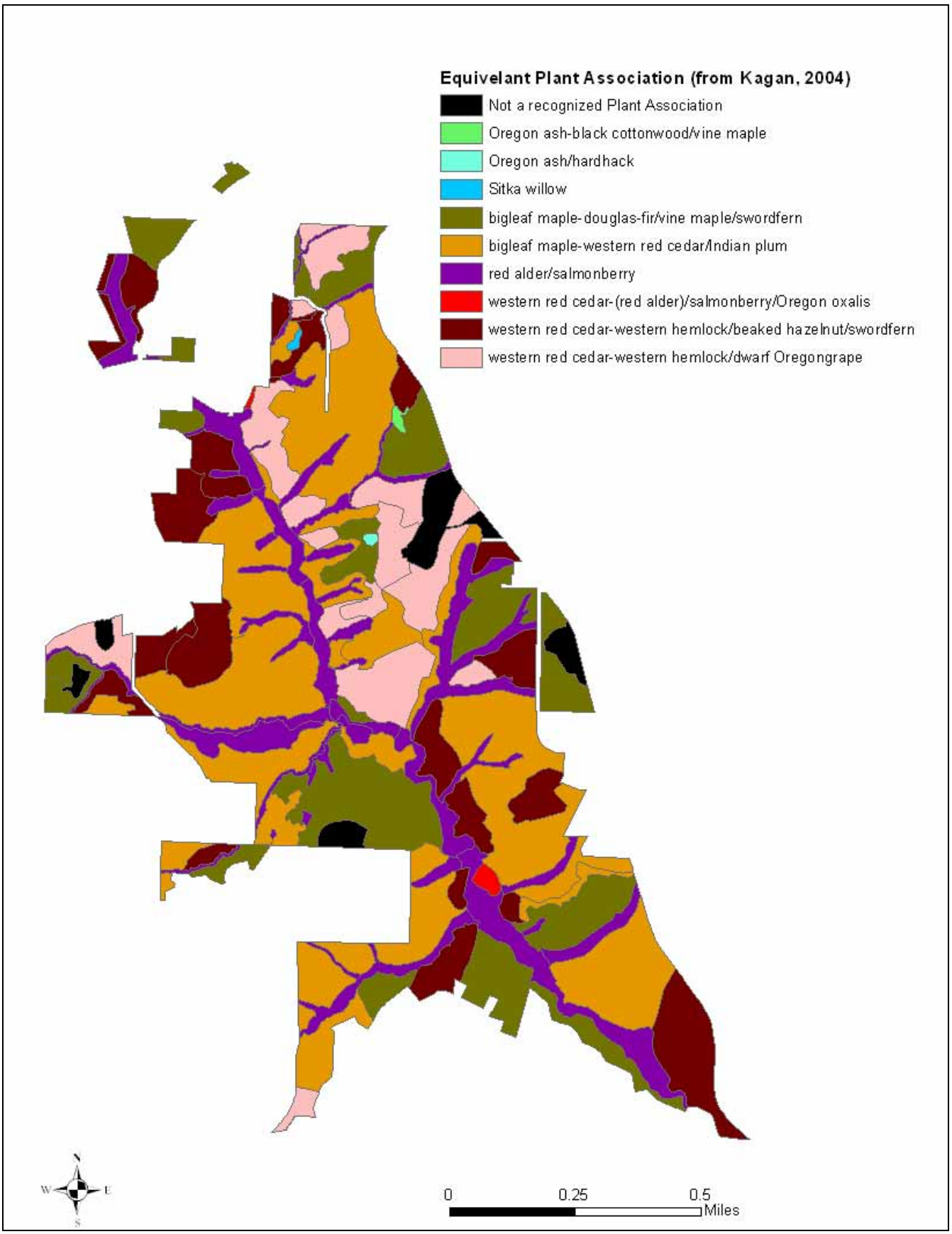


Figure 8. Map depicting layout of the matrix published plant association class for each polygon.

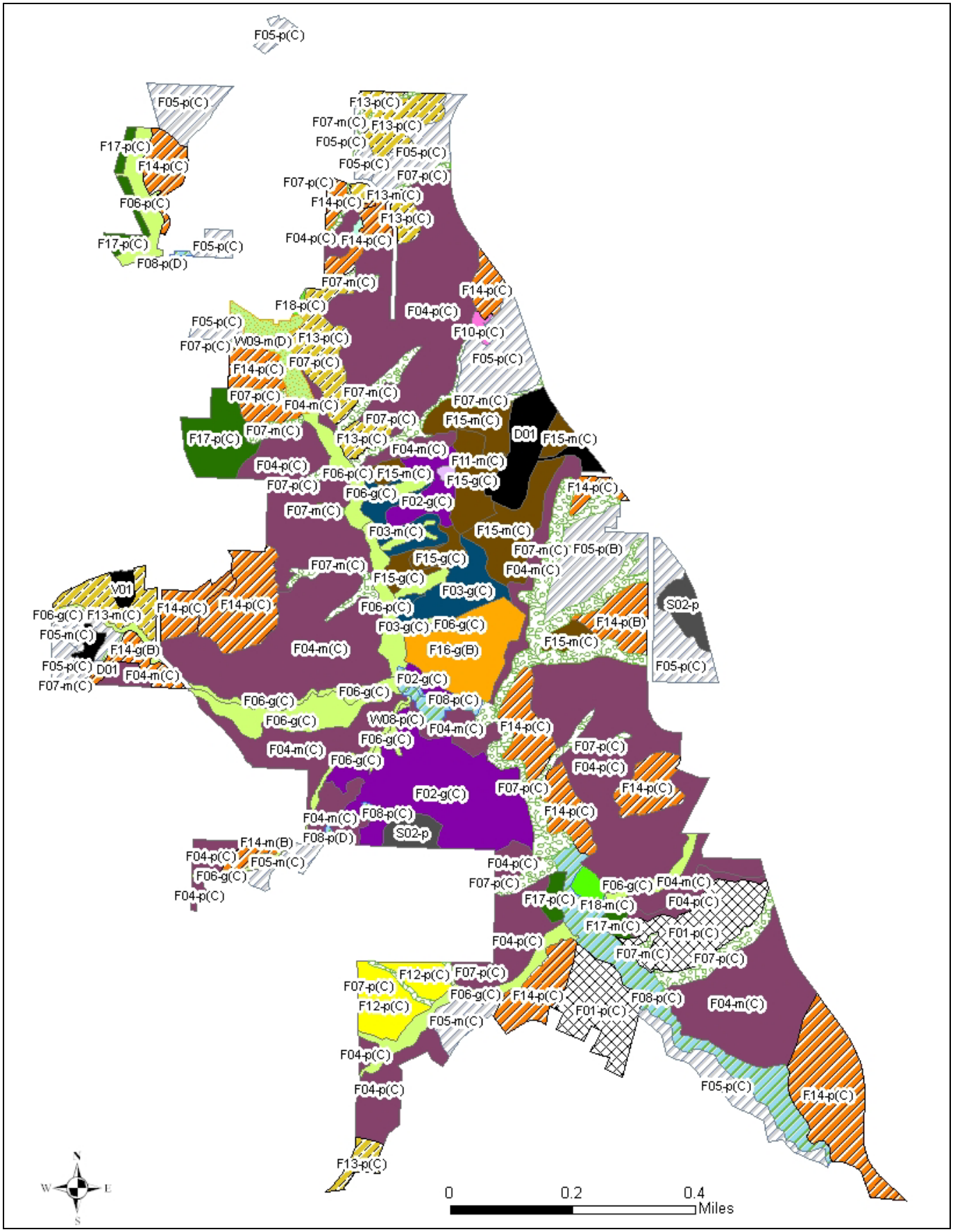


Figure 9. Map depicting the layout of the matrix existing vegetation community class for each polygon.

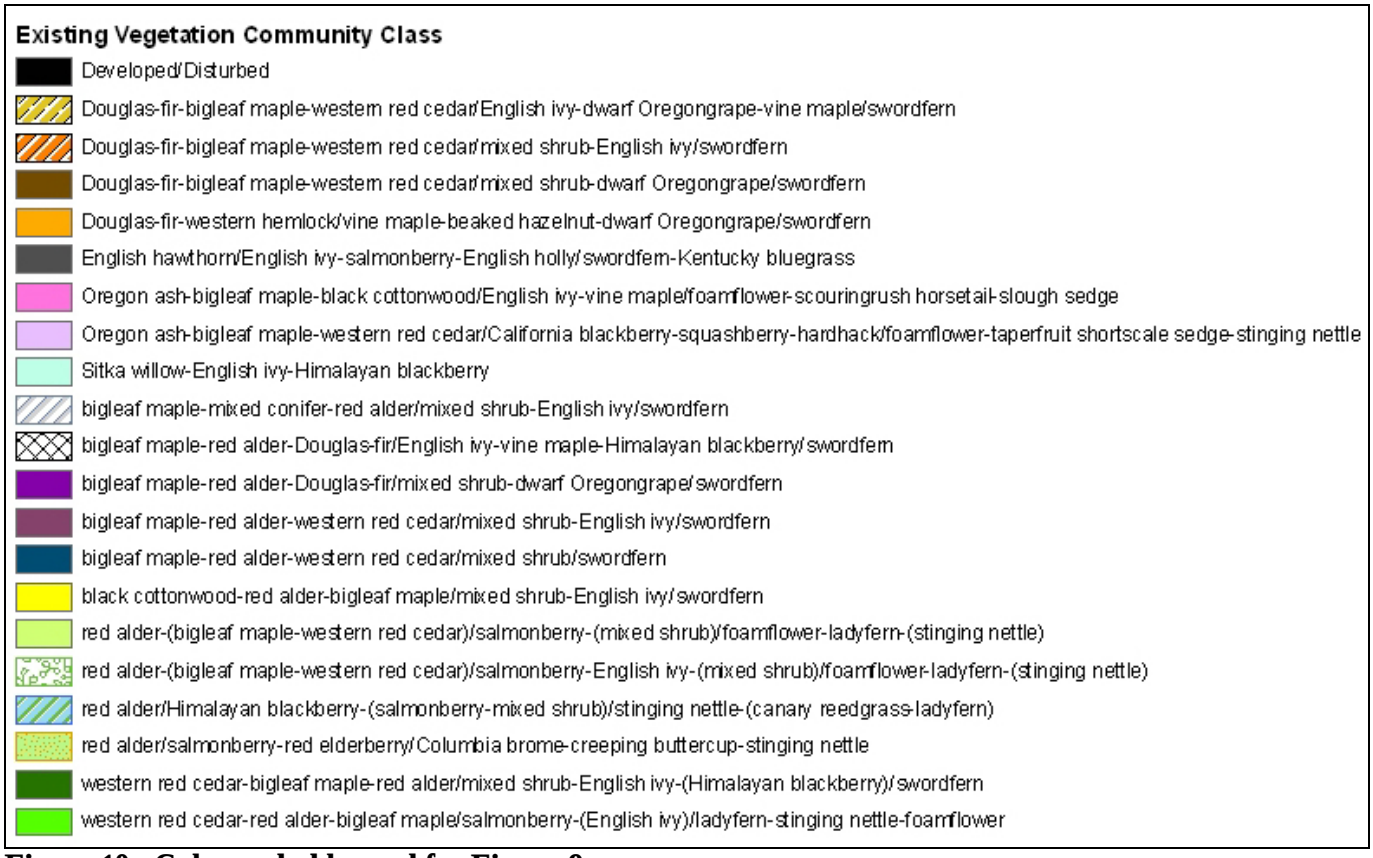


Figure 10. Color coded legend for Figure 9.

Apart from collecting data on vegetation community composition and plant association relationships, we also collected data on the overall condition of each polygon as it relates to the occurrence and abundance of exotic plants, vegetation disturbances, and naturally occurring native plant diversity. The following Table 4 and Figure 11 detail the abundance of each condition ranking in terms of overall condition of the matrix community (most poor and marginal polygon rankings were due to high abundance of English Ivy [*Hedera helix*]).

Table 4. Table illustrating the summation of the amount of area and number of polygons for each condition class.

Condition Class	Acres	Polygons	Percent of Area
Good	91.96	23	15%
Marginal	156.57	37	25%
Poor	370.62	81	59%
Developed	9.71	2	2%

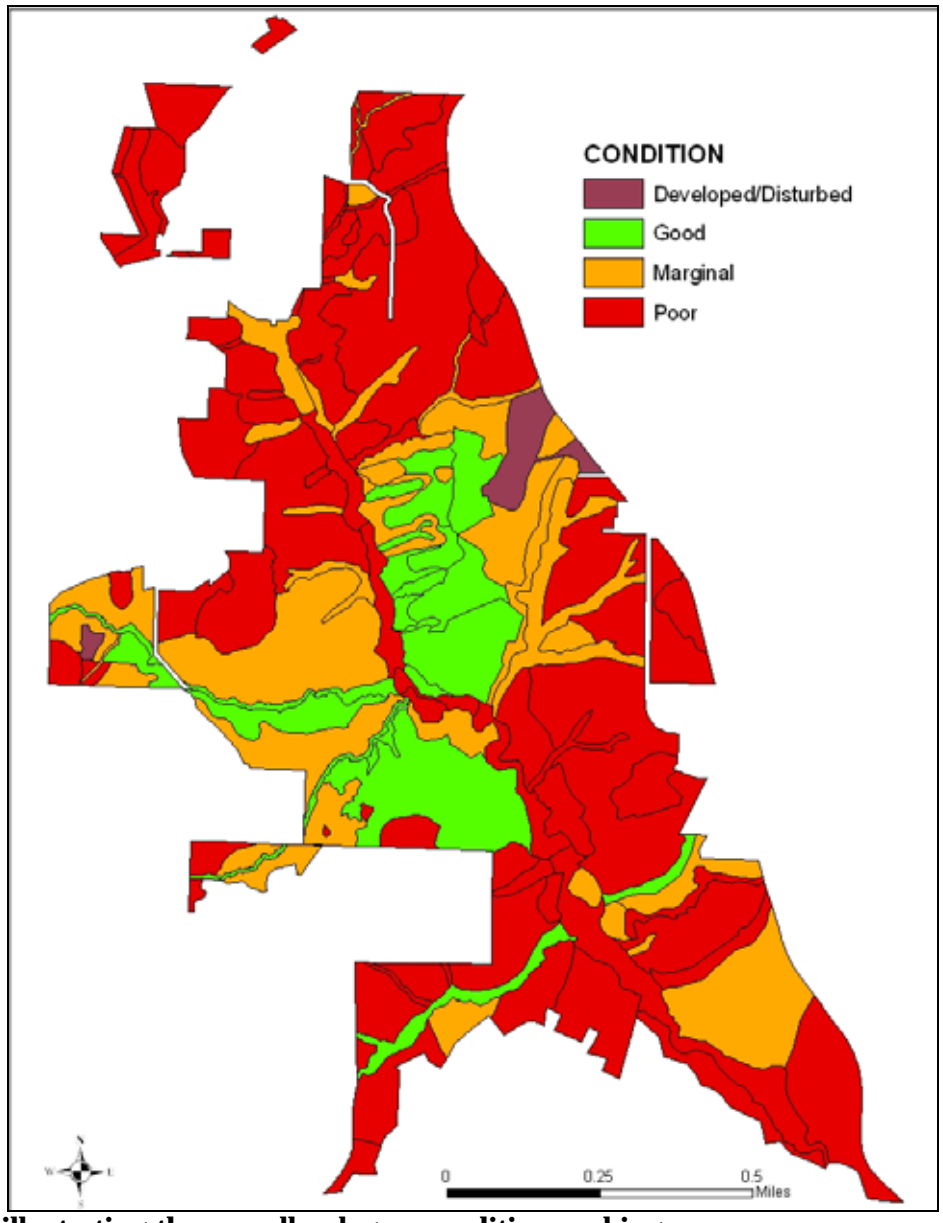


Figure 11. Map illustrating the overall polygon condition rankings.

Much of Tryon Creek State Natural Area is currently ranked as being in poor condition, and around one quarter of the park is in marginal condition, mostly due to large-scale infestations of exotic plants. In Figure 8 it is apparent that the best vegetation community conditions are located in the center of the park away from the park's property boundaries. Intensive restoration activities by civic volunteers have helped to control exotic plant cover in some of the polygons listed as being in good or moderate condition.

Taking into account the overall polygon condition ranks, the presence of wetland communities, the associated conservation ranks of all communities attributed within a polygon, and the ageclass of forested and woodland polygons, we used the Plant Community Suitability Ratings reference matrices provided in the Statement of Work to produce suitability ratings for each polygon. The following Table 5 and Figure 12 illustrate the resulting distribution of suitability rankings by polygon.

Table 5. Table illustrating the summation of the amount of area and number of polygons for each plant community suitability rank.

Plant Community Suitability Rank	Acres	Polygons	Percent of Area
2	186.54	65	30%
3	251.41	46	40%
4	190.91	32	30%

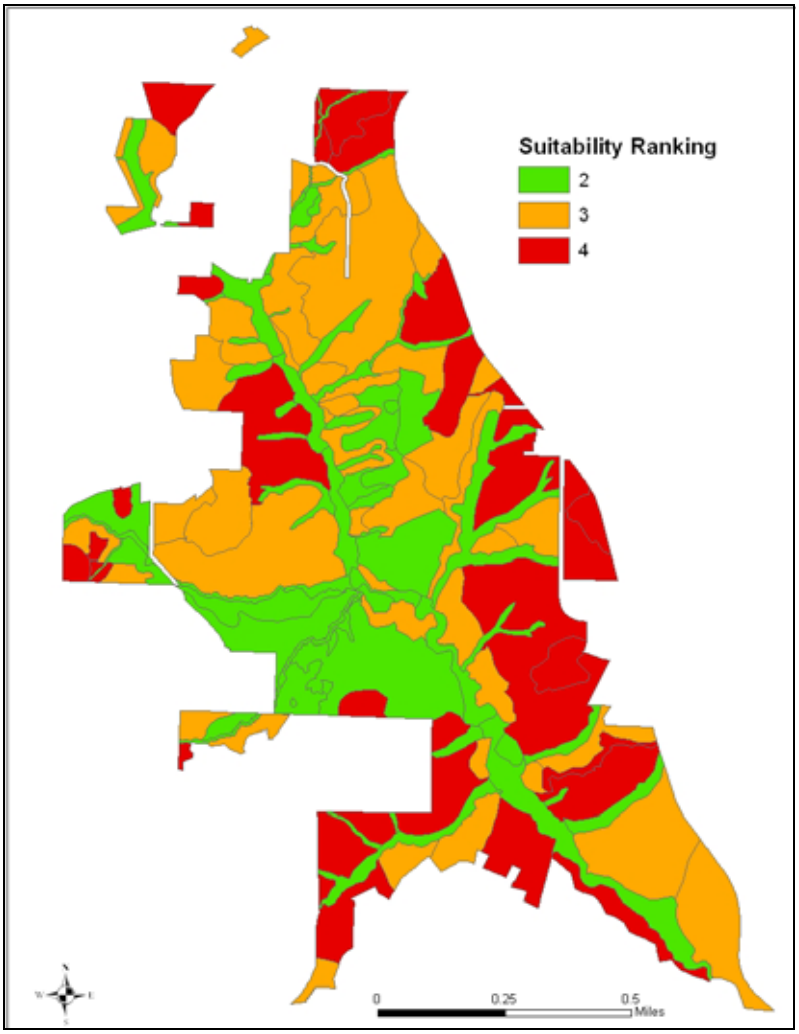


Figure 12. Map of the resulting plant community suitability ranks for each polygon.

Descriptions of Existing Vegetation Communities

F01: bigleaf maple - red alder - Douglas-fir / English ivy – vine maple – Himalayan blackberry / swordfern
ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN ~G4S4

This community is a variant of the ACEMAC-PSEMEN/ACECIR/POLMUN plant association. Its rarity ranking is based on the ranking of that association. Only two polygons in the southern section of the park were attributed as this community in the park. Bigleaf maple is a canopy dominant with a consistent occurrence of red alder. Douglas-fir also occurs with some regularity and with greater abundance in smaller patches. The understory is dominated by English ivy and swordfern, although other shrubs do occur with some abundance. Vine maple is a native common shrub, as well as beaked hazelnut. Himalayan blackberry occurs in frequent patches throughout both polygons. Although no designated trails exist within either polygon, non-designated trails do penetrate both polygons. Both polygons are listed as mid-aged forests. As is indicated by the name of this community, exotic plant presence is high thus both polygons are ranked as being in poor condition.

F02: bigleaf maple - red alder - Douglas-fir / mixed shrub – dwarf Oregongrape / swordfern
ACEMAC-ALNRUB-PSEMEN/mixed shrub-MAHNER/POLMUN ~G4S4

This community is a variant of the ACEMAC-PSEMEN/ACECIR/POLMUN plant association. Its rarity ranking is based on the ranking of that association. Three polygons were attributed with this community in the park. Bigleaf maple is a canopy dominant with a consistent occurrence of red alder. Douglas-fir also occurs with some regularity and with greater abundance in smaller patches. Shrub diversity is high in these polygons with vine maple, beaked hazelnut, and salmonberry all occurring with similar abundance and frequency. Western burning-bush is another common shrub component in this community. Dwarf Oregongrape is a unique commonly occurring shrub component that separates this community from other similar forest patches. Exotic plant cover is low in these polygons, although small amounts of English ivy occur in all of them. Some restoration work has been conducted to control ivy climbing trees in each of these polygons. Some small patches of wetland soils occur within two of the polygons and besides the herbaceous dominance of swordfern some facultative wetland herbs such as foamflower and stinging nettle occur in these patches. Designated hiking trails occur within each polygon.

F03: bigleaf maple - red alder – western red cedar / mixed shrub / swordfern
ACEMAC-ALNRUB-THUPLI/mixed shrub/POLMUN ~G2SU

This community is a variant of the ACEMAC-THUPLI/OEMCER plant association. Its rarity ranking is based on the ranking of that association. Four polygons were attributed with this community as a matrix community in the park, while six polygons had this community listed as an inclusive patch community. Where it was included as a patch community it was typically associated with wetland influenced varieties of the ALNRUB/RUBSPE forest type. Most of the polygons this community is associated with are located within steep-sided ravines or hillsides where the toe slopes contain wetland soils. Bigleaf maple is a canopy dominant with a consistent occurrence of red alder. Young western red cedar commonly occurs within the polygon. The shrub component is highly diverse, and typically shrub cover is thick. Indian plum, vine maple,

salmonberry, and elderberry commonly occur with similar abundance and frequency. Western burning-bush is occasionally a common shrub component in this community. Swordfern is the dominant herbaceous component, although stinging nettle can occur with high frequency. Exotic plant cover is low in these polygons, although small amounts of English ivy occur in all of them. Some restoration work has been conducted to control ivy climbing trees in each of these polygons. Depending on the amount of ivy present, and the amount of restoration activities controlling ivy infestations, these polygons range from condition ranks of good to moderate.

F04: bigleaf maple - red alder – western red cedar / mixed shrub – English ivy / swordfern
ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN ~G2SU

This community is a variant of the ACEMAC-THUPLI/OEMCER plant association. Its rarity ranking is based on the ranking of that association. Twenty-one polygons were attributed with this community as a matrix community in the park, while eighteen polygons had this community listed as an inclusive patch community. Summing the area of polygons for which this community is a matrix community reveals that one-third of the park's landscape is made up of this community type, and perhaps greater. Its distribution spreads over the entire park. Bigleaf maple is a canopy dominant with a consistent occurrence of red alder. Young to mid-aged western red cedar commonly occurs within the polygons. Other species of conifer, such as Douglas-fir, grand fir, and western hemlock may occur in small patches. Although similar in shrub composition to ACEMAC-ALNRUB-THUPLI/mixed shrub/POLMUN, high amounts of cover and occurrence of English ivy distinguish this community from other types. The abundance of English ivy, as well as many other commonly occurring exotic shrubs such as English holly and Himalayan blackberry provide polygons of this community with a condition ranking of poor to marginal.

F05: bigleaf maple – mixed conifer - red alder / mixed shrub – English ivy / swordfern
ACEMAC-mixed conifer-(ALNRUB)/mixed shrub-HEDHEL/POLMUN ~G4S4

This community is a variant of the ACEMAC-PSEMEN/ACECIR/POLMUN plant association. Its rarity ranking is based on the ranking of that association. While bigleaf maple is a consistent canopy dominant in this community, the high diversity and abundance of other conifers such as Douglas-fir, western red cedar, western hemlock, and grand fir distinguish this community from the more deciduous dominated forest types such as ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN. Shrub composition is similar to that community however, and like that community the abundance of English ivy is an important distinguishing characteristic of this community class. Fifteen polygons are attributed with this community class as a matrix community, and it occurs as a secondary patch community in one other polygon. While widely distributed across the park's landscape, all patches of this community occur along the park's outer boundaries where exotic plant infestations tend to be the worst. All polygons with this community class are ranked as poor or marginal condition, with a majority of polygons ranked as poor.

F06: red alder – (bigleaf maple – western red cedar) / salmonberry – (mixed shrub) / foamflower – ladyfern – (stinging nettle)
ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) ~G5S4

This community is a variant of the ALNRUB-RUBSPE and ACECIR/ATHFIL-TOLMEN plant associations. Its rarity ranking is based on the rankings of those communities. This community class actually encompasses a mosaic of upland, wetland, and riparian communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. It occurs in and near the bottoms of many of the park's large ravines, and within the

Tryon Creek riparian area. Red alder is the canopy dominant, while bigleaf maple and young to mid-aged western red cedar may occur mixed into the canopy. The three polygons depicting riparian areas of Tryon Creek in this vegetation class are different than the other ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) communities in that there is almost only red alder in the tree canopy and there is a high abundance of exotic plants due to human disturbances of the riparian areas, including sewer / stormwater infrastructure and road culverts. These three polygons are listed as being in poor condition but it should be noted that intensive restoration efforts are being made here including cutting back of invasive species and planting native trees and shrubs. The other polygons are listed as being in good condition and do not suffer from the same degree of exotic species infestations. Sixteen polygons are attributed with this community class as a matrix community, and four polygons contain it as a secondary community. Thick patches of salmonberry and vine maple are constantly occurring in both the upland and riparian/wetland patches of the mosaic. Foamflower, ladyfern and sometimes stinging nettle also occur in both the upland and riparian/wetland patches of the mosaic. Western burning bush is frequently found in this community type.

F07: red alder – (bigleaf maple – western red cedar) / salmonberry – English ivy - (mixed shrub) / foamflower – ladyfern – (stinging nettle)
ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) ~G5S4

This community is a variant of the ALNRUB-RUBSPE and ACECIR/ATHFIL-TOLMEN plant associations. Its rarity ranking is based on the rankings of those communities. It is almost identical to the ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) community in terms of topographical location and species composition except that English ivy becomes a major shrub component of this community. This community type encompasses many of the smaller ravine bottoms where wetland soil patches are more narrow and constricted and English ivy can successfully invade from the adjacent upland patches. All patches of this community class are listed as being in poor or marginal condition. There are twenty-three polygons attributed with this community class as a matrix community, and two polygons contain it as a secondary community. Western burning bush is frequently found in this community type.

F08 and W08: red alder / Himalayan blackberry – (salmonberry – mixed shrub) / stinging nettle – (canary reedgrass – ladyfern)
ALNRUB/RUBARM-(RUBSPE-mixed shrub)/URTDIO-(PHAARU-ATHFIL) ~G5S4

This community is a variant of the ALNRUB-RUBSPE and ACECIR/ATHFIL-TOLMEN plant associations. Its rarity ranking is based on the rankings of those communities. This community class actually encompasses a mosaic of upland, wetland, and riparian communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. It mostly occurs in the Tryon Creek riparian area, although a few swampy wetlands on the westside of the park are also included in this community class. There are five polygons attributed with this community class as a matrix community, and two polygons contain it as a secondary community. Red alder is the only tree with significant abundance, and the shrub layer has large amounts of Himalayan blackberry infestations. Other shrubs such as salmonberry and red elderberry will commonly occur, and the herbaceous component can be diverse although stinging nettle is typically well represented. In the Tryon Creek riparian area polygons of this vegetation class have high amounts of cover by canary reedgrass. All polygons in which this community class is a matrix community are ranked as being in poor condition.

