Iron Mountain Plant Inventory Report

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Iron Mountain is divided into two relatively distinct forest stand cover types. One that is dominated by a mixed species Douglas fir forest and the other is dominated by primarily Oregon white oaks (Figure 1). The habitats overlap minimally and are generally separated by the trail crossing Iron Mountain within the upper third of the slope.

For each of the forest stand types transects were installed 300’ apart (Figure 2), perpendicular to the slope, and the number of plots was calculated to ensure that one plot represented approximately two acres in the Douglas fir dominated stands and one plot represented approximately each acre of the white oak dominated stands (Figure 3). In addition to the installation of transects, multiple wandering transects were installed.

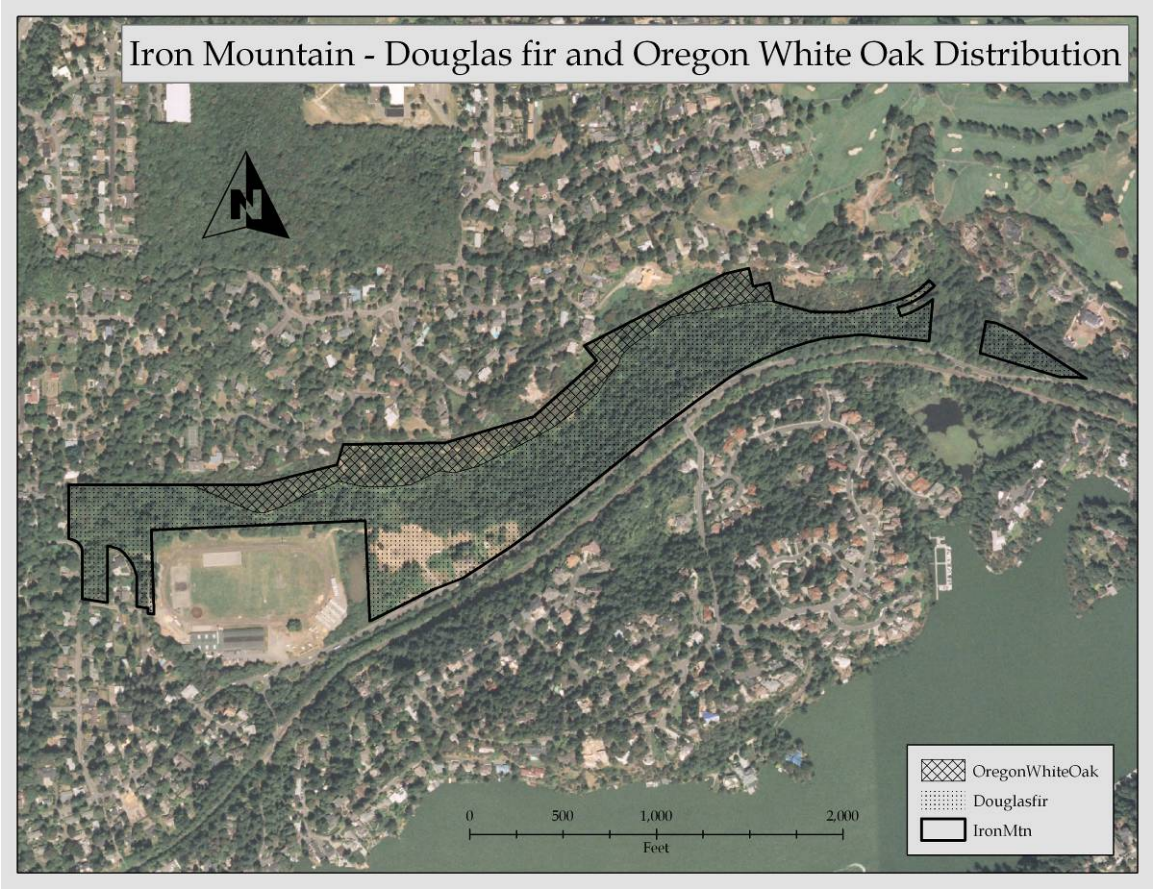

Figure 1. Relative locations of Douglas fir/big leaf maple and Oregon white oak dominated stands on Iron Mountain.

For the purposes of sampling the Douglas fir dominated stands, which is relatively uniform in species composition, distribution and cover and equals approximately 40.26 acres, plots were measured and installed every 300’ along each transect using a Fieldranger hip chain. Sampling at an intensity of one plot per acre was not needed as the uniformity of cover and diversity lends itself well to a less intense sampling method but ensures adequate sampling and representation of the species on site.

When sampling the white oak dominated stands, which had a calculated area of 10.71 acres, plots were also measured using the Fieldranger hip chain, but were installed every 100’ along each transect. Given the relatively smaller habitat dominated by the oaks necessitated a more intense sampling protocol to ensure adequate representation of the species within the oak dominated stands.

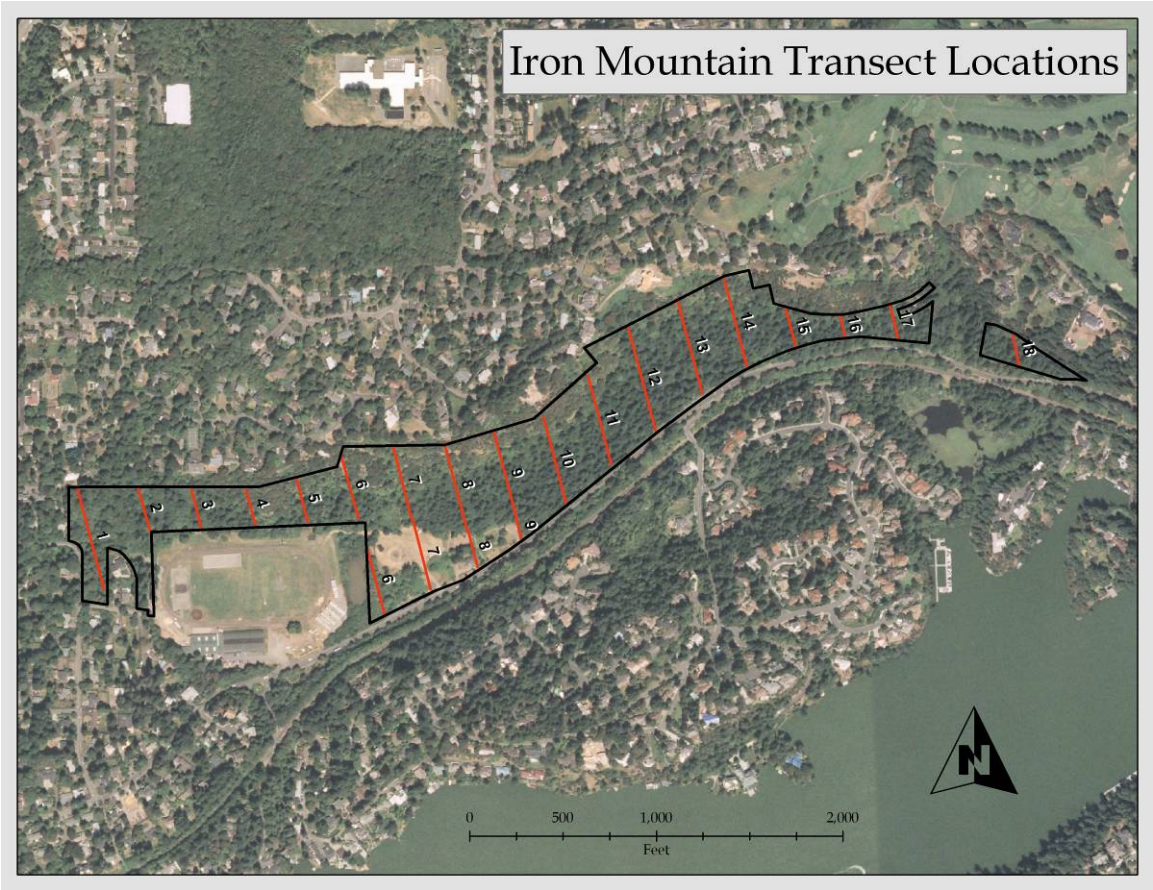

Figure 2. Location of plant inventory transects on Iron Mountain.

Following is a break down of how plots were organized in each of the habitats present on Iron Mountain:

1. Douglas fir dominated stands
    Stand size: 40.26 acres
    Plot size: 11.8’ radius
    Distance between transects: 300’
    Distance between plots: 300’
    Number of plots: Approximately 20, 1 plot for approximately every 2 acres

2. Oregon white oak dominated stands
    Stand size: 10.71 acres
    Plot size: 11.8’ radius
    Distance between transects: 300’
    Distance between plots: 100’
    Number of plots: 10, 1 plot for approximately each acre

The methodology for installing and gather plot data is as follows:

Circular plots, 11.8’ in radius measured with a Spencer tape, were installed along transects aligned perpendicular to the predominant topography of Iron Mountain. Plots were marked with pink and blue flagging.

Plots were spaced as indicated above and all vegetation within each plot was identified and percent cover estimated according to the Braun-Blanquet cover-abundance scale. Diameter at breast height (DBH, which is approximately 4.5' from the ground) of all trees was measured and recorded by species (see attached plot data).

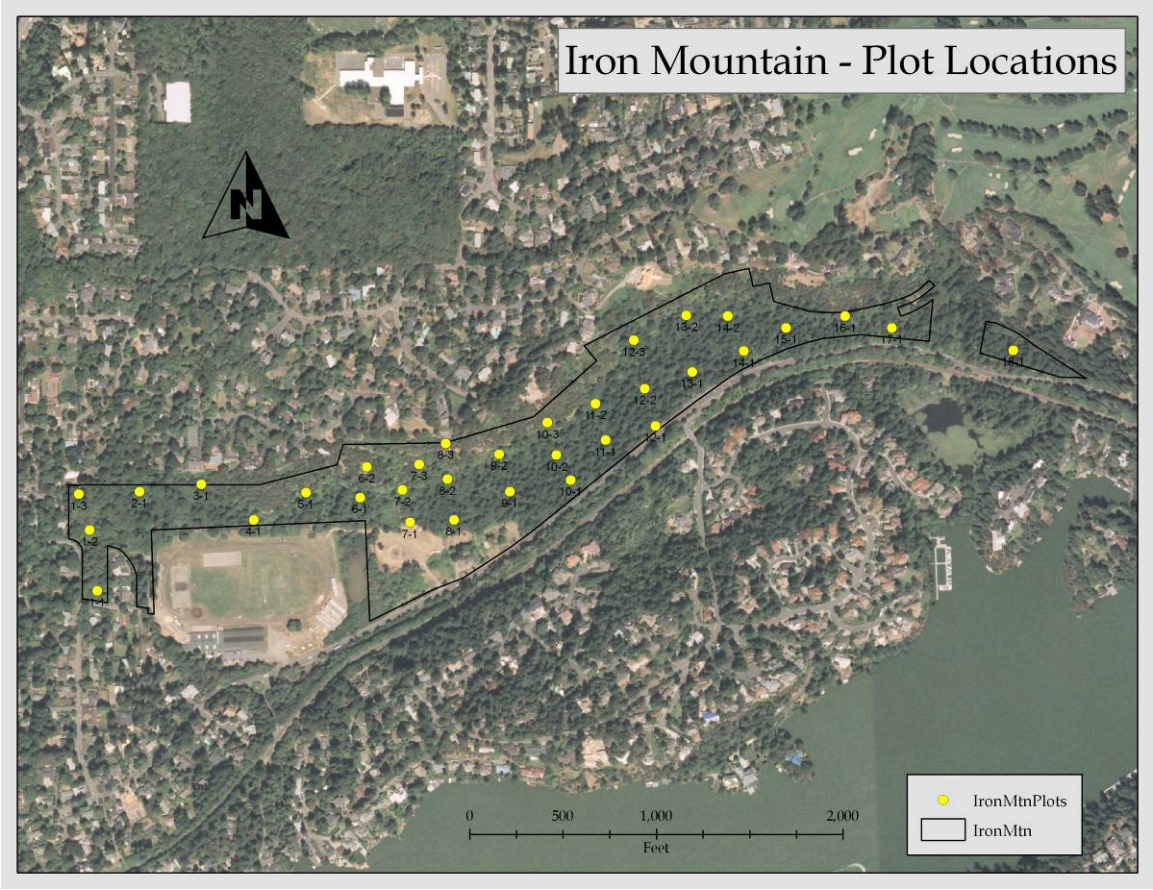

Figure 3. Numbered plot locations on Iron Mountain. Plots are numbered first by associated transect and secondly by the number of plots per transect.

