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Landscape Unit #12

Summary Table for Landscape Unit #12

Site ID	Community ID	Community Type	Quality Ranking
95	09282016	Oak Savanna/Woodland	CD
98	10282001	Deep Open Water Marsh	C
99	10282002	Oak Forest/Woodland	D
107	10282011	Prairie Restoration	NA
108	10282012	Dry Prairie (Sand-Gravel Subtype)	B
111	10282015	Conifer Plantation	NA
113	10282017	Oak Savanna Restoration	NA
115	10282017	Oak Savanna Restoration	NA
134	15282003	Wet Meadow	C
137	15282007	Oak Woodland	C
151	15282022	Shrub Swamp (Alder Subtype)	B

Landscape Unit Rankings

Ecological Ranking: This landscape unit contains a good diversity of moderate to higher quality natural communities and includes an extensive mosaic of oak woodland/savanna, native prairie and wetland. This area also includes some extensive areas of oak savanna and prairie restoration on the Belwin property. This landscape unit is given a high ecological ranking.

Wildlife Habitat Ranking: This landscape unit provides excellent wildlife habitat due to the quality and diversity of natural communities. The Valley Creek riparian corridor also provides a significant connection between the St. Croix River and areas to the West. In general, the same wildlife habitat values detailed in landscape unit #11 and 13 apply to this landscape unit. This landscape unit is given a high wildlife habitat ranking.

Rare Features Ranking: This landscape unit contains probably the largest concentration of rare features records in the City of Afton. It should be noted here that much of this landscape unit encompasses Belwin property, where more biological survey work on plants, animals, birds and reptiles has been conducted than perhaps anywhere in the City except for Afton State Park. Within this landscape unit there are records for four reptiles, two birds, one mammal, three plants and two different types of natural communities. Most of these records are for State Special Concern species, although there is one species that is State Endangered and three that are State Threatened. This landscape unit has a high rare features ranking.

Stewardship Recommendations

1. Belwin Foundation actively manages natural communities within their holdings. There appears to be opportunities for the City of Afton and private landowners to collaborate with Belwin on natural community restoration and management activities. In particular, there are opportunities for private landowners to extend management to their land where their property is adjacent to Belwin property. This could be particularly important where management activities such as herbicide application and prescribed burns require landowner notification and coordination.
2. Within portions of Belwin bordering Valley Creek, riparian buffers are either lacking or quite narrow. Since adjoining land uses are not likely to have high impacts (i.e., agricultural or residential land uses), a buffer at this location is not critical to preserving the quality of

Valley Creek. The primary rationale for riparian buffers is to maintain a viable riparian corridor for wildlife traveling through this area.

Community Description

Community 09-28-20-16

No access provided. Based on photo interpretation, Community 09-28-20-16 appears to be a CD-quality oak savanna-woodland.

Community 10-28-20-01

Community 10-28-20-01 is a deep, open water marsh with a mixed emergent marsh fringe. This wetland is landlocked and like many wetlands in the area, appears to be groundwater-fed. Based on landowner comments and tree mortality near the wetland edge, water levels have been higher recently, perhaps due to higher ground water levels.

The open water portion of this wetland is lake-like and contains a prominent, submerged aquatic bed that is dominated by coontail. The primary floating-leaf vegetation is yellow water lily. The wetland fringe is dominated by cattail jewel weed, boneset, water smartweed, blue flag, reed canary grass, soft-stem bulrush, river bulrush, lake sedge, and tussock sedge. The margins of the wetland contain black willow, silver maple, buckthorn, and red osier dