

**WEST TRAIL STUDY AREA**

**NATURAL RESOURCE INVENTORY REPORT**

**September 24, 2008**

*Prepared by:*  
ERO Resources Corp.

*Prepared for:*  
City of Boulder Open Space and Mountain Parks



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NATURAL RESOURCE INVENTORY REPORT

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Appendix A – Field Survey Reports

## **SECTION 1. WEST TSA CONTEXT**

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### **Project Purpose and Description**

The City of Boulder Open Space and Mountain Parks Department (OSMP) is initiating a Trail Study Area (TSA) planning process for the OSMP-managed lands on the western edge of the City of Boulder. This study area is called the West TSA (Figure 1). The overall purpose of the TSA process is to evaluate existing designated and undesignated trails and provide recommendations and implementation alternatives for trail improvements, resource protection measures, and trail uses and management.

The purpose of this Natural Resource Inventory Report is to provide OSMP with a scientifically-based analysis of a key set of wildlife species that occur within the West TSA and are indicators for habitat condition and sensitivity. This information will be used during the TSA planning process to inform decisions about habitat conservation and trail design and management.

This inventory focuses on three areas:

1. Background, life history, and local occurrences of each indicator species
2. Sensitivity of indicator species to trails and public use
3. Evaluation of habitat condition and trail management issues in the West TSA

### **Surrounding Land Ownership**

The West TSA is primarily bounded to the east by privately-owned residential and commercial land within the City of Boulder. One notable exception is the National Center for Atmospheric Research complex (U.S. Government), which occupies a large mesa near the center of the east boundary.

Most of the south boundary is surrounded by private lands along Eldorado Springs Drive, except for Eldorado Canyon State Park, which is contiguous with the southernmost boundary of the TSA. The southwest corner of the TSA is dominated by Boulder County's Walker Ranch Open Space, as well as several private residential parcels on the slopes above South Boulder Creek.

The western margins of the TSA are dominated by a patchwork of private residential lands, OSMP lands, and conservation easement lands along Bison Drive. Boulder County's Betasso Preserve and newly-acquired Benjamin Open Space are located to the west of the TSA, just north of Boulder Creek. The north and northwestern margins of the TSA are dominated by private, rural residential lands.

## **Background Resources**

The West TSA encompasses about 10,670 acres of OSMP-managed lands in the foothills immediately west of the City of Boulder. The TSA extends from South Boulder Creek and Eldorado Canyon State Park on the south side to Mount Sanitas 7 miles to the north. The West TSA is shown in Figure 1.

## **Topography**

The West TSA encompasses the transition between the Great Plains physiographic province and the foothills of the Southern Rocky Mountains, and includes large portions of both. Elevations range between about 5,300 feet at the easternmost point to around 8,500 feet at the highest peaks (including South Boulder Peak, Bear Peak and Green Mountain).

## **Geology**

The study area is located along the Front Range Mountains (the easternmost range of the Southern Rocky mountains). The Front Range contains rock formations dating back to 1.7 billion to 65 million years, as well as unconsolidated surficial deposit laid down over the past 2 million years (Mieras 1996). Bedrock in the area generally trends north-south with upturned layers of sedimentary rock lying against the older igneous and metamorphic core of the mountains (Mieras 1996).

Within the study area, the mountains west of Flatirons and the Dakota Ridge Hogbacks are composed of igneous rocks of Precambrian age (1.7 b.y.a). Generally these mountains contain Granitic rock, which includes Granites, Quartz Monzonites and unnamed granitic rocks (Tweto 1979). South Boulder Peak, Green Mountain, and Flagstaff Mountain among others, are included in this category.