Below details the methodology for installing and completing the wandering transects:

These are transects designed to capture plant species present at Iron Mountain but that may not fall within the plots installed as conducted above. When combined with the formally measured and installed plots, the wandering transect technique enabled the compilation of a relatively comprehensive plant list. Wandering transects will follow the same layout as the plots and transects but differ in that all species observed are recorded and no formally measured plots are installed.

Summary – Data analysis

For analysis plots have been separated by the main two dominant forest stands (i.e. Douglas fir or Oregon white oaks) and briefly discussed below. As previously stated, Iron Mountain is dominated by Douglas fir and Oregon white oak stands the understories of which are primarily a mix of native shrubs and herbaceous plants competing with dense and threating populations of establishing non-native woody and herbaceous species.

Douglas fir dominated stand

Iron Mountain is primarily dominated by a Douglas fir/big leaf maple association compromising approximately 40 acres which, for a visual representation, is similar to the southwest portion of Cook's Butte (see attached survey list of observed species). Observed tree species in the Douglas fir stands range in diameter from 4 to 40 inches when measure at 4.5' from the ground.

The Douglas fir dominated stands are represented by dense, nearly single canopy populations of Douglas fir and interspersed big leaf maple. Other tree species that occurred in the understory of the Douglas fir dominated stands include Pacific madrone, western red cedar, English hawthorn, English holly, Pacific yew, cascara, non-native cherries and one species of non-native plum. Other tree species that occur in the lower third of the slope, as well the southern edge environment include black cottonwood, pacific willow, scouler willow, Oregon ash, black locust, horse chestnut and red alder.

Shrubs that occurred most frequently in the Douglas fir dominated stands include, vine maple, serviceberry, western wahoo, ocean spray, orange trumpet honeysuckle, poison oak, indian plum, mock orange, thimbleberry, tall Oregon grape, low Oregon grape, baldhip rose, snowberry and hazelnut.

The most frequently occurring native herbaceous plants in the understory include sword fern, fringe cup, lady fern, Dewey sedge, Oregon drops of gold, inside out flower, wood strawberry, pacific waterleaf, false lily of the valley, sweetcicley, Pacific trillium and wood violet.

Non-native species are present throughout the understory and were observed on every installed plot and along every wandering transect. English ivy is the most dominant non-native species, having an observed cover of 75-100% on most plots, and is evenly distributed throughout the Douglas fir dominated stands (Figure 1). Other non-native

species less dominant in cover, when compared to English ivy, but observed throughout the understory within the Douglas fir dominated stands, and especially present along the southern edge as well as along Iron Mountain Road (Figure 1) include English holly, English laurel, clematis, Armenian blackberry, English hawthorn, garlic mustard, herb robert and nipplewort. One satellite population of garlic mustard was found between plots 7-3 and 8-3 (Figure 3).

Non-native herbaceous species, such as Canada and bull thistles, annual sow thistle, Queen Anne's lace, common mullen, meadow foxtail, burdock, chickory, Scot's broom, bindweed, poison hemlock, teasel and clover are ubiquitous in presence throughout the Douglas fir dominated stands but are highest in cover where wandering transects intersected the southern edge of Iron Mountain as well as boarding nearly all of the existing trails.

Oregon white oak dominated stand

The upper approximately 10 acres of Iron Mountain is steep and covered by relatively loose and rocky soils, dominated by Oregon white oaks. The understory of the oak dominated stands are primarily herbaceous being represented by many native and non-native graminoid and forb species, with multiple dense clusters of native shrub species as well (see survey list of observed species). Oaks were relatively short, with an open grown habit and ranged in diameter from 4 to 16 inches measured at 4.5' from the ground

Dominant shrubs species, occupied dense, interspersed clusters often beyond the drip line of the oaks, primarily consisted of poison oak, tall Oregon grape, snowberry, ocean spray, orange trumpet honeysuckle and serviceberry.

Several understory herbaceous species present on Iron Mountain have been rarely documented in the Portland metro area (*Cynoglossum grande* and *Lomatium* sp.) and at least one herbaceous species observed (*Delphinium pavonaceum*), that should be monitored and keyed for identification verification during the flowering period of 2013, is listed federally as endangered and might be the first report of this species in the Portland metro area. The most dominant understory herbaceous species observed was shiny leaf geranium, which is a common non-native species that is particularly threatening to those species typically found in the understory of Oregon white oaks. Shiny leaf geranium is highly competitive and a prolific seed producer which is able to displace most oak associated herbaceous species, including those that are rare and endangered. This habit often results in an overall loss of species diversity and a dense, non-native monoculture, which can fundamentally change the functional properties of oak woodlands.

Management recommendations

As the majority of the site is in relatively good condition, the following recommendations are for the general control of non-native species throughout the entire acreage of Iron Mountain and can be used as a starting point for reducing the overall dominance of non-native species and shifting dominance towards the native species in the park. A

comprehensive plan will be necessary prior to the initiation of control efforts, however, the information below may be of assistance.

Prior to initiating any control efforts a surveyor should be employed to mark the entire Iron Mountain boundary within Lake Oswego ownership. Marking the boundary will ensure the avoidance of trespassing onto private property and will expedite the work of city employees, volunteers or contract crews during non-native species control efforts and subsequent replanting and maintenance.

Notify park users and stakeholders well in advance of starting any control efforts and reach out to neighboring landowners where populations of non-native species may persist so that they may be controlled as well.

Seek to control all non-native species balanced with seasonality of sensitive and native woody and herbaceous plants. Many non-native species are found both in the Douglas-fir stands as well as the Oregon oak stands and as the seasonal cycles of the native species must be considered when developing a non-native species management plan so to must the seasonal cycles of the non-native target species. This can prove to be a difficult task, however, a suitable non-native species management plan for Iron Mountain may appear as outlined in Table 1.

Site	Treatment	Season	Notes
Douglas fir stands	Spot spray ivy and blackberries. Stump treat hawthorn, holly and laurels.	Year 1 - Late fall/early winter	Time treatment to occur after most native plants have entered dormancy. Leave stumps 6-10” high for re-treatment as needed.
Douglas fir stands	Hand cutting	Year 2- Early summer	Mechanically reduce all dead and live blackberries to facilitate future treatments. Time cutting with active flowering of blackberries.
Douglas fir stands	Spot spray ivy, blackberries and clematis. Stump treat skipped or resprouting hawthorn, holly and laurels.	Year 2 - Early summer	Target those areas free of native herbaceous plants, exercise caution around native vegetation. Cut and treat clematis vines.

Douglas fir stands	Spot spray ivy and blackberries. Stump treat non-native trees	Year 2- Late fall/early winter	Treat ivy and blackberries. Treat non-native trees.
Douglas fir stands	Planting	Year 3-Late winter/early spring	Install woody and herbaceous plants in areas free of non-native species.
Douglas fir stands	Spot spraying and Planting	Years 4 and beyond	Spot spray ivy and other non-natives as encountered and as seasonally effective, introduce additional native species with volunteers or crews.
Oak Woodland	Spot spray all non-native species	Year 1- Early fall	Target all non-natives, including non-native trees, as most herbaceous native species will be dormant at this time. Avoid chemicals with soil residual effects.
Oak Woodland	Survey and study	Year 2- Spring/Summer	Study plant species present, note timing of growth and flowering to plan follow up spring and summer treatments
Oak Woodland	Spot spray all non-native species	Year 2- Early Fall	Spot spray all non-native species after native herbaceous species have entered dormancy.
Oak Woodland	Spot spray all non-native species	Year 3- Spring/summer	Time treatments to target shiny leaf geranium and other non-native herbaceous species.
Oak Woodland	Planting	Year 3- Fall/Winter	Sow native grass. Use of native grasses allows the continued use of broadleaf

			selective herbicides while building a native grass seed bank.
Oak Woodland	Survey and study, as well as Spot spray all non-native species	Year 4- Spring/summer	Time treatments to target shiny leaf geranium and other non-native herbaceous species as encountered. Survey for native herbaceous plants of interest and work with Metro, or other partners, to propagate plugs and bulbs to increase frequency and diversity of native herbaceous wild flowers in this area.

Table 1. Conceptual non-native species control and native plant reestablishment prescription for Iron Mountain.