W09: red alder / salmonberry – red elderberry / Columbia brome – creeping buttercup – stinging nettle
ALNRUB/RUBSPE-SAMRAC/BROVUL-RANREP-URTDIO ~G5S4

This community is a variant of the ALNRUB-RUBSPE and ACECIR/ATHFIL-TOLMEN plant associations. Its rarity ranking is based on the rankings of those communities. This community class actually encompasses a mosaic of upland, wetland, and riparian communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. Only one polygon is mapped as this community type. This polygon is located on the north end of the park around the riparian area where Tryon Creek enters the park boundary. A large-scale restoration project is underway in this area that is dramatically impacting the existing vegetation composition. In this area the red alder canopy is more open, resulting in woodland habitat designation. Salmonberry and red elderberry occur as the dominant shrubs in sporadic clumps and patches throughout the polygon with Columbia brome, creeping buttercup, and stinging nettle consistently dominating the thick herbaceous layer. It appears that restoration efforts have virtually dug up large sections of vegetation in this area and re-seeded or re-planted the affected sites with native species. While this effort has reduced the exotic species abundance, the abundance of creeping buttercup and small resilient patches of Japanese knotweed, poison hemlock, and Himalayan blackberry have resulted in this polygons getting ranked as marginal condition.

F10: Oregon ash – bigleaf maple – black cottonwood / English ivy – vine maple / foamflower – scouringrush horsetail – slough sedge
FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN ~G3S3

This community is a variant of the FRALAT-POPBALT/ACECIR plant association. Its rarity ranking is based on the ranking of that association. This community class actually encompasses a mosaic of upland and wetland communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. Only one polygon is mapped as this community type. It occurs as a small patch in the northeast section of the park on a low gradient slope just above the start of a ravine. Within the polygon multiple small patches of Oregon ash with an understory of foamflower, scouringrush horsetail, and slough sedge (and English ivy) mosaic with an upland matrix of bigleaf maple with English ivy and vine maple understory. Large black cottonwoods occur in this area as well. Because of the abundance of English ivy this polygon was ranked as poor condition. One of the park's trails currently passes through the north and eastern edge of this wetland mosaic.

F11: Oregon ash – bigleaf maple – western red cedar / California blackberry - squashberry – hardhack / foamflower – taperfruit shortscale sedge – stinging nettle
FRALAT-ACEMAC-THUPLI/RUBURS-VIBEDU-SPIDOU/TOLMEN-CARDEW-URTDIO ~G3S3

This community is a variant of the FRALAT/SPIDOU plant association. Its rarity ranking is based on the ranking of that association. This community class actually encompasses a mosaic of upland and wetland communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. As with the FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN community, only one polygon is mapped as this community type in the park, and it occurs as a small patch on a low gradient slope just above the start of a ravine. However, the species composition of this community is

much different than the FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN community. Within the polygon a matrix of Oregon ash with a general understory of California blackberry, taperfruit shortscale sedge, and stinging nettle is occasionally interrupted by thick small patches of squashberry and hardhack. One very small clump of slough sedge also exists within the polygon. An abundance of Robert geranium and some small clumps of English ivy forced this polygon to be ranked as marginal condition.

F12: black cottonwood – red alder – bigleaf maple / mixed shrub – English ivy / swordfern
POPBALT-ALNRUB-ACEMAC/mixed shrub-HEDHEL/POLMUN ~G2SU

This community is a variant of the ACEMAC-THUPLI/OEMCER plant association. Its rarity ranking is based on the ranking of that association. Only two polygons in the southwest section of the park were described as this vegetation community. In both polygons large black cottonwoods tower over the mostly mixed deciduous forest canopy that includes some small patches of young to mid-aged western red cedar. Shrub composition is diverse with equal abundance of Indian plum, vine maple, and salmonberry. Abundant English ivy and some extensive patches of Himalayan blackberry exist in both polygons and resulted in condition rankings of poor. Swordfern is the dominant herbaceous cover but grows in well-spaced patches.

F13: Douglas-fir – bigleaf maple – western red cedar / English ivy – dwarf Oregongrape – vine maple / swordfern
PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN ~G3S1

This community is a variant of the THUPLI-TSUHET/MAHNER plant association. Its rarity ranking is based on the ranking of that association. Eight polygons are attributed with this community class as a matrix community, and one polygon contains it as a secondary community. Most of the polygons are located in north section of the park, east of Tryon Creek. Douglas-fir is a canopy dominant in these polygons, although bigleaf maple is consistently present and a young cohort of western red cedar exists in the forest understory. Shrub diversity is high in these stands, but the collective abundance of three particular shrubs (English ivy, dwarf Oregongrape, and vine maple) separates these forest patches from other similar forest types. Swordfern is the dominant herbaceous cover. Due to the large abundance of English ivy in these forest patches these polygons were ranked as poor to marginal condition.

F14: Douglas-fir – bigleaf maple – western red cedar / mixed shrub - English ivy / swordfern
PSEMEN-ACEMAC-THUPLI/mixed shrub-HEDHEL/POLMUN ~G2S1

This community is a variant of the THUPLI-TSUHET/CORCOR/POLMUN plant association. Its rarity ranking is based on the ranking of that association. Eighteen polygons are attributed with this community class as a matrix community, and three polygons contain it as a secondary patch community. This community class is the second most dominant type in the park consisting of at least 13% of the park's area. It is well distributed throughout the park's landscape. Douglas-fir is a canopy dominant in these polygons, although bigleaf maple is consistently present and a young cohort of western red cedar and western hemlock exists in the forest understory. Shrub diversity is high in these stands with vine maple, beaked hazelnut, and Indian plum the dominant shrubs besides English ivy, which occurs at pandemic levels in each of these polygons. Large infestations of Himalayan blackberry and English holly also occur within many of these polygons, and in some cases evergreen clematis occurs. Almost of these polygons are listed as being in poor condition, a few are marginal. Swordfern is the dominant herbaceous cover. Little to no restoration activities are currently occurring in these polygons.

F15: Douglas-fir – bigleaf maple – western red cedar / mixed shrub – dwarf Oregongrape / swordfern
PSEMEN-ACEMAC-THUPLI/mixed shrub-MAHNER/POLMUN ~G3S1

This community is a variant of the THUPLI-TSUHET/MAHNER plant association. Its rarity ranking is based on the ranking of that association. Seven polygons are attributed with this community class as a matrix community, and one polygon contains it as a secondary community. Most of the polygons are located near the visitor center or between there and Tryon Creek. This is the area that is receiving a bulk of the upland forest restoration activities that includes ivy pulling and cutting. This community is almost identical in composition to the PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN community, except that it lacks the major English ivy component due to restoration efforts. Without restoration it should be assumed that these polygons would quickly move to resemble the PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN community. Because of restoration efforts these polygons have been ranked as good to marginal condition, the marginal ranking being derived from the presence of other exotics like Robert geranium, wall lettuce, garlic mustard, and some residual English ivy. The park's major trail network services most of these polygons and their ease of access is one reason they've received a bulk of the restoration attention.

F16: Douglas-fir – western hemlock / vine maple – beaked hazelnut – dwarf Oregongrape / swordfern
PSEMEN-TSUHET/ACECIR-CORCOR-MAHNER/POLMUN ~G3S3

This community is a variant of the THUPLI-TSUHET/MAHNER plant association. Its rarity ranking is based on the ranking of that association. Only one polygon was attributed with this community class as a matrix community. This polygon is a large mature coniferous forest patch south of the visitor's center. This forest patch is unique because of its clear canopy dominance by conifers (with only small inclusions of deciduous trees), although it is compositionally similar to the PSEMEN-ACEMAC-THUPLI/mixed shrub-MAHNER/POLMUN community. This forest patch has more western hemlock however than that other forest type. Extensive restoration work is helping to maintain the dominance and abundance of native plants in this polygon. Although a small amount of residual English ivy can be found in the understory this polygon received a good condition rank. A large population of western burning bush can be found along the trail network in this polygon.

F17: western red cedar – bigleaf maple – red alder / mixed shrub – English ivy – (Himalayan blackberry) / swordfern
THUPLI-ACEMAC-ALNRUB/mixed shrub-HEDHEL-(RUBARM)/POLMUN ~G2S1

This community is a variant of the THUPLI-TSUHET/CORCOR/POLMUN plant association. Its rarity ranking is based on the ranking of that association. Five polygons were attributed with this community class as a matrix community, and it occurs as a secondary patch community in one other polygon. These patches are spread out across the park's landscape. Forests of this community class have an abundant composition of western red cedar mixed with bigleaf maple some red alder. A small amount of western hemlock is present in many of the polygons as well. A significant component of Douglas-fir is conspicuously lacking. Shrub composition in these stands is diverse, with salmonberry, vine maple, and Indian plum as common dominant native shrubs. One polygon in the south section of the park had a co-dominant cover of western burning bush. English ivy is abundant throughout each of these polygons, and the polygons in the north

section of the park had significant infestations of Himalayan blackberry as well. Because of the abundance of English ivy, and in some cases Himalayan blackberry, these polygons were ranked as poor or marginal condition with most in the poor category.

F18: western red cedar – red alder – bigleaf maple / salmonberry – (English ivy) / ladyfern – stinging nettle - foamflower
THUPLI-ALNRUB-ACEMAC/RUBSPE-(HEDHEL)/ATHFIL-URTDIO-TOLMEN ~G3S2

This community is a variant of the THUPLI-(ALNRUB)/RUBSPE/OXAORE plant association. Its rarity ranking is based on the ranking of that association. Two polygons were attributed with this community class as a matrix community, and it occurs as a secondary patch community in one other polygon. This community class actually encompasses a mosaic of upland, wetland, and riparian communities that are not easily separated due to the continuation of the same facultative wetland plants across the different soil types. This community type is very similar to the ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) community, except there is a clear dominance of western red cedar in the forest canopy versus the deciduous trees. It exists in small swampy patches in zones of riparian influence along some of the major creeks in the park. Its occurrence and distribution is currently minor, but as the younger western red cedars in the ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO) community grow and become more dominant in the upper canopy these areas may come to resemble more of the THUPLI-ALNRUB-ACEMAC/RUBSPE-(HEDHEL)/ATHFIL-URTDIO-TOLMEN community. The abundance of English ivy in the two polygons where this community is the matrix community forced condition rankings of poor and marginal. Where this community is included as a secondary patch community it is ranked as good condition.

S01: Sitka willow – English ivy – Himalayan blackberry
SALSIT-HEDHEL-RUBARM ~G4S4

This community is a variant of the SALSIT plant association. Its rarity ranking is based on the ranking of that association. Only one polygon was attributed with this community class as a matrix community. It occurs in a small swampy depression in the northeast section of the park. A thick patch of Sitka willow denotes the location of the swamp, but thick cover by English ivy and Himalayan blackberry obscure the soil surface and force this polygon into a poor condition rating. Some patches of English hawthorn also abound in this polygon.

S02: English hawthorn / English ivy – salmonberry – English holly / swordfern – Kentucky bluegrass
CRAMON/HEDHEL-RUBURS-ILEAQU/POLMUN-POAPRA

This community has no published equivalent plant association. It is made up of mostly exotic plants that have recolonized a site after severe disturbance. It occurs in two polygons in the park, one on the east border of the park and one on the west border. It is possible that these sites were old home sites and yards or old pastures. The polygon on the west side of the park is maintained more as an open parkland with the mowed grasses between the clumps of hawthorn. On the east side of the park the exotic vegetation has been allowed to grow more wild. Both of these polygons were ranked as poor condition.

Vascular Plant Occurrence within the Project Area

166 species of vascular plants were identified within the project area during this project. This included 57 plant families, with the Rosaceae, Poaceae, and Asteraceae families making up 35% of the species total. 42% of the total vascular plant diversity is exotic plants. See Appendix A for the full species list.

At-risk Plants within the Project Area

Only one at-risk plant was located within the project area during the 2007 surveys.

***Euonymus occidentale* Nutt. ex Torr. - western burning bush - Celastraceae - G5S3**

Western burning bush (also known as western wahoo) is the only species of *Euonymus* that occurs naturally in the Pacific Northwest. It is associated with shaded, moist wooded draws and ravines on the west side of the Cascade Mountains. In Tryon Creek State Natural Area it is occurs in small shrubby patches within a diverse set of vegetation communities with a diversity of forest conditions. Patches were found within older conifer dominated stands with low exotic plant occurrence, while other patches were found in principally deciduous forest stands with massive amounts of exotic plant cover. It is not known how much western burning bush occurs outside of the natural area, but it should be assumed that the natural area is currently supplying important habitat to this at-risk species.

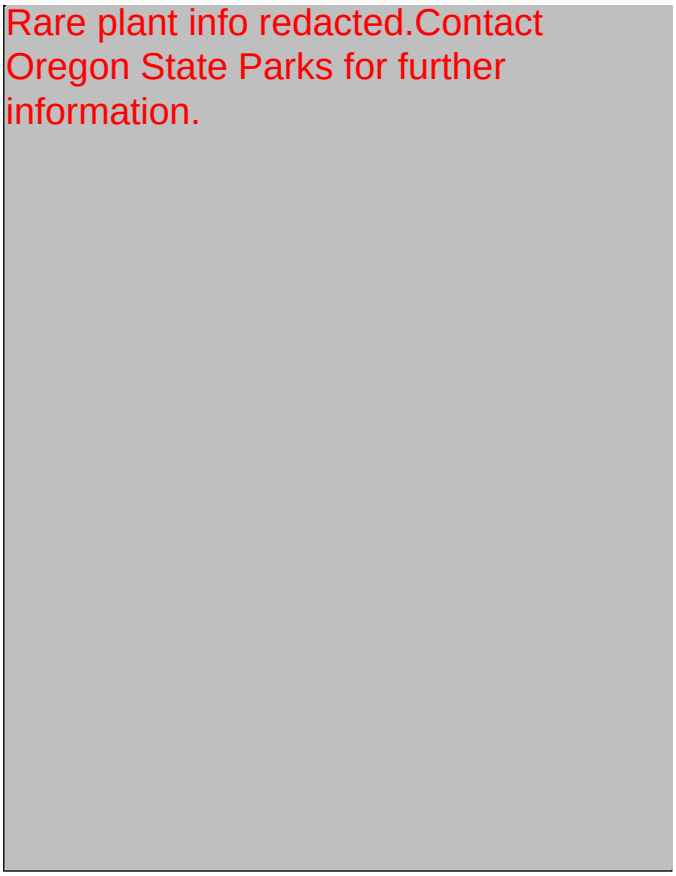


Figure 13 illustrates which polygons were found to have populations of western burning bush during the 2007 surveys. Given its large distribution throughout the project area, coupled with its apparent tendency to occur within a large array of forest types and conditions, including in areas dominated by exotic invasive species, we suggest the entire park be considered potential habitat for *Euonymus occidentale*. Figures 14 - 16 provide pictures of western burning bush in the natural area.

Figure 13. Vegetation community polygons containing western burning bush during the 2007 field surveys



Figures 14 - 16. Photos of western burning bush in Tryon Creek State Natural Area.

***Actaea elata (Cimicifuga elata)* Nutt. – tall bugbane – Ranunculaceae – G3S3**

Tall bugbane is not known to occur in the park, and no new populations were encountered during the 2007 surveys. However, much of the upland forests within Tryon Creek offer suitable potential habitat for tall bugbane. This plant is known to occur in westside forests with an abundant bigleaf maple component. Herbivory by native ungulates seems to be a significant threat to existing populations across its range. Because extensive herbivory by native ungulates is a relatively low threat in the park and because of the abundance of bigleaf maple throughout the park's landscape we would consider the entire park property potential tall bugbane habitat, except for the disturbed/developed areas and wetland habitats.

A query of the most current threatened and endangered plant spatial database maintained by the Oregon Natural Heritange Information Center returned no known sightings of any other at-risk plants in the Tryon Creek State Natural Area (ONHIC, 2007).

Invasive and Exotic Plants of Concern within the Project Area

Table 6 lists the Class B noxious plants encountered in the park during this project. There were a total of 13 Class B plants and no Class A plants identified.

Table 6. Invasive and noxious plants listed by the State of Oregon encountered in the park.

Symbol	Scientific Name	Common name	Family	Class
CIAR4	Cirsium arvense (L.) Scop.	Canada thistle	Asteraceae	B
CIVU	Cirsium vulgare (Savi) Ten.	bull thistle	Asteraceae	B
CLVI6	Clematis vitalba L.	evergreen clematis	Ranunculaceae	B
COMA2	Conium maculatum L.	poison hemlock	Apiaceae	B
CYSC4	Cytisus scoparius (L.) Link	Scotch broom	Fabaceae	B
EQTE	Equisetum telmateia Ehrh.	giant horsetail	Equisetaceae	B
HEHE	Hedera helix L.	English ivy	Araliaceae	B
HYPE	Hypericum perforatum L.	common St. Johnswort	Clusiaceae	B
IRPS	Iris pseudacorus L.	paleyellow iris	Iridaceae	B
POCU6	Polygonum cuspidatum Sieb. & Zucc.	Japanese knotweed	Polygonaceae	B
RUAR9	Rubus armeniacus Focke	Himalayan blackberry	Rosaceae	B
SEJA	Senecio jacobaea L.	stinking willie	Asteraceae	B
ALPE4	Alliaria petiolata (Bieb.) Cavara & Grande	garlic mustard	Brassicaceae	B, T

The occurrence and distribution of some Class B noxious plants were mapped during field surveys. Figure 17 illustrates the location of some noxious plant infestations.

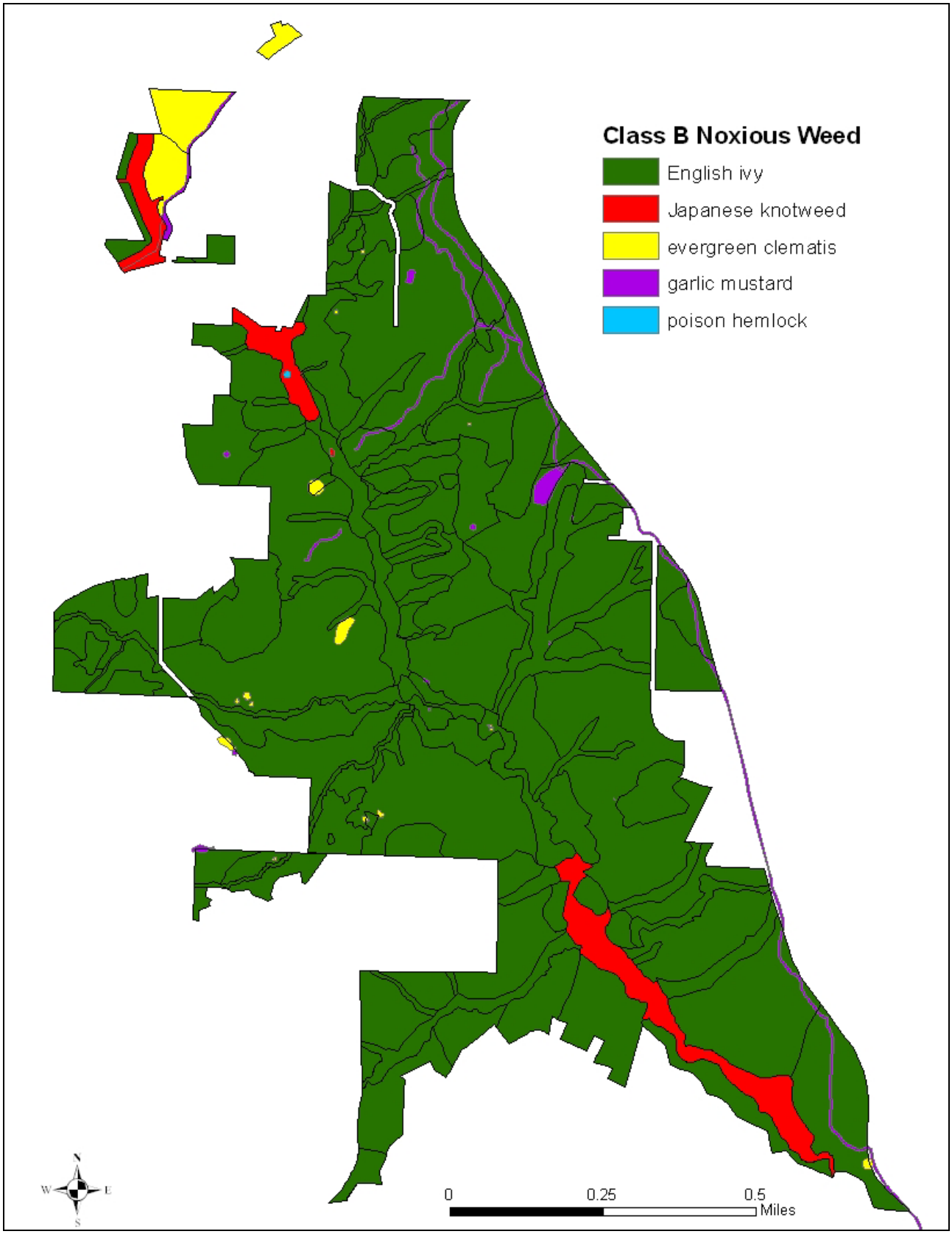


Figure 17. Location of noxious plants mapped with within the park.

Exotic and noxious weeds were abundant throughout much of the natural area. Massive infestations of English ivy threaten to displace native understory vegetation as well as kill overstory trees. Other exotic species are prolific along the Tryon Creek riparian corridor, such as canary reed grass and Himalayan blackberry. Garlic mustard and evergreen clematis are worrisome invaders in some patches of forest, but by far the worst exotic plant in the area is English ivy. Figures 18 - 20 provide photos of some of the infestations encountered in the natural area.

Figures 18 - 20. Photos of exotic plant invasions in the project area. Top left: Canary reed grass and Himalayan blackberry along Tryon Creek. Top right: English ivy climbing trees. Bottom: Evergreen clematis climbing trees.

Recommendations for Restoration and Vegetation Management

English ivy single-handedly presents the largest exotic plant threat to the native ecosystems of Tyron Creek State Natural Area. It occurs to some degree in almost every mapped vegetation community polygon. In many polygons it is replacing native understory plants and threatening to kill overstory trees. Restoration and control efforts for ivy infestation areas are already underway in a small portion of the park. These efforts are largely conducted by volunteer groups who cut ivy vines off of trees and rip what they can of the vines and roots out of the ground. While limited in spatial extent to just a fraction of the park, the control efforts are having a noticeable effect on ivy cover in the target areas. Other dominant exotic plants such as Himalayan blackberry, evergreen clematis, and English holly are also removed when encountered during the control projects. Unfortunately, such control efforts that rip ivy out of the ground may be helping to disturb the soil bed to the advantage of other exotic plants such as Robert geranium.

At the very least a targeted effort to keep ivy vines off of trees via cutting or pulling should be more broadly applied throughout the park. Being spatially explicit about where control efforts for ivy should occur is difficult given its overwhelming abundance; however areas around the main visitor's center where current control activities are being conducted would be a wise place to continue to invest control and eradication resources. We also recommend that the vegetation polygons with the least ivy be prioritized for control efforts. These polygons can be picked out of the GIS data and/or maps by condition ranking. These areas may have little ivy now and control efforts can be minimal compared to heavily infested areas. The less infested areas represent the vegetation communities that are in the best current ecological condition, but may rapidly deteriorate as ivy becomes more dominant. Long-term monitoring and maintenance is necessary for weed eradication efforts to be successful. Ivy will quickly rebound on a site if control efforts are not maintained over long periods of time.

The trails along the east boundary of the park, as well as some off trail sites along the eastern boundary are beginning to develop infestations of garlic mustard. Focusing control efforts to address garlic mustard expansion into the park may be warranted in these areas. Systematically searching for garlic mustard populations along the park's entire trail network, and pulling or covering encountered populations may help reduce this plant's spread. Some of the larger populations off the trail system should be addressed soon with pulling and/or covering employed on the bulk of the population and monitoring of population response over a longer period of time.

Evergreen clematis is another species that could be systematically targeted for reduction and control in some areas of the park. Unfortunately this plant is difficult to notice until it has reached the forest canopy and has begun to proliferate, at which point it is harder to control. Cutting and severing connecter vines of the arboreal infestations from the rooted masses in the ground may be an effective way to kill some populations and save infected trees.

Some of the riparian areas along Tryon Creek are already undergoing intensive restoration projects. Keeping the public out of restoration areas while cutting back the exotic grasses and vines and planting native shrub and tree seedlings and seeding native grasses seems to be the general restoration approach taking place. If this approach proves successful it should be attempted in many of the other weedy sections of the Tryon Creek riparian area. Monitoring for expansions of the Japanese knotweed population in the Tryon Creek riparian area should be conducted from time to time to be sure this exotic invader is not increasing its population and replacing native vegetation.

GIS Data Deliverables

Project GIS Data – Metadata

Survey_Routes_*Park_Name*
LINE_ID, Long, 14
DATE, String, 20 (date of site visit)
OBSERVER, String, 50
COMMENTS, String, 100

***Park_Name*_Vegetation_Polygons**
POLY_ID, String, 14
OPRD_CODE, String, 20
COMPLEX, Short (Value between 1 and 3, 1 = only one published plant association type ascribed to polygon, 2 = two published plant association types ascribed to polygon, 3 = three published plant association types ascribed to polygon)
FIELD_DATA, String, 100 = (6 letter plant code description of the matrix existing vegetation by growth form within the polygon [trees/shrubs/herbaceous])
ACRONYM, String, 50 (6 letter plant code description of the matrix existing vegetation class within the polygon)
SCI_NAME, String, 100 (Full scientific name of ACRONYM)
COM_NAME, String, 100 (Full common name of ACRONYM)
EQUIV, String, 50 (6 letter plant code of the equivalent published plant association with the authorities name and date)
ALLIANCE, String, 100
HABITAT, String, 100
AGECLASS, String, 4
RANK, Short, 2
CONDITION, String, 2
WEEDCOVR, String, 15
WETLAND, String, 4
FIELD_DATA2, String, 100 = (6 letter plant code description of unique smaller patches of existing vegetation by growth form within the polygon [trees/shrubs/herbaceous])
ACRONYM2, String, 50 (6 letter plant code description of unique smaller patches of existing vegetation community classes occurring in the polygon)
SCI_NAME2, String, 100 (Full scientific name of ACRONYM2)
COM_NAME2, String, 100 (Full common name of ACRONYM2)
EQUIV2, String, 50 (6 letter plant code of the equivalent published plant association with the authorities name and date)
ALLIANCE2, String, 200
HABITAT2, String, 200
AGECLASS2, String, 4
RANK2, Short, 2
CONDITION2, String, 2
WEEDCOVR2, String, 25
WETLAND2, String, 4
FIELD_DATA3, String, 100 = (6 letter plant code description of unique smaller patches of existing vegetation by growth form within the polygon [trees/shrubs/herbaceous])
ACRONYM3, String, 50 (6 letter plant code description of unique smaller patches of existing vegetation community classes occuring in the polygon)
SCI_NAME3, String, 100 (Full scientific name of ACRONYM3)
COM_NAME3, String, 100 (Full common name of ACRONYM3)

EQUIV3, String, 50 (6 letter plant code of the equivalent published plant association with the authorities name and date)
ALLIANCE3, String, 300
HABITAT3, String, 300
AGECLASS3, String, 4
RANK3, Short, 2
CONDITION3, String, 2
WEEDCOVR3, String, 35
WETLAND3, String, 4
SUITABL, String, 4
COMMENTS, String, 100

T_E_Plants_*Park_Name*
SCI_NAME, String, 100
COM_NAME, String, 100
COMMENTS, String, 100
METHOD, String, 40 (method of localization of feature – i.e. GIS import, GPS, aerial photo interp/digitization, compass triangulation, traverse, azimuth and distance from a reference point)

SAMP_DATE, String, 20 (date of site visit)
PT_RELIAB, Short, 4 (reliability of point coordinates. Valid values 1,2,3,4,5. Value 1 – One foot or less, Value 2 – Three feet or less, Value 3 – Ten feet or less, Value 4 – 40 feet or less, Value 5 – more than 40 feet)

ClassB_Noxious_*Park_Name*
ODA_RATING, String, 4
CODE, String, 7 (4 letter plant code according to Plants National Database)
SCI_NAME, String, 100
COM_NAME, String, 100
COMMENTS, String, 100
METHOD, String, 40 (method of localization of feature – i.e. GIS import, GPS, aerial photo interp/digitization, compass triangulation, traverse, azimuth and distance)
SAMP_DATE, String, 20 (date of site visit)
PT_RELIAB, Short, 4 (reliability of point coordinates. Valid values 1,2,3,4. Value 1 – One foot or less, Value 2 – Three feet or less, Value 3 – Ten feet or less, Value 4 – 40 feet or less)

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Appendix A – Vascular Plant List for Tryon Creek State Natural Area

Count	Symbol	Scientific Name	Common name	Family	Alien	Class	Status
1	ABGR	Abies grandis (Dougl. ex D. Don) Lindl.	grand fir	Pinaceae			
2	ACCI	Acer circinatum Pursh	vine maple	Aceraceae			
3	ACMA3	Acer macrophyllum Pursh	bigleaf maple	Aceraceae			
4	ACRU2	Actaea rubra (Ait.) Willd.	red baneberry	Ranunculaceae			
5	ADBI	Adenocaulon bicolor Hook.	American trailplant	Asteraceae			
6	ADAL	Adiantum aleuticum (Rupr.) Paris	Aleutian maidenhair	Pteridaceae			
7	AEHI	Aesculus hippocastanum L.	horse chestnut	Hippocastanaceae	Yes		
8	AGCA5	Agrostis capillaris L.	colonial bentgrass	Poaceae	Yes		
9	AGGI2	Agrostis gigantea Roth	redtop	Poaceae	Yes		
10	ALPE4	Alliaria petiolata (Bieb.) Cavara & Grande	garlic mustard	Brassicaceae	Yes	B, T	
11	ALRU2	Alnus rubra Bong.	red alder	Betulaceae			
12	AMAL2	Amelanchier alnifolia (Nutt.) Nutt. ex M. Roemer	Saskatoon serviceberry	Rosaceae			
13	ANOD	Anthoxanthum odoratum L.	sweet vernalgrass	Poaceae	Yes		
14	ARMI2	Arctium minus Bernh.	lesser burdock	Asteraceae	Yes		
15	ASCA2	Asarum caudatum Lindl.	British Columbia wildginger	Aristolochiaceae			
16	ATFI	Athyrium filix-femina (L.) Roth	common ladyfern	Dryopteridaceae			
17	BRVU	Bromus vulgaris (Hook.) Shear	Columbia brome	Poaceae			
18	CASE13	Calystegia sepium (L.) R. Br.	hedge false bindweed	Convolvulaceae	Yes		
19	CAHE7	Carex hendersonii Bailey	Henderson's sedge	Cyperaceae			
20	CALE24	Carex leptopoda Mackenzie	taperfruit shortscale sedge	Cyperaceae			
21	CAOB3	Carex obnupta Bailey	slough sedge	Cyperaceae			
22	CEGL2	Cerastium glomeratum Thuill.	sticky chickweed	Caryophyllaceae	Yes		
23	CHMU2	Chenopodium murale L.	nettleleaf goosefoot	Chenopodiaceae	Yes		
24	CIIN	Cichorium intybus L.	chicory	Asteraceae	Yes		
25	CIAL	Circaea alpina L.	small enchanter's nightshade	Onagraceae			
26	CIAR4	Cirsium arvense (L.) Scop.	Canada thistle	Asteraceae	Yes	B	
27	CIVU	Cirsium vulgare (Savi) Ten.	bull thistle	Asteraceae	Yes	B	
28	CLSI2	Claytonia sibirica L.	Siberian springbeauty	Portulacaceae			
29	CLVI6	Clematis vitalba L.	evergreen clematis	Ranunculaceae	Yes	B	
30	COMA2	Conium maculatum L.	poison hemlock	Apiaceae	Yes	B	
31	COBO	Conyza *bonariensis* (L.) Cronq.	asthmaweed	Asteraceae	Yes		
32	COSE16	Cornus sericea L.	redosier dogwood	Cornaceae			
33	COCO6	Corylus cornuta Marsh.	beaked hazelnut	Betulaceae			
34		Cotoneaster	cotoneaster	Rosaceae	Yes		
35	CRMO3	Crataegus monogyna Jacq.	oneseed hawthorn	Rosaceae	Yes		
36	CRSU16	Crataegus suksdorfii (Sarg.) Kruschke	Suksdorf's hawthorn	Rosaceae			
37	CYER2	Cyperus erythrorhizos Muhl.	redroot flatsedge	Cyperaceae			
38	CYSC4	Cytisus scoparius (L.) Link	Scotch broom	Fabaceae	Yes	B	
39	DAGL	Dactylis glomerata L.	orchardgrass	Poaceae	Yes		
40	DACA6	Daucus carota L.	Queen Anne's lace	Apiaceae	Yes		

Count	Symbol	Scientific Name	Common name	Family	Alien	Class	Status
41	DECA18	Deschampsia caespitosa (L.) Beauv.	tufted hairgrass	Poaceae			
42	DEEL	Deschampsia elongata (Hook.) Munro	slender hairgrass	Poaceae			
43	DIFO	Dicentra formosa (Haw.) Walp.	Pacific bleeding heart	Fumariaceae			
44	DIPU	Digitalis purpurea L.	purple foxglove	Scrophulariaceae	Yes		
45	DISA	Digitaria sanguinalis (L.) Scop.	hairy crabgrass	Poaceae			
46	DIFU2	Dipsacus fullonum L.	Fuller's teasel	Dipsacaceae	Yes		
47	DREX2	Dryopteris expansa (K. Presl) Fraser-Jenkins & Jermy	spreading woodfern	Dryopteridaceae			
48	ECCR	Echinochloa crus-galli (L.) Beauv.	barnyardgrass	Poaceae	Yes		
49	ELGL	Elymus glaucus Buckl.	blue wildrye	Poaceae			
50	EPCI	Epilobium ciliatum Raf.	fringed willowherb	Onagraceae			
51	EQAR	Equisetum arvense L.	field horsetail	Equisetaceae			
52	EQHY	Equisetum hyemale L.	scouringrush horsetail	Equisetaceae			
53	EQTE	Equisetum telmateia Ehrh.	giant horsetail	Equisetaceae		B	
54	EUOC9	Euonymus occidentale Nutt. ex Torr.	western burning bush	Celastraceae			G5 - S3 - 4
55	FESU	Festuca subulata Trin.	bearded fescue	Poaceae			
56	FRVE	Fragaria vesca L.	woodland strawberry	Rosaceae			
57	FRPU7	Frangula purshiana (DC.) Cooper	Cascara buckthorn	Rhamnaceae			
58	FRLA	Fraxinus latifolia Benth.	Oregon ash	Oleaceae			
59	GAAP2	Galium aparine L.	stickywilly	Rubiaceae			
60	GATR3	Galium triflorum Michx.	fragrant bedstraw	Rubiaceae			
61	GASH	Gaultheria shallon Pursh	salal	Ericaceae			
62	GERO	Geranium robertianum L.	Robert geranium	Geraniaceae	Yes		
63	GEMA4	Geum macrophyllum Willd.	largeleaf avens	Rosaceae			
64	GEUR	Geum urbanum L.	herb bennet	Rosaceae	Yes		
65	GLST	Glyceria striata (Lam.) A.S. Hitchc.	fowl mannagrass	Poaceae			
66	GNUL	Gnaphalium uliginosum L.	marsh cudweed	Asteraceae			
67	HEHE	Hedera helix L.	English ivy	Araliaceae	Yes	B	
68	HOLA	Holcus lanatus L.	common velvetgrass	Poaceae	Yes		
69	HODI	Holodiscus discolor (Pursh) Maxim.	oceanspray	Rosaceae			
70	HYTE	Hydrophyllum tenuipes Heller	Pacific waterleaf	Hydrophyllaceae			
71	HYPE	Hypericum perforatum L.	common St. Johnswort	Clusiaceae	Yes	B	
72	HYRA3	Hypochaeris radicata L.	hairy catsear	Asteraceae	Yes		
73	ILAQ80	Ilex aquifolium L.	English holly	Aquifoliaceae	Yes		
74	IMCA	Impatiens capensis Meerb.	jewelweed	Balsaminaceae			
75	IRPS	Iris pseudacorus L.	paleyellow iris	Iridaceae	Yes	B	
76	JUEF	Juncus effusus L.	common rush	Juncaceae			
77	JUTE	Juncus tenuis Willd.	poverty rush	Juncaceae			
78	LABI	Lactuca biennis (Moench) Fern.	tall blue lettuce	Asteraceae			
79	LASE	Lactuca serriola L.	prickly lettuce	Asteraceae	Yes		
80	LACO3	Lapsana communis L.	common nipplewort	Asteraceae	Yes		
81	LEOR	Leersia oryzoides (L.) Sw.	rice cutgrass	Poaceae			
82	LETAT	Leontodon taraxacoides (Vill.) Mérat ssp. taraxacoides	lesser hawkbit	Asteraceae	Yes		
83	LEVU	Leucanthemum vulgare Lam.	oxeye daisy	Asteraceae	Yes		

Count	Symbol	Scientific Name	Common name	Family	Alien	Class	Status
84	LOPE	Lolium perenne L.	perennial ryegrass	Poaceae	Yes		
85	LOCO6	Lotus corniculatus L.	bird's-foot trefoil	Fabaceae	Yes		
86	LYAM3	Lysichiton americanus Hultén & St. John	American skunkcabbage	Araceae			
87	LYNU	Lysimachia nummularia L.	creeping jenny	Primulaceae	Yes		
88	MAAQ2	Mahonia aquifolium (Pursh) Nutt.	hollyleaved barberry	Berberidaceae			
89	MANE2	Mahonia nervosa (Pursh) Nutt.	Cascade barberry	Berberidaceae			
90	MADI	Maianthemum dilatatum (Wood) A. Nels. & J.F. Macbr.	false lily of the valley	Liliaceae			
91	MARA7	Maianthemum racemosum (L.) Link	feathery false lily of the valley	Liliaceae			
92	MAPU	Malus pumila P. Mill.	paradise apple	Rosaceae	Yes		
93	MAOR3	Marah oreganus (Torr. ex S. Wats.) T.J. Howell	coastal manroot	Cucurbitaceae			
94	MELU	Medicago lupulina L.	black medick	Fabaceae	Yes		
95	MEOF2	Melissa officinalis L.	common balm	Lamiaceae	Yes		
96	MYMU	Mycelis muralis (L.) Dumort.	wall-lettuce	Asteraceae	Yes		
97	OECE	Oemleria cerasiformis (Torr. & Gray ex Hook. & Arn.) Landon	Indian plum	Rosaceae			
98	OESA	Oenanthe sarmentosa K. Presl ex DC.	water parsely	Apiaceae			
99	OSBE	Osmorhiza berteroi DC.	sweetcicely	Apiaceae			
100	OXSU	Oxalis suksdorfii Trel.	Suksdorf woodsorrel	Oxalidaceae			
101	PEFR5	Petasites frigidus (L.) Fries	arctic sweet coltsfoot	Asteraceae			
102	PHNE2	Phacelia nemoralis Greene	shade phacelia	Hydrophyllaceae			
103	PHAR3	Phalaris arundinacea L.	reed canarygrass	Poaceae	Yes		
104	PHLE4	Philadelphus lewisii Pursh	Lewis' mock orange	Hydrangeaceae			
105	PLLA	Plantago lanceolata L.	narrowleaf plantain	Plantaginaceae	Yes		
106	PLMA2	Plantago major L.	common plantain	Plantaginaceae	Yes		
107	POPR	Poa pratensis L.	Kentucky bluegrass	Poaceae	Yes		
108	POAV	Polygonum aviculare L.	prostrate knotweed	Polygonaceae	Yes		
109	POCU6	Polygonum cuspidatum Sieb. & Zucc.	Japanese knotweed	Polygonaceae	Yes	B	
110	POPE3	Polygonum persicaria L.	spotted ladysthumb	Polygonaceae	Yes		
111	POGL8	Polypodium glycyrrhiza D.C. Eat.	licorice fern	Polypodiaceae			
112	POVI9	Polypogon viridis (Gouan) Breistr.	beardless rabbitsfoot grass	Poaceae	Yes		
113	POMU	Polystichum munitum (Kaulfuss) K. Presl	western swordfern	Dryopteridaceae			
114	POBAT	Populus balsamifera L. ssp. trichocarpa (Torr. & Gray ex Hook.) Brayshaw	black cottonwood	Salicaceae			
115	PRHOO	Prosartes hookeri Torr. var. oregana (S. Wats.) Kartesz	Oregon drops of gold	Liliaceae			
116	PRVU	Prunella vulgaris L.	common selfheal	Lamiaceae	Yes		
117	PRAV	Prunus avium (L.) L.	sweet cherry	Rosaceae	Yes		
118	PRLA5	Prunus laurocerasus L.	cherry laurel	Rosaceae	Yes		
119	PSME	Pseudotsuga menziesii (Mirbel) Franco	Douglas-fir	Pinaceae			
120	PTAQ	Pteridium aquilinum (L.) Kuhn	western brackenfern	Dennstaedtiaceae			
121	RARE3	Ranunculus repens L.	creeping buttercup	Ranunculaceae	Yes		
122	RAUN	Ranunculus uncinatus D. Don ex G. Don	woodland buttercup	Ranunculaceae			