Younger rock formations, including the Flatirons and the Dakota Ridge Hogbacks, are found along the eastern slopes, closer to the base of the foothills. The Flatirons are composed of sedimentary rocks of Triassic, Permian and Pennsylvanian age (325 to 190 m.y.a). The Flatirons include Lykins, Lyons and Fountain formations, which contain red siltstone, sandstone and conglomerate (Mieras 1996; Tweto 1979). The Dakota Ridge Hogbacks, which lay east of the Flatirons, are composed of sedimentary rock of Jurassic and Cretaceous age (190 to 65 m.y.a). The sandstone beds of the Dakota Hogbacks include Dakota Groups rocks, Morrison, Sundance and Ralston Creek Formations (Tweto 1979).

Lower elevations areas, east of the Dakota Hogbacks, extending into the basin, are underlain by younger sedimentary rocks and unconsolidated surficial deposits of Cretaceous and Quaternary age (136 to <2.0 m.y.a). These areas include all units of Pierre Shale (which contain areas of sandstone), as well as older gravels and alluviums, and modern alluviums (Mieras 1996; Tweto 1979).

## **Soils**

The Natural Resources Conservation Service (NRCS) has mapped fourteen soil types in the study area. Each mapping unit is described below and Figure 2 shows the NRCS soil mapping. All soil information was gathered from the NRCS soil survey (NRCS 1975).

**Mapping Unit BaF. Baller stony sandy loam** (9 to 35 percent slopes). This soil includes small areas near the bottoms of slopes that have a sandy loam surface layer and a sandy clay loam subsoil. Also included near ridgetops, are small areas of Rock outcrop. Runoff is rapid and the erosion hazard is high. These soils are used principally as native pastureland. Principal native plants are blue grama, cactus, yucca, green needlegrass, sand dropseed, and scattered juniper.

**Mapping Unit Cu. Colluvial Land.** This soil has a sandy loam to clay subsoils and a sandy loam surface layer with varying amounts of stones and cobbles. This soil type is found in long narrow valleys and can be used for grass; however, stones and cobbles on the surface typically interfere with cultivation. Colluvial land receives runoff from adjacent slopes and the erosion hazard is high.

**Mapping Unit FcF. Fern Cliff-Allens Park-Rock outcrop complex** (15 to 60 percent slopes). This soil includes small areas of Fern Cliff stony loam sand, Juget soils, Peyton soils, and narrow bands of alluvial soils along drainageways. Runoff is medium to rapid and the erosion hazard is high. Native vegetation is mainly pine and fir woodland with an understory of fescue, mountain muhly, and pine dropseed.

**Mapping Unit GP. Gravel Pits and Mine Dumps.** (No description).

**Mapping Unit GrF. Goldvale-Rock outcrop complex** (9 to 55 percent slopes). This complex includes Goldvale stony coarse sandy loam and Rock outcrop. Also included with this complex are minor amounts of shallow soils on ridgetops, and alluvial soils along the edges of streams and drainages. Runoff is rapid and the erosion hazard is high. Principal native vegetation is lodgepole pine and spruce, with a grass understory.

**Mapping Unit HaD. Hargreave fine sandy loam** (3 to 9 percent slopes). This soil includes other Hargreave fine sandy loams, shallow soils, wet areas, and sandstone outcrop. Runoff is medium to rapid and the erosion hazard is moderate to high. Native vegetation blue grama and western wheatgrass.

**Mapping Unit JrF. Juget-Rock outcrop** (9 to 55 percent slopes). This soil includes small areas of Peyton soils near drainageways and a few small areas of Allens Park soils. Runoff is high and the erosion hazard is high. Native vegetation consists of spruce and fir at higher elevations and ponderosa pine, Gambel oak, mountain mahogany, and grasses at lower elevations.

**Mapping Unit KuD. Kutch clay loam** (3 to 9 percent slopes). This soil includes small areas of Nunn clay loam, Samsil clay, Renohill silty clay loam, and Shingle loam. In some places scattered gravel and cobblestones are on the surface. Runoff is rapid and the erosion hazard is high. Native vegetation is western wheat, blue grama, sage, and cactus.

**Mapping Unit NdD. Nederland very cobbly sandy loam** (1 to 12 percent slopes). This soil includes areas that lack a sandy clay loam subsoil and are very stony and cobbly throughout. Also included in this soil are small areas of Valmont cobbly clay loam. Runoff is slow to medium and the erosion hazard is slight. Native vegetation is blue grama, needleandthread grass, and western wheatgrass.

**Mapping Unit Nh. Niwot soils** (0 to 1 percent slopes). This soil includes small almost barren gravel bars and small areas of Loveland soils. Also included in this soil are unnamed sandy soils. This soil type is found on flood plains or low terraces. Runoff is slow and the erosion hazard is slight except for back cutting near channels. Principal native vegetation is brome grass, orchard grass, wheatgrass, junegrass, and water-tolerant grasses and sedges.

**Mapping Unit PgE. Peyton-Juget very gravelly loamy sands** (5 to 20 percent slopes). This soil includes areas of rock outcrop and a few small areas of Allens Park soils. Runoff is slow to medium and the erosion hazard is moderate to high. Native vegetation is bluestem, sandreed grass, blue grama, and needleandthread grass.

**Mapping Unit PrF. Pinata-Rock outcrop complex** (5 to 55 percent slopes). This complex includes Pinata very stony loamy fine sand and Rock outcrop. Also included in this complex are small areas of Pinata-like soil overlying sandstone and a few areas of Colluvial land. Runoff is medium to rapid and the erosion hazard is high. These soils are used for rangeland, woodland, and wildlife. Vegetation is ponderosa pine, Douglas fir, and some juniper and oak brush.

**Mapping Unit Ro. Rock outcrop.** These areas consist of steep slopes and cliffs composed of mixed materials, including granite, sandstone, shale, and limestone. Rock Outcrop is mainly used for watershed and wildlife habitat; however, many areas are also used for recreational purposes such as climbing and hiking.

**Mapping Unit SmF. Sixmile stony loam** (10 to 50 percent slopes). This soil is typically found on western side of steep ridges and includes narrow bands of Rock outcrop and rock escarpments. Also included in this soil are small areas of Colluvial land. Runoff is rapid and the erosion hazard is high. Principal native vegetation is blue grama, western wheatgrass, and cactus.

**Mapping Unit Te. Terrace escarpments.** These areas consist of undifferentiated shallow soils that have many cobbles and stones on the surface. In many places there is merely a thin layer of cobbles over sandstone or shale. Only limited moisture is available for plants because these undifferentiated soils are shallow. Runoff is rapid and the erosion hazard is high.

**Mapping Unit VaB. Valmont clay loam** (1 to 3 percent slopes). This soil includes small areas of Valmont cobbly clay loam and Nunn clay loam. The surface layer is about 9 inches of clay loam and the subsoil is about 6 inches of clay that grades into limy clay loam about 14 inches thick. Runoff is medium and the erosion hazard is moderate. Principal native vegetation is blue grama, western wheatgrass, and cactus.

**Mapping Unit VaC. Valmont clay loam** (3 to 5 percent slopes). This soil includes other Valmont clay loams, Nunn clay loam, and Valmont cobbly clay loam. Runoff is rapid and the erosion hazard is moderate.

**Mapping Unit VcE. Valmont cobbly clay loam** (5 to 25 percent slopes). This soil includes Valmont clay loams. Runoff is medium and the erosion hazard is slight to moderate.

## **Hydrology**

The West TSA bisected by several major perennial streams, and numerous intermittent drainages (Figure 3). The most prominent streams include South Boulder Creek (which defines the south TSA boundary) and Boulder Creek, both of which are major drainages of regional significance. Several smaller drainages define the canyons along the eastern slopes of the TSA. These include (from north to south): Sunshine Creek, Gregory Creek, Bluebell Creek, Skunk Creek, Bear Creek, Fern Canyon Creek and Shadow Canyon Creek.

The western flanks of the TSA are drained by Lost Gulch, which runs to the north towards Boulder Creek, and Harmon Gulch and Woods Gulch which drain into Martin Gulch before reaching South Boulder Creek in the southwest corner of the TSA.

## **Vegetation Communities**

Vegetation in the West TSA is characterized by mixed coniferous forests through the mountainous terrain, and open grasslands dominating the eastern slopes. OSMP has identified and mapped vegetation based on the U.S. National Vegetation Classification format, which classifies Formations (general ecosystem) and Associations and Alliances (vegetation communities). Specific vegetation subclass types identified in the West TSA are shown on Figure 4 and are briefly described below.

### ***Forests and Woodlands***

Most of the study area is dominated by evergreen woodlands dominated by ponderosa pine and Douglas fir. Deciduous forests and woodlands, characterized by aspen, box elder, and narrowleaf cottonwood are much less abundant and are generally associated with riparian corridors.

| <b>Formation</b>                | <b>Alliance</b>   | <b>Acres</b>   |
|---------------------------------|---|----------------|
| <b>Evergreen Forest</b>         | Douglas Fir Forest Alliance                                     | 513.3          |
|                                 | Lodgepole Pine Forest Alliance                                  | 0.8            |
|                                 | Ponderosa Pine - Douglas-fir Forest Alliance                    | 2,008.2        |
|                                 | Ponderosa Pine - Quaking Aspen Forest Alliance                  | 49.9           |
|                                 | Ponderosa Pine Forest Alliance                                  | 619.8          |
|                                 | Quaking Aspen - Douglas-fir Forest Alliance                     | 0.7            |
|                                 | Other   | 3.1            |
|                                 | <b>Evergreen Forest Total</b>                                   |                |
| <b>Evergreen Woodland</b>       |   | 49.1           |
|                                 | Douglas-fir Temporarily Flooded Woodland Alliance               | 25.3           |
|                                 | Douglas-fir Woodland Alliance                                   | 156.6          |
|                                 | Netleaf Hackberry Woodland Alliance                             | 0.2            |
|                                 | Ponderosa Pine - Douglas-fir Woodland Alliance                  | 1890.7         |
|                                 | Ponderosa Pine Temporarily Flooded Woodland Alliance            | 5.1            |
|                                 | Ponderosa Pine Woodland Alliance                                | 2,227.8        |
| <b>Evergreen Woodland Total</b> |   | <b>4,355.5</b> |
| <b>Deciduous Forest</b>         |   | 1.3            |
|                                 | Box-elder Temporarily Flooded Forest Alliance                   | 24.3           |
|                                 | Green Ash - (American Elm) Temporarily Flooded Forest Alliance  | 12.3           |
|                                 | Narrowleaf Cottonwood Temporarily Flooded Forest Alliance       | 14.8           |
|                                 | Paper Birch Forest Alliance                                     | 0.7            |
|                                 | Ponderosa Pine - Douglas-fir Forest Alliance                    | 1.8            |
|                                 | Ponderosa Pine - Quaking Aspen Forest Alliance                  | 0.9            |
|                                 | Quaking Aspen - Douglas-fir Forest Alliance                     | 6.5            |
|                                 | Quaking Aspen Forest Alliance                                   | 21.2           |
|                                 | Quaking Aspen Temporarily Flooded Forest Alliance               | 43.3           |
|                                 | Quaking Aspen Woodland Alliance                                 | 0.7            |
| <b>Deciduous Forest Total</b>   |   | <b>127.2</b>   |
| <b>Deciduous Woodland</b>       |   | 18.5           |
|                                 | Box-elder Temporarily Flooded Woodland Alliance                 | 34.2           |
|                                 | Crack Willow (introduced) Temporarily Flooded Woodland Alliance | 1.0            |
|                                 | Douglas-fir Temporarily Flooded Woodland Alliance               | 2.5            |
|                                 | Eastern Cottonwood Temporarily Flooded Woodland Alliance        | 29.6           |
|                                 | Narrowleaf Cottonwood Temporarily Flooded Woodland Alliance     | 36.0           |
|                                 | Netleaf Hackberry Woodland Alliance                             | 11.9           |
|                                 | Non-Native Dominated Temporarily Flooded Woodland               | 5.9            |
|                                 | Peachleaf Willow Temporarily Flooded Woodland Alliance          | 2.8            |
|                                 | Ponderosa Pine Temporarily Flooded Woodland Alliance            | 3.1            |
|                                 | Quaking Aspen Woodland Alliance                                 | 3.2            |
| <b>Deciduous Woodland Total</b> |   | <b>148.8</b>   |
| <b>Grand Total</b>              |   | <b>7,827.2</b> |

***Perennial Graminoid Vegetation (Grasslands)***

Open grasslands dominated by perennial graminoid vegetation dominate the eastern slopes of the TSA, including a large area in the southeast corner known as the Shanahan Mesa and several small to medium sized forest openings and meadows on the western margins of the TSA.

| <b>Formation</b>                                 | <b>Alliance</b>  | <b>Acres</b>  |
|--|--|---------------|
| <b>Perennial Graminoid Vegetation</b>            |  | 903.7         |
|  | Baltic Rush Seasonally Flooded Herbaceous Alliance           | 75.8          |
|  | Big Bluestem - (Yellow Indiangrass) Herbaceous Alliance      | 939.7         |
|  | Canada Bluegrass Semi-Natural Herbaceous Alliance            | 3.5           |
|  | Clustered Field Sedge Seasonally Flooded Herbaceous Alliance | 2.3           |
|  | Emory Sedge Seasonally Flooded Herbaceous Alliance           | 0.6           |
|  | Green Needlegrass Herbaceous Alliance                        | 1.6           |
|  | Intermediate Wheatgrass Semi-natural Herbaceous Alliance     | 8.4           |
|  | Little Bluestem - Sideoats Grama Herbaceous Alliance         | 8.0           |
|  | Mountain Muhly Herbaceous Alliance                           | 10.3          |
|  | Mountain-mahogany Shrub Herbaceous Alliance                  | 5.1           |
|  | native seed restoration                                      | 3.0           |
|  | Nebraska Sedge Seasonally Flooded Herbaceous Alliance        | 4.6           |
|  | Needle-and-Thread - Blue Grama Herbaceous Alliance           | 24.1          |
|  | Parry's Oatgrass Herbaceous Alliance                         | 2.7           |
|  | Perennial Graminoid Disturbance Community                    | 37.4          |
|  | Ponderosa Pine Tallgrass Savannah Herbaceous Alliance        | 430.8         |
|  | Ponderosa Pine Wooded Mixed Herbaceous Alliance (Savannah)   | 398.6         |
|  | Ponderosa Pine Woodland Alliance                             | 3.6           |
|  | Prairie Cordgrass Temporarily Flooded Herbaceous Alliance    | 7.0           |
|  | Redtop (introduced) Seasonally Flooded Herbaceous Alliance   | 1.8           |
|  | Sand Dropseed Herbaceous Alliance                            | 21.0          |
|  | Smooth Brome Semi-Natural Herbaceous Alliance                | 65.9          |
|  | Smooth Sumac Shrub Savannah Herbaceous Alliance              | 2.9           |
|  | Soapweed Yucca Shrub Savannah Herbaceous Alliance            | 128.2         |
|  | Sun Sedge-Agassiz Kentucky Bluegrass Herbaceous              | 17.5          |
|  | Three-leaved Sumac Shrub Savannah Herbaceous Alliance        | 120.2         |
|  | Timothy Herbaceous Alliance                                  | 8.3           |
|  | Western Wheatgrass Herbaceous Alliance                       | 306.4         |
|  | Western Wheatgrass Temporarily Flooded Herbaceous Alliance   | 39.8          |
|  | Wood's Rose Shrub Herbaceous Alliance (Savannah)             | 3.2           |
|  | Woolly Sedge Seasonally Flooded Herbaceous Alliance          | 9.6           |
| <b>Perennial Graminoid Vegetation Total</b>      |  | <b>3595.3</b> |
| <b>Annual graminoid or forb vegetation</b>       |  |               |
|  | Cheatgrass Annual Grassland                                  | 7.4           |
| <b>Annual graminoid or forb vegetation Total</b> |  | <b>7.4</b>    |
| <b>Grand Total</b>                               |  | <b>3602.7</b> |

### ***Shrublands***

Deciduous shrublands are found along hillsides and drainages, primarily in the eastern third of the TSA.

| <b>Formation</b>                      | <b>Alliance</b>                                       | <b>Acres</b> |
|---------------------------------------|---|--------------|
| <b>Deciduous dwarf-Shrubland</b>      |   |              |
|                                       | Creeping Oregon-Grape Dwarf-Shrubland Alliance        | 4.9          |
|                                       | Fendler's Ceanothus Deciduous Shrubland               | 72.5         |
|                                       | Snakeweed Dwarf-shrubland Alliance                    | 19.3         |
| Deciduous dwarf-Shrubland Total       |   |              |
| <b>Deciduous Shrubland</b>            |   |              |
|                                       | American Plum Shrubland Alliance                      | 4.6          |
|                                       | Mountain Ninebark Shrubland                           | 5.6          |
|                                       | Mountain-mahogany Shrubland Alliance                  | 9.9          |
|                                       | Smooth Sumac Shrubland Alliance                       | 79.4         |
|                                       | Three-leaved Sumac Upland Shrubland Alliance          | 88.5         |
|                                       | White Squaw Currant Shrubland Alliance                | 5.1          |
|                                       | Woods' Rose Temporarily Flooded Shrubland Alliance    | 18.1         |
| Deciduous Shrubland Total             |   |              |
| 211.2                                 |   |              |
| <b>Evergreen Dwarf-Shrubland</b>      |   |              |
|                                       | Creeping Oregon-Grape Dwarf-Shrubland Alliance        | 101.7        |
|                                       | Fendler's Ceanothus Deciduous Shrubland               | 1.7          |
| Evergreen Dwarf-Shrubland Total       |   |              |
| 103.4                                 |   |              |
| Evergreen Shrubland                   | Soapweed Yucca Evergreen Shrubland                    | 8.2          |
| Evergreen Shrubland Total             |   |              |
| 8.2                                   |   |              |
| <b>Perennial Graminoid Vegetation</b> |   |              |
|                                       | Mountain-mahogany Shrub Herbaceous Alliance           | 5.1          |
|                                       | Smooth Sumac Shrub Savannah Herbaceous Alliance       | 2.9          |
|                                       | Soapweed Yucca Shrub Savannah Herbaceous Alliance     | 128.2        |
|                                       | Three-leaved Sumac Shrub Savannah Herbaceous Alliance | 120.1        |
|                                       | Wood's Rose Shrub Herbaceous Alliance (Savannah)      | 3.2          |
| Perennial Graminoid Vegetation Total  |   |              |
| 259.6                                 |   |              |
| <b>Grand Total</b>                    |   |              |
| 679.1                                 |   |              |

### ***Riparian Areas***

The large and small creeks in the TSA support deciduous riparian vegetation characterized by narrowleaf cottonwood and willow at lower elevations and a variety of smaller shrubs and trees at higher elevations.