Count	Symbol	Scientific Name	Common name	Family	Alien	Class	Status
123	ROCU	Rorippa curvisiliqua (Hook.) Bess. ex Britt.	curvepod yellowcress	Brassicaceae			
124	ROGY	Rosa gymnocarpa Nutt.	dwarf rose	Rosaceae			
125	RONU	Rosa nutkana K. Presl	Nootka rose	Rosaceae			
126	RUAR9	Rubus armeniacus Focke	Himalayan blackberry	Rosaceae	Yes	B	
127	RUPA	Rubus parviflorus Nutt.	thimbleberry	Rosaceae			
128	RUSP	Rubus spectabilis Pursh	salmonberry	Rosaceae			
129	RUUR	Rubus ursinus Cham. & Schlecht.	California blackberry	Rosaceae			
130	RUCO2	Rumex conglomeratus Murr.	clustered dock	Polygonaceae	Yes		
131	RUOB	Rumex obtusifolius L.	bitter dock	Polygonaceae	Yes		
132	SALU	Salix lucida Muhl.	shining willow	Salicaceae			
133	SASI2	Salix sitchensis Sanson ex Bong.	Sitka willow	Salicaceae			
134	SARA2	Sambucus racemosa L.	red elderberry	Caprifoliaceae			
135	SCPH	Schedonorus phoenix (Scop.) Holub	tall fescue	Poaceae	Yes		
136	SCMI2	Scirpus microcarpus J.& K. Presl	panicled bulrush	Cyperaceae			
137	SEJA	Senecio jacobaea L.	stinking willie	Asteraceae	Yes	B	
138	SEVU	Senecio vulgaris L.	old-man-in-the-Spring	Asteraceae	Yes		
139	SODU	Solanum dulcamara L.	climbing nightshade	Solanaceae	Yes		
140	SOAR2	Sonchus arvensis L.	field sowthistle	Asteraceae	Yes		
141	SOAU	Sorbus aucuparia L.	European mountain ash	Rosaceae	Yes		
142	SPDO	Spiraea douglasii Hook.	rose spirea	Rosaceae			
143	STCHC3	Stachys chamissonis Benth. var. cooleyae (Heller) G. Mulligan & D. Munro	coastal hedgenettle	Lamiaceae			
144	STCR2	Stellaria crispa Cham. & Schlecht.	curled starwort	Caryophyllaceae			
145	STAM2	Streptopus amplexifolius (L.) DC.	claspleaf twistedstalk	Liliaceae			
146	SYAL	Symphoricarpos albus (L.) Blake	common snowberry	Caprifoliaceae			
147	TAOF	Taraxacum officinale G.H. Weber ex Wiggers	common dandelion	Asteraceae	Yes		
148	TABR2	Taxus brevifolia Nutt.	Pacific yew	Taxaceae			
149	TEGR2	Tellima grandiflora (Pursh) Dougl. ex Lindl.	bigflower tellima	Saxifragaceae			
150	THPL	Thuja plicata Donn ex D. Don	western red cedar	Cupressaceae			
151	TITR	Tiarella trifoliata L.	threeleaf foamflower	Saxifragaceae			
152	TOME	Tolmiea menziesii (Pursh) Torr. & Gray	youth on age	Saxifragaceae			
153	TOAR	Torilis arvensis (Huds.) Link	spreading hedgeparsley	Apiaceae	Yes		
154	TRPR2	Trifolium pratense L.	red clover	Fabaceae	Yes		
155	TRRE3	Trifolium repens L.	white clover	Fabaceae	Yes		
156	TROV2	Trillium ovatum Pursh	Pacific trillium	Liliaceae			
157	TSHE	Tsuga heterophylla (Raf.) Sarg.	western hemlock	Pinaceae			
158	URDI	Urtica dioica L.	stinging nettle	Urticaceae			
159	VAPA	Vaccinium parvifolium Sm.	red huckleberry	Ericaceae			
160	VAHE	Vancouveria hexandra (Hook.) Morr. & Dcne.	white insideout flower	Berberidaceae			
161	VECAC	Veratrum californicum Dur. var. caudatum (Heller) C.L. Hitchc.	Cascade false hellebore	Liliaceae			

Count	Symbol	Scientific Name	Common name	Family	Alien	Class	Status
162	VEAM2	Veronica americana Schwein. ex Benth.	American speedwell	Scrophulariaceae			
163	VESE	Veronica serpyllifolia L. ssp. serpyllifolia	thymeleaf speedwell	Scrophulariaceae	Yes		
164	VIED	Viburnum edule (Michx.) Raf.	squashberry	Caprifoliaceae			
165	VITE	Vicia tetrasperma (L.) Schreb.	lentil vetch	Fabaceae	Yes		
166	VIMA	Vinca major L.	bigleaf periwinkle	Apocynaceae	Yes		

Appendix B – Condensing Existing Vegetation Community Descriptions into 21 Existing Vegetation Classes

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
F01	ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN	ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN	1
		ACEMAC-ALNRUB-PSEMEN/HEDHEL-ACECIR-RUBARM/POLMUN-URTDIO	1
F02	ACEMAC-ALNRUB-PSEMEN/mixed shrub-MAHNER/POLMUN	ACEMAC-ALNRUB-PSEMEN/ACECIR-CORCOR-MAHNER/URTDIO-POLMUN-TOLMEN	1
		ACEMAC-ALNRUB-PSEMEN/CORCOR-MAHNER-ACECIR/POLMUN-EQUHYM	1
		ACEMAC-ALNRUB-PSEMEN/OEMCER-CORCOR-MAHNER/POLMUN-POLGLY	1
F03	ACEMAC-ALNRUB-THUPLI/mixed shrub/POLMUN	ACEMAC-ALNRUB-THUPLI/ACECIR-MAHNER/POLMUN-URTDIO	1
		ACEMAC-ALNRUB-THUPLI/ACECIR-RUBSPE/POLMUN	5
		ACEMAC-ALNRUB-THUPLI/RUBSPE-SAMRAC/POLMUN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/ACECIR-EUOOCC-RUBSPE/POLMUN-TOLMEN	1
		ALNRUB-ACEMAC-THUPLI/MAHNER-OEMCER-ACECIR/POLMUN	1
		ALNRUB-THUPLI-ACEMAC/RUBSPE-OEMCER-EUOOCC/POLMUN	1
F04	ACEMAC-ALNRUB-THUPLI/mixed shrub-HEDHEL/POLMUN	ACEMAC-ALNRUB/HEDHEL-RUBSPE-RUBARM/POLMUN	1
		ACEMAC-ALNRUB-THUPLI/HEDHEL-ACECIR-CORCOR/POLMUN	1
		ACEMAC-ALNRUB-THUPLI/HEDHEL-ACECIR-OEMCER/POLMUN	2
		ACEMAC-ALNRUB-THUPLI/HEDHEL-ACECIR-OEMCER/POLMUN-URTDIO	1
		ACEMAC-ALNRUB-THUPLI/HEDHEL-ACECIR-RUBSPE/POLMUN	16
		ACEMAC-ALNRUB-THUPLI/HEDHEL-ILAAQU-CORCOR/POLMUN	1
		ACEMAC-ALNRUB-THUPLI/HEDHEL-OEMCER-RUBSPE/POLMUN	2
		ACEMAC-ALNRUB-THUPLI/OEMCER-HEDHEL-RUBSPE/POLMUN-RANREP	1
		ACEMAC-ALNRUB-THUPLI/OEMCER-RUBSPE-HEDHEL/POLMUN-URTDIO	1
		ACEMAC-THUPLI/ACECIR-HEDHEL-CORCOR/POLMUN-URTDIO	1
		ACEMAC-THUPLI/HEDHEL-ILAAQU-CORCOR/POLMUN	1
		ACEMAC-THUPLI/HEDHEL-RUBARM-CORCOR/POLMUN	1
		ACEMAC-THUPLI/OEMCER-RUBSPE/POLMUN	1
		ACEMAC-THUPLI-ALNRUB/HEDHEL-RUBSPE-OEMCER/POLMUN-URTDIO-RANREP	1
		ALNRUB-ACEMAC/HEDHEL-RUBSPE-CORCOR/POLMUN	1

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
		ALNRUB-ACEMAC-THUPLI/ACECIR-SAMRAC-HEDHEL/POLMUN-TOLMEN	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-ACECIR-RUBSPE/POLMUN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-OEMCER/POLMUN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-RUBSPE/POLMUN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-RUBSPE-ACECIR/POLMUN	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-RUBSPE-SAMRAC/POLMUN-URTDIO	1
		ALNRUB-THUPLI-ACEMAC/RUBSPE-HEDHEL-EUOOCC/POLMUN-ATHFIL-TOLMEN	1
F05	ACEMAC-mixed conifer-(ALNRUB)/mixed shrub-HEDHEL/POLMUN	ACEMAC-PSEMEN/HEDHEL-CORCOR-MAHNER/POLMUN	1
		ACEMAC-PSEMEN/HEDHEL-PRULAU-CRAMON/POLMUN	1
		ACEMAC-PSEMEN-ALNRUB/RUBSPE-HEDHEL-ACECIR/POLMUN	1
		ACEMAC-PSEMEN-THUPLI/ACECIR-HEDHEL-OEMCER/POLMUN-URTDIO	1
		ACEMAC-PSEMEN-THUPLI/CORCOR-OEMCER-HEDHEL/POLMUN	2
		ACEMAC-PSEMEN-THUPLI/HEDHEL-ACECIR/POLMUN-URTDIO	1
		ACEMAC-PSEMEN-THUPLI/HEDHEL-ACECIR-CORCOR/POLMUN	1
		ACEMAC-PSEMEN-THUPLI/HEDHEL-RUBARM-CORCOR/POLMUN	1
		ACEMAC-THUPLI/ACECIR-HEDHEL-ILEAQU/POLMUN-VANHEX	1
		ACEMAC-THUPLI/OEMCER-RUBSPE-HEDHEL/POLMUN	1
		ACEMAC-THUPLI-PSEMEN/HEDHEL-ACECIR/POLMUN	1
		ACEMAC-THUPLI-PSEMEN/HEDHEL-CORCOR-ACECIR/POLMUN	1
		ACEMAC-THUPLI-TSUHET/HEDHEL-OEMCER-CORCOR/POLMUN	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR-HEDHEL/ATHFIL-TOLMEN-URTDIO	1
		ALNRUB-PSEMEN-THUPLI/HEDHEL-OEMCER-ACECIR/POLMUN	1
F06	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	ALNRUB/ACECIR-RUBSPE-EUOOCC/TOLMEN-RANREP-IMPCAP	1
		ALNRUB/RUBSPE/URTDIO-TOLMEN-ATHFIL	1
		ALNRUB/RUBSPE/URTDIO-TOLMEN-LYSAME	1
		ALNRUB/RUBSPE-ACECIR/ATHFIL	1
		ALNRUB/RUBSPE-CORCOR/POLMUN-ATHFIL	1
		ALNRUB-ACEMAC/ACECIR-CORCOR-RUBSPE/TOLMEN-ATHFIL	1
		ALNRUB-ACEMAC/RUBSPE/ATHFIL-OENSAR	1
		ALNRUB-ACEMAC/RUBSPE-ACECIR/TOLMEN-ATHFIL-URTDIO	1
		ALNRUB-ACEMAC/RUBSPE-ACECIR-CORCOR/ATHFIL-POLMUN-URTDIO	1

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR/ATHFIL-POLMUN	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR/ATHFIL-TOLMEN-URTDIO	2
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR/TOLMEN-ATHFIL-EQUHYM	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR-SAMRAC/ATHFIL-TOLMEN	1
		ALNRUB-ACEMAC-TSUHET/OEMCER-RUBSPE/POLMUN-ATHFIL	1
		ALNRUB-THUPLI/RUBARM-RUBSPE/RANREP-URTDIO-TOLMEN	1
		ALNRUB-THUPLI/RUBSPE-ACECIR/ATHFIL-TOLMEN-IMPCAP	1
		ALNRUB-THUPLI/RUBSPE-ACECIR/TOLMEN-URTDIO-ATHFIL	1
		ALNRUB-THUPLI-ACEMAC/ACECIR-RUBSPE/ATHFIL-TOLMEN	1
		ALNRUB-TSUHET/RUBSPE-ACECIR/ATHFIL-TOLMEN	1
F07	ALNRUB-(ACEMAC-THUPLI)/RUBSPE-HEDHEL-(mixed shrub)/TOLMEN-ATHFIL-(URTDIO)	ACEMAC-ALNRUB-THUPLI/ACECIR-RUBSPE-HEDHEL/ATHFIL-PTEAQU-TOLMEN	1
		ACEMAC-ALNRUB-THUPLI/OEMCER-HEDHEL-RUBSPE/POLMUN	1
		ACEMAC-THUPLI-ALNRUB/ACECIR-HEDHEL-OEMCER/POLMUN-URTDIO	1
		ACEMAC-THUPLI-ALNRUB/RUBSPE-EUOOCC-HEDHEL/ATHFIL-TOLMEN-RANREP	1
		ALNRUB-ACEMAC/HEDHEL-RUBSPE/POLMUN-ATHFIL-TOLMEN	2
		ALNRUB-ACEMAC/RUBSPE-HEDHEL/TOLMEN-ATHFIL	1
		ALNRUB-ACEMAC-THUPLI/ACECIR-RUBSPE-HEDHEL/ATHFIL-TOLMEN	1
		ALNRUB-ACEMAC-THUPLI/HEDHEL-RUBSPE-ACECIR/ATHFIL-TOLMEN-POLMUN	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACCIR-HEDHEL/POLMUN-ATHFIL-TOLMEN	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-ACECIR-HEDHEL/ATHFIL-TOLMEN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-HEDHEL/ATHFIL-TOLMEN	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-HEDHEL/ATHFIL-TOLMEN-URTDIO	1
		ALNRUB-ACEMAC-THUPLI/RUBSPE-HEDHEL/TOLMEN-ATHFIL-EQUHYM	1
		ALNRUB-THUPLI/ACECIR-HEDHEL-RUBSPE/ATHFIL-TOLMEN	1
		ALNRUB-THUPLI/HEDHEL-ACECIR-RUBSPE/ATHFIL	1
		ALNRUB-THUPLI/HEDHEL-RUBARM-RUBSPE/ATHFIL	1
		ALNRUB-THUPLI/HEDHEL-RUBSPE/ATHFIL-TOLMEN-POLMUN	1
		ALNRUB-THUPLI-ACEMAC/HEDHEL-ACECIR-RUBSPE/ATHFIL-TOLMEN	1
		ALNRUB-THUPLI-ACEMAC/HEDHEL-RUBSPE-ACECIR/ATHFIL-TOLMEN-RANREP	1

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
		ALNRUB-THUPLI-ACEMAC/HEDHEL-RUBSPE-ACECIR/POLMUN-ATHFIL	1
		ALNRUB-THUPLI-ACEMAC/RUBARM-HEDHEL-RUBSPE/ATHFIL-TOLMEN-RANREP	1
		ALNRUB-THUPLI-ACEMAC/RUBSPE-HEDHEL/ATHFIL	1
		ALNRUB-THUPLI-ACEMAC/RUBSPE-HEDHEL/ATHFIL-POLMUN	1
		ALNRUB-THUPLI-TSUHET/RUBSPE-HEDHEL-EUOOCC/TOLMEN-URTDIO	1
F08 or W08	ALNRUB/RUBARM-(RUBSPE-mixed shrub)/URTDIO-(PHAARU-ATHFIL)	ALNRUB/RUBARM/PHAARU	1
		ALNRUB/RUBARM-ACECIR/PHAARU-URTDIO-TOLMEN	1
		ALNRUB/RUBARM-EUOOCC-SAMRAC/PHAARU-TOLMEN-URTDIO	1
		ALNRUB/RUBARM-HEDHEL	1
		ALNRUB/RUBSPE-RUBARM/GLYSTR-RANREP-ATHFIL	1
		ALNRUB/RUBSPE-SAMRAC-RUBARM	1
		ALNRUB/RUBSPE-SAMRAC-RUBARM/PHAARU-URTDIO-ATHFIL	1
W09	ALNRUB/RUBSPE-SAMRAC/BROVUL-RANREP-URTDIO	ALNRUB/RUBSPE-SAMRAC/BROVUL-RANREP-URTDIO	1
F10	FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN	FRALAT-ACEMAC-POPBALT/HEDHEL-ACECIR/TOLMEN-EQUHYM-CAROBN	1
F11	FRALAT-ACEMAC-THUPLI/RUBURS-VIBEDU-SPIDOU/TOLMEN-CARDEW-URTDIO	FRALAT-ACEMAC-THUPLI/RUBURS-VIBEDU-SPIDOU/TOLMEN-CARDEW-URTDIO	1
F12	POPBALT-ALNRUB-ACEMAC/mixed shrub-HEDHEL/POLMUN	ALNRUB-ACEMAC-THUPLI/HEDHEL-OEMCER-RUBSPE/POLMUN-URTDIO	1
		POPBALT-ALNRUB-ACEMAC/HEDHEL-OEMCER-ACECIR/POLMUN	1
F13	PSEMEN-ACEMAC-THUPLI/HEDHEL-MAHNER-ACECIR/POLMUN	ACEMAC-PSEMEN-THUPLI/MAHNER-HEDHEL/POLMUN	1
		PSEMEN-ACEMAC/OEMCER-RUBARM-MAHNER/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/HEDHEL-ACECIR-MAHNER/POLMUN	2
		PSEMEN-ACEMAC-THUPLI/HEDHEL-ILEAQU-MAHNER/POLMUN	2
		PSEMEN-THUPLI-ACEMAC/HEDHEL-ACECIR-MAHNER/POLMUN	2
		THUPLI-ACEMAC-PSEMEN/HEDHEL-MAHNER/POLMUN	1
F14	PSEMEN-ACEMAC-THUPLI/mixed shrub-HEDHEL/POLMUN	PSEMEN-ACEMAC/RUBSPE-HEDHEL/ATHFIL-TOLMEN	1
		PSEMEN-ACEMAC-ALNRUB/HEDHEL-ACECIR-OEMCER/POLMUN	1
		PSEMEN-ACEMAC-POPBALT/HEDHEL-ACECIR-RUBSPE/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/HEDHEL-ACECIR-OEMCER/POLMUN-URTDIO	1
		PSEMEN-ACEMAC-THUPLI/HEDHEL-CORCOR/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/HEDHEL-CORCOR-OEMCER/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/HEDHEL-RUBARM-CORCOR/POLMUN	1

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
		PSEMEN-THUPLI/HEDHEL/POLMUN-ATHFIL-TOLMEN	1
		PSEMEN-THUPLI-ACEMAC/ACECIR-CORCOR-HEDHEL/POLMUN	1
		PSEMEN-THUPLI-ACEMAC/ACECIR-CORCOR-HEDHEL/POLMUN-VANHEX	1
		PSEMEN-THUPLI-ACEMAC/HEDHEL-ACECIR-CORCOR/POLMUN-URTDIO	1
		PSEMEN-THUPLI-ACEMAC/HEDHEL-CORCOR-ACECIR/POLMUN	1
		PSEMEN-THUPLI-ACEMAC/HEDHEL-OEMCER-CORCOR/POLMUN	2
		PSEMEN-THUPLI-ACEMAC/HEDHEL-RUBSPE-ACECIR/POLMUN	1
		PSEMEN-THUPLI-ACEMAC/OEMCER-RUBURS-HEDHEL/POLMUN-VANHEX	1
		PSEMEN-TSUHET-ACEMAC/HEDHEL-ACECIR-CORCOR/POLMUN	1
		THUPLI-ACEMAC-PSEMEN/OEMCER-CORCOR-HEDHEL/POLMUN	2
		THUPLI-PSEMEN-ACEMAC/HEDHEL-ACECIR-CORCOR/POLMUN	1
		THUPLI-PSEMEN-ACEMAC/HEDHEL-ILEAQU-ACECIR/POLMUN	1
F15	PSEMEN-ACEMAC-THUPLI/mixed shrub-MAHNER/POLMUN	PSEMEN-ACEMAC/ACECIR-MAHNER-CORCOR/POLMUN-URTDIO	1
		PSEMEN-ACEMAC/SAMRAC-ACECIR-MAHNER/POLMUN-URTDIO	1
		PSEMEN-ACEMAC-THUPLI/ACECIR-CORCOR-MAHNER/POLMUN-HYDTEN-URTDIO	1
		PSEMEN-ACEMAC-THUPLI/ACECIR-MAHNER/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/ACECIR-MAHNER-OEMCER/POLMUN	1
		PSEMEN-ACEMAC-THUPLI/CORCOR-MAHNER-ACECIR/POLMUN-URTDIO	2
		PSEMEN-ACEMAC-THUPLI/RUBSPE-CORCOR-ACECER/POLMUN-URTDIO	1
F16	PSEMEN-TSUHET/ACECIR-CORCOR-MAHNER/POLMUN	PSEMEN-TSUHET/ACECIR-CORCOR-MAHNER/POLMUN	1
F17	THUPLI-ACEMAC-ALNRUB/mixed shrub-HEDHEL-(RUBARM)/POLMUN	THUPLI-ACEMAC-ALNRUB/HEDHEL-RUBARM-RUBSPE/POLMUN	1
		THUPLI-ACEMAC-ALNRUB/HEDHEL-RUBARM-SAMRAC/POLMUN-URTDIO-RANREP	1
		THUPLI-ACEMAC-ALNRUB/RUBARM-ACECIR-HEDHEL/POLMUN	2
		THUPLI-ALNRUB/HEDHEL-OEMCER-MAHNER/POLMUN	1
		THUPLI-ALNRUB/HEDHEL-RUBSPE-EUOOCC/POLMUN	1
F18	THUPLI-ALNRUB-ACEMAC/RUBSPE-(HEDHEL)/ATHFIL-URTDIO-TOLMEN	THUPLI-ALNRUB/HEDHEL-RUBARM-RUBSPE/ATHFIL-URTDIO	1
		THUPLI-ALNRUB-ACEMAC/ACECIR-CORCOR-HEDHEL/URTDIO-ATHFIL-TOLMEN	1
		THUPLI-ALNRUB-ACEMAC/ACECIR-RUBSPE/POLMUN-TOLMEN-ATHFIL	1
S01	SALSIT-HEDHEL-RUBARM	SALSIT-HEDHEL-RUBARM	1

OPRD Code	Existing Vegetation Community Class	Existing Vegetation Community Field Description	Count of Polygons
S02	CRAMON/HEDHEL-RUBURS-ILEAQU/POLMUN-POAPRA	CRAMON/HEDHEL-RUBURS-ILEAQU/POLMUN-POAPRA	1
		CRAMON-HEDHEL/POLMUN	1
D01 or V01	Developed/Disturbed	Developed	2
		Lawn	1
		RUBARM	1

Appendix C – Definitions of Vegetation Community Ranks

The following table defines the ranking system for plants and plant communities used by ONHIC (Kagan et al. 2004).

Code	Definition
G1	Critically imperiled throughout its range; extremely rare with five or fewer occurrences or very few remaining acres.
G2	Imperiled throughout its range; rare with six to 20 occurrences or few remaining acres.
G3	Either very rare and local throughout its range or found locally in a restricted range; uncommon with 21 to 100 occurrences.
G4	Apparently secure throughout its range, though it may be quite rare in some parts of its range, especially at the periphery; many occurrences.
G5	Demonstrably secure in its range, though it may be quite rare in some parts of its range, especially at the periphery; ineradicable under present conditions.
S1	Critically imperiled in Oregon; extremely rare with five or fewer occurrences or very few remaining acres.
S2	Imperiled in Oregon; rare with six to 20 occurrences or few remaining acres.
S3	Either very rare and local in Oregon or found locally in a restricted range; uncommon with 21 to 100 occurrences.
S4	Apparently secure in Oregon, though it may be quite rare in some parts; many occurrences.
S5	Demonstrably secure in Oregon, though it may be quite rare in some parts; ineradicable under present conditions.
U	Unknown
NA	Natural Heritage Rank not available
NR	Not Ranked

Appendix D – Work Scope Tasks and Criteria

Data Review

The Consultant shall review pertinent literature and other existing information as a basis for completing other tasks in this work scope. Pertinent literature will include, but is not limited to, the following sources:

1. The criteria sections of this work scope.

2. Existing published plant associations as a reference for identifying, delineating, naming, and describing the plant communities in the study area.

3. OPRD methodology for coding plant association and land cover polygons on presentation maps.

4. ONHIC (Oregon Natural Heritage Information Center) data on existing and historic vegetation in the study area.

5. National Wetland Inventory and/or Local Wetland Inventory mapping and any other available references that will assist in identifying and mapping wetlands in the study area.

6. ODA (Oregon Department of Agriculture) data and other available information on invasive exotic plant species within, or in the vicinity of, the study area that will assist in identifying and mapping exotic plants of particular concern.

7. ONHIC data and any other available information on at-risk plant species, including listed or candidate state or federal protected species, and/or species otherwise listed as rare by ONHIC. This shall include a review of the Natural Heritage Database for any known occurrences or historic sightings of rare species within, or in the vicinity of, the study area.

Aerial Photo Interpretation

The Consultant shall:

1. Review air photos and property boundary data provided by OPRD as a preliminary step in identifying and delineating plant association types and conditions.

2. Use the air photos provided by OPRD as base maps for the development of spatial data required by this work scope.

Field Mapping

The Consultant shall:

1. Make arrangements for access to the study area by coordinating with the appropriate park manager (see contacts section above).

2. Except in areas where OPRD has indicated that ground-truthing is not necessary, conduct site visits to each plant association polygon for the purposes described below :

    a. To verify and refine preliminary mapping and descriptions of plant association polygons;

b. To add map polygons for communities, which are not differentiable using aerial photography
alone.

c. To assess and document the characteristics of each plant association polygon using the criteria in this work scope;

d. To map at-risk plant species occurrences identified through data review or otherwise encountered during site visits to plant association polygons, and to map habitats that would likely support at-risk species (actual species occurrences shall be mapped using GPS technology, to the extent feasible);

e. To map wetlands identified through data review or aerial photo interpretation or otherwise encountered during site visits to plant association polygons (no formal determinations or delineations required);

f. To map invasive exotic plant species of particular concern identified through data review or otherwise encountered during site visits to plant association polygons.

If OPRD has not indicated any areas that do not need ground-truthing, the Consultant shall assume that ground truthing is necessary everywhere.

Note:
For mapping of wetlands, at-risk plant species, and invasive species of particular concern, the Consultant is not expected to search the ground for all such features that have not been identified through data review or air photo interpretation. Rather, the purpose is to map, as accurately as is feasible, such features that are encountered during site visits to plant association polygons, as well as those identified through data review or air photo interpretation.

The Consultant's draft findings may identify a need for more intensive survey for wetlands and at-risk plant species in specific areas where they are likely to occur and where they could be threatened by park uses. If such a situation arises, any additional work necessary may be negotiated and addressed in the form of a contract modification/amendment, at OPRD's discretion.

Criteria for Mapping and Characterizing Plant Communities, Conditions, and Other Land Cover Features

The Consultant shall:

1. Digitally map plant associations and their conditions in the study area using polygon coding and other mapping criteria developed by OPRD, discussed below. Mapping shall include native and non-native plant communities and other land cover features.

a) Plant communities shall be named and described according to their current and existing vegetation. Published classifications and associations shall only be used to name a community when the published description accurately describes the current species composition of the community – not the eventual or climax community. The standard naming conventions used by ONHIC and NatureServe shall be followed in creating a new plant association code. When plant communities are clearly very close to published associations, these similarities shall be noted for determination of conservation ranking (see 2.h., below). When

naming communities according to published plant associations, preference shall be given to use of the ONHIC names listed in "Classification of Native Vegetation of Oregon" (Kagan et al 2004). When a plant association is mapped as an early to mid-successional community, it may be appropriate to describe basic community origin and future trajectory in the text description for that community in the written report or in the comments field in the GIS tabular data. This might include indication of the likely climax association, when appropriate and feasible.

b) Upland plant association types as small as two acres shall be mapped as discrete polygons. Upland plant association types smaller than two acres shall be mapped at the discretion of the Consultant in cases where illustration as discrete polygons is important to the purpose of this work scope. Otherwise, these may be treated as inclusions in larger polygons and described as such in the written report. In cases where a habitat is made up of a complex mosaic of small (less than 2 acre), closely-related or inextricable communities, it may be necessary to name a plant community group - describing the component communities within the discussion of the larger group in the written report. Each park to be assessed under this work scope shall contain 10-25 distinct plant community-mapping types, or fewer. There may be more distinct plant communities than this identifiable on the ground, but for the purposes of master planning the communities will be aggregated for map and planning clarity. At the Consultant's discretion, more detail can be mapped as long as tabular data allows for aggregation into the coarser level needed for master planning. Following this later course of action might require the addition of an extra field to the tabular data.

c) All wetland plant communities and other surface water features that are identified through data review, aerial photo interpretation, or that are encountered during site visits (see note under "Field Mapping"), shall be mapped regardless of their size to the extent that such features can reasonably be illustrated separately from surrounding polygons. Use of GPS technology may be preferable in areas where the locations and/or boundaries of water features and wetlands are not evident in the aerial photography (especially in forested wetland situations).

2. Develop GIS data with attributes that characterize the native plant association polygons, and other land cover polygons, using the following fields as appropriate for each polygon:

a) OPRD mapping code for each plant association and land cover polygon (see section below "OPRD Mapping Codes").

b) Scientific name for each native plant association, using ONHIC / NatureServe classification format. No more than 3 species shall be used per canopy layer, unless there is a compelling reason for doing so. The reasons for citing more than 3 species per layer shall be detailed in the description of that community in the written report, and perhaps in the comments field of the GIS tabular data.

For example: Abies procera / Oxalis oregana

c) Common name for each native plant association, non-native plant community, or other land cover classification.

For example: noble fir / redwood sorrel

d) ONHIC / NatureServe acronym for each native plant association

For example: ABIPRO / OXAORE

e) Equivalent published association acronym, if applicable or discernable. Preference shall be given to ONHIC names.

In the example given above, this would be the same as the code assigned for item d: ABIPRO / OXAORE

f) NVCS (National Vegetation Classification System) alliance, following NVCS protocols

For example: Abies procera forest alliance

g) Habitat type for each native plant association, using the following land cover types (from the NVCS "Class"):

i. **Forest:** Trees with their crowns overlapping (generally forming 60-100% cover).
ii. **Woodland:** Open stands of trees with crowns not usually touching (generally forming 25-60% cover). Canopy tree cover may be less than 25% in cases where it exceeds shrub, dwarfshrub, herb, and nonvascular cover, respectively.
iii. **Shrubland:** Shrubs generally greater than 0.5 m tall with individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees generally less than 25% cover). Shrub cover may be less than 25% where it exceeds tree, dwarf-shrub, herb, and nonvascular cover, respectively. Vegetation dominated by woody vines is generally treated in this class.
iv. **Dwarf shrubland:** Low-growing shrubs usually under 0.5 m tall. Individuals or clumps overlapping to not touching (generally forming more than 25% cover, trees and tall shrubs generally less than 25% cover). Dwarfshrub cover may be less than 25% where it exceeds tree, shrub, herb, and nonvascular cover, respectively
v. **Herbaceous:** Herbs (graminoids, forbs, and ferns) dominant (generally forming at least 25% cover; trees, shrubs, and dwarf-shrubs generally with less than 25% cover). Herb cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and nonvascular cover, respectively.
vi. **Nonvascular:** Nonvascular cover (bryophytes, non-crustose lichens, and algae) dominant (generally forming at least 25% cover). Nonvascular cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and herb cover, respectively.
vii. **Sparse vegetation:** Abiotic substrate features dominant. Vegetation is scattered to nearly absent and generally restricted to areas of concentrated resources (total vegetation cover is typically less than 25% and greater than 0%). Types within the Nonvascular and Sparse Vegetation Classes have not been well developed. Sparse Vegetation types are primarily based on substrate features, rather than vegetation. As more information is gathered, these types shall be increasingly defined by their vegetation characteristics.
viii. **Disturbed** *(not in NVCS classes)***:** sites with heavily impacted vegetation, resulting in significant bare ground or nearly complete dominance of early seral invasive species. Examples of this cover type include quarries, gravel piles, stockpiles, slash/debris piles, wide road shoulders/pullouts, cutbanks, and fill slopes, etc.
ix. **Developed** *(not in NVCS classes)***:** landscaped areas dominated by non-native vegetation or other built environments, including structures and infrastructure. Examples include lawns, gardens, buildings, parking lots, campgrounds, and picnic areas.

x. **Agriculture** *(not in NVCS classes)*: farmed fields, pastures, and recently abandoned farming ground that still retains an agricultural character.

h) Age class for each forest or woodland polygon: A = old (or if appropriate, the model expression of the NVCS plant community – as in the case of disturbance-adapted environments such as certain savannas, floodplains, etc), B = mature, C = mid-aged, D = young. See "OPRD Mapping Codes", subsection 4, below.

i) Global and State Ranks representing conservation status of each native association, based on ONHIC ranking criteria – e.g. "G3S2". In cases where plant communities have been aggregated into a larger polygon due to inextricable community mixtures or the presence of small inclusions, the highest conservation rank of any of the component communities shall be assigned to the composite polygon. Where no recorded conservation rank is available for a community, the contractor shall use best professional judgment to assign an approximate state rank. This code shall be preceded by the character "~". Where a plant community is similar but not identical to an ONHIC-listed association, that ranking can be used – but this code should also be preceded by "~".

For example, consider the following communities found in a park:

1. ABIPRO/OXAORE
2. ABIPRO/UVWXYZ
3. ABIPRO/OXAORE-UVWXYZ

The first community, ABIPRO/OXAORE, is ranked by ONHIC as G1S1. It would be recorded as such in the tabular data.

The second community, ABIPRO/UVWXYZ is unranked. Assume best professional judgment indicates that the community is somewhat rare, but not immediately imperiled. This would result in coding the community as "~S3".

The third community, ABIPRO/OXAORE-UVWXYZ is very similar to but not identical to that which received the ranking. In this case the ranking could be recorded as "~G1S1".

j) OPRD condition rating representing the condition of each plant association (using condition rating criteria below): e = excellent condition, g = good condition, m = marginal condition, p = poor condition (see "Criteria for Ranking...", below)

k) Percent cover of exotic species. Do not use relative covers.

For example, consider a Douglas-fir forest with an extremely dense understory of English ivy and false brome. The forest canopy might provide 70% cover, while the ivy and false brome covers 80% of the ground beneath the canopy. In this case, the percent cover of exotic species (English ivy and false brome) would be reported as 80%, not 53% (80/150).

l) Wetland polygon indicator, representing wetland plant association types and other surface water features (yes/no/maybe/partially field). Use "partially" only if a polygon is an unmappable mosaic of wetland and upland community types; otherwise probable wetlands (as indicated by their plant communities) are to be mapped regardless of size.

m) Plant community development suitability rating. See "Criteria for Assigning Plant Community Suitability Ratings", below.

n) Field for other comments that are pertinent to the purpose of this work scope.

Criteria for Ranking Plant Community Condition

1. The condition of each plant association delineated as a discrete polygon shall be rated using the codes below, which shall represent the following conditions:

Condition "e" (excellent): Pristine or near pristine native plant community. Exotic plants typically have a significant presence in the species composition over less than 10 percent of the polygon. These communities will have little or no evidence of trampling, disturbance, or human management. Late seral second growth forest stands may still potentially be in excellent condition. Forested stands that are recovering from logging within the last 30-50 years will generally be in marginal to good condition because of rutting, compaction, invasive species, or other human impact.

Condition "g" (good): Native plant community generally of good vigor and condition. Exotic plants typically have a significant presence in the species composition over 10 to 30 percent of the polygon. Natural or Human-caused damage may be evident.

Condition "m" (marginal): Native plant community substantially degraded by intrusion of exotic plants or disturbance. Exotic plants typically have a significant presence in the species composition over 30 to 70 percent of the polygon. Or, the native plant community is substantially and unnaturally lacking in plant diversity (such as in dense, single species and age, early to mid- successional forest, or plantation forest, etc.). Factors that degrade the community may include sources such as wind-throw, fire, logging, brush removal, vandalism, trampling, flood, disease, and landslides.

Condition "p" (poor): Native plant community highly degraded or replaced by exotic plants. Exotic plants typically have a significant presence in the species composition over more than 70 percent of the polygon. Factors that degrade the community may include sources such as wind-throw, fire, logging, brush removal, vandalism, trampling, flood, disease, and landslides.

Note:
Discretion must be used in rating the plant association conditions. The estimated percentage of polygon area where exotic plants appear to be significant should not be the deciding factor in isolation from other factors. In assessing how "significant" the exotic species presence is, the degree of threat from the exotic species to the dominant native species, as well as to the native species diversity, should be considered. The Consultant shall rate the plant association conditions in consultation with OPRD, and describe the rationale supporting the condition ratings for each plant association polygon in the written report.

2. Polygons that represent predominantly unvegetated areas (e.g., deep water, recently

graded areas, paved or hard-scaped areas, buildings, etc.) shall not be ranked.

OPRD Mapping Codes

Plant community polygons shall be identified using OPRD's traditional mapping codes. These codes are assigned based on the concatenation of various site features:

1. **Land cover type prefix.**

a. **"F"= forest**
b. **"S"= shrub**
c. **"H"= herbaceous**
d. **"N"= non-vegetated**
e. **"V"= developed**
f. **"D"= disturbed.**
g. **"A"= agriculture**

2. **Sequential number of the community within the land cover type. There will likely be duplicates – i.e. more than one instance of a particular community in the study area.**

3. **Condition class, details above in "Criteria for Ranking Conditions of Plant Associations".**

4. **Age class (for forested communities only).**
   "A"= old. This age class is characteristic of oldgrowth forest, with many trees being over 150 years old. Vegetation is usually close to climax composition.

   "B"= mature. This age class corresponds to an age at which communities of this overstory species typically near climax understory species composition.

   "C"= mid-aged. This age class is still successionally transitional, sharing characteristics of mature and young stands.

   "D"= young. This age class generally still shows significant signs of the disturbance that killed the previous forest stand. Trees are typically small and young. The canopy layer is typically even-aged.

Examples:

1. **The third forested community described in the report might be a 35 year-old Douglas-fir/sword fern stand in poor condition. This would be coded as "F03-p(C)". For the purposes of calibration, a young Douglas fir stand would probably be 0-25 years old and a mature stand would be approximately 60-150 years old.**

2. **A native upland prairie in marginal condition that is the 5th described herbaceous community in the report would be coded as "H05-m"**

Criteria for Assigning Plant Community Suitability Ratings

Plant community suitability ratings shall be used to determine the appropriate locations for development, conservation, or restoration in the park, along with ratings of other factors including known occurrences of sensitive species, habitat, hazards, and cultural resources.

Ratings are numeric and range from 1 to 4, based on the matrices below:

For Non-Forested Habitats

	Special Designation*	Condition E	Condition G	Condition M	Condition P
Special designation*	1	1	1	1	1
Conservation rank S1	1	2	2	2	3
Conservation rank S2	1	2	2	3	3
Conservation rank S3	1	2	2	3	4
Conservation rank NA, S4,or S5	1	3	3	3	4
Developed or agricultural	1	4	4	4	4
(Containing) Definite wetland plant communities	1	2	2	2	2
(Containing) Possible wetland plant communities	1	2 if S1,S2,S3 3 if NA,S4,S5	2 if S1,S2,S3 3 if NA,S4,S5	3	3

For Forested Habitats (including woodlands)

	Special Designation*	Condition E	Condition G	Condition M	Condition P
Special designation*	1	1	1	1	1
Conservation rank S1	1	2 if age A,B,C 3 if age D	2 if age A,B,C 3 if age D	2 if age A,B 3 if age C,D	3
Conservation rank S2	1	2 if age A,B,C 3 if age D	2 if age A,B,C 3 if age D	2 if age A,B 3 if age C,D	3
Conservation rank S3	1	2 if age A,B 3 if age C,D	2 if age A,B 3 if age C,D	2 if age A 3 if age B,C,D	4
Conservation rank NA, S4, or S5	1	2 if age A,B 3 if age C,D	2 if age A 3 if age B,C,D	3	4
Developed	1	4	4	4	4
(Containing) Definite wetland plant communities	1	2	2	2	2
(Containing) Possible wetland plant communities	1	2 if S1,S2,S3 3 if NA,S4,S5	2 if S1,S2,S3 3 if NA,S4,S5	3	3

** for the purposes of this matrix, "special designation" means that the polygon is part of a conservation area such as a Natural Heritage Conservation Area, a Research Natural Area, an Area of Critical Environmental Concern, a designated Wilderness, a conservation easement, or a Habitat Conservation Plan.*

Criteria for Mapping At-Risk Plant Species

1. The Consultant shall map known occurrences of at-risk plant species in the study area in an acceptable GIS format (see section below on final mapping products).

    a. Mapping of at-risk species shall include both occurrences identified in research of existing information, and any new occurrences found during site visits. (See note under "Field Mapping.")

    b. All at-risk plant species occurrences identified in the study area shall be mapped, regardless of the size of the site. For the purposes of this assessment, at-risk is defined as all species that are either

1. Species that are currently listed, proposed for listing, or candidates for listing as endangered or threatened under the federal or state Endangered Species Acts.

2. Federal (US Fish and Wildlife) species of concern.

3. Species that are not in either of the preceding categories, but which are listed by ONHIC (lists 1-4).

    c. In cases where sites of identified at-risk species are not readily and accurately mappable using aerial photography, use of GPS technology or informal surveying may be necessary to assure accurate site location information. Informal surveying may be done with a compass and string box (or other system of measurement of distance) from photo-identifiable points, or sites may be mapped using triangulation. If a string box is used, the string shall be removed from the site after the measurements are completed.

2. The Consultant shall digitally map areas that provide potential habitat for federally and/or state listed or candidate plant species

    a. All areas where state or federally listed or candidate plant species have potential to occur shall be mapped, regardless of polygon size.

    b. Areas providing habitat for other at-risk species such as those listed by ONHIC (but not by the state or federal ESAs) may be mapped at the discretion of the Consultant.

Criteria for Mapping Invasive Exotic Plant Species of Particular Concern

The Consultant shall digitally map invasive exotic plant species of particular concern that are identified within, or in the immediate vicinity of, the study area.

1. For the purposes of this project, OPRD considers all ODA "A" and "T" list species, as well as all "B"list species ***except*** the following to be of particular concern:
    a. Scotch broom — *Cytisus scoparius*
    b. St. John's wort — *Hypericum perforatum*
    c. Himalayan blackberry — *Rubus discolor/ armeniacus/ procerus*
    d. Evergreen blackberry — *Rubus laciniatus*
    e. Canada thistle — Cirsium arvense
    f. Bull thistle — Cirsium vulgare
    g. Tansy ragwort — Senecio jacobea

    The excluded B-list species are widespread and firmly established in western Oregon. Their mapping is required only if they form large enough populations to be mapped as distinct plant communities, or if the populations are isolated enough to be significant (because, for example, they are manageable in size and/or are of high treatment priority from an ecological viewpoint). Determination of significant isolation shall be based on the Consultant's best professional judgment.

2. The mapping shall include all identified occurrences of exotic plants of particular concern, regardless of the size of the occurrence.

3. Mapping of exotic plants of concern shall include occurrences identified from review of available existing data as well as occurrences located during site visits. (See note under “Field Mapping.”)

4. In cases where sites of identified exotic plants of concern are not readily and accurately mappable using aerial photography, the use of GPS technology or informal surveying may be necessary to assure accurate site location information. Informal surveying may be done with a compass and string box (or other system of measurement of distance) from photo-identifiable points, or sites may be mapped using triangulation. If a string box is used, the string shall be removed from the site after the measurements are completed.