| <b>Formation</b>                          | <b>Alliance</b>  | <b>Acres</b> |
|---|--|--------------|
| <b>Deciduous Forest</b>                   |  |              |
|   | Box-elder Temporarily Flooded Forest Alliance                            | 24.3         |
|   | Green Ash - (American Elm) Temporarily Flooded Forest Alliance           | 12.3         |
|   | Narrowleaf Cottonwood Temporarily Flooded Forest Alliance                | 14.8         |
|   | Paper Birch Forest Alliance  | 0.7          |
|   | Quaking Aspen Temporarily Flooded Forest Alliance                        | 43.3         |
| Deciduous Forest Total                    |  | 95.4         |
| <b>Deciduous Shrubland</b>                |  |              |
|   | (Black Hawthorn, Fleshy Hawthorn) Temporarily Flooded Shrubland Alliance | 15.3         |
|   | (Coyote Willow, Sandbar Willow) Temporarily Flooded Shrubland Alliance   | 7.1          |
|   | Bluestem Willow Temporarily Flooded Shrubland Alliance                   | 0.4          |
|   | Choke Cherry Shrubland Alliance  | 198.4        |
|   | Desert False Indigo Temporarily Flooded Shrubland Alliance               | 1.8          |
|   | Ill-scented Sumac Intermittently Flooded Shrubland Alliance              | 178.3        |
|   | Rocky Mountain Maple Temporarily Flooded Shrubland Alliance              | 22.1         |
|   | Water Birch Seasonally Flooded Shrubland Alliance                        | 4.9          |
|   | Western Snowberry Temporarily Flooded Shrubland Alliance                 | 35.5         |
|   | Woods' Rose Temporarily Flooded Shrubland Alliance                       | 18.1         |
| Deciduous Shrubland Total                 |  | 481.9        |
| <b>Deciduous Woodland</b>                 |  |              |
|   | Box-elder Temporarily Flooded Woodland Alliance                          | 34.2         |
|   | Crack Willow (introduced) Temporarily Flooded Woodland Alliance          | 1.0          |
|   | Douglas-fir Temporarily Flooded Woodland Alliance                        | 2.5          |
|   | Eastern Cottonwood Temporarily Flooded Woodland Alliance                 | 29.6         |
|   | Narrowleaf Cottonwood Temporarily Flooded Woodland Alliance              | 36.0         |
|   | Non-Native Dominated Temporarily Flooded Woodland                        | 5.9          |
|   | Peachleaf Willow Temporarily Flooded Woodland Alliance                   | 2.8          |
|   | Ponderosa Pine Temporarily Flooded Woodland Alliance                     | 3.1          |
| Deciduous Woodland Total                  |  | 115.1        |
| <b>Evergreen Woodland</b>                 |  |              |
|   | Douglas-fir Temporarily Flooded Woodland Alliance                        | 25.3         |
|   | Ponderosa Pine Temporarily Flooded Woodland Alliance                     | 5.1          |
| Evergreen Woodland Total                  |  | 30.4         |
| <b>Mixed Evergreen-Deciduous Woodland</b> |  |              |
|   | Ponderosa Pine Temporarily Flooded Woodland Alliance                     | 0.5          |
| Mixed Evergreen-Deciduous Woodland Total  |  | 0.50         |
| <b>Perennial Graminoid Vegetation</b>     |  |              |
|   | native seed restoration  | 3.0          |
|   | Prairie Cordgrass Temporarily Flooded Herbaceous Alliance                | 7.0          |
|   | Western Wheatgrass Temporarily Flooded Herbaceous Alliance               | 39.8         |
| Perennial Graminoid Vegetation Total      |  | 49.8         |
| <b>Grand Total</b>                        |  | <b>773.1</b> |

***Cliff/Talus***

Other important habitat features in the West TSA include rock outcrops, cliffs, and talus, which support minimal vegetation but provide important habitat.

| <b>Formation</b>   | <b>Alliance</b>                          | <b>Acres</b> |
|--|--|--------------|
| <b>Boulder, Gravel, Cobble, or Talus Sparse Vegetation</b> |  |              |
|  | Montane Talus Sparsely Vegetated         | 199.9        |
|  | Rock Outcrop Sparsely Vegetated Alliance | 1.9          |
| Boulder, Gravel, Cobble, or Talus Sparse Vegetation Total  |  | 201.7        |
| <b>Consolidated Rock Sparse Vegetation</b>                 |  |              |
|  | Montane Talus Sparsely Vegetated         | 0.5          |
|  | Open Cliff Sparsely Vegetated Alliance   | 299.8        |
|  | Rock Outcrop Sparsely Vegetated Alliance | 53.2         |
| Consolidated Rock Sparse Vegetation Total                  |  | 353.4        |
| <b>Grand Total</b>   |  | <b>555.2</b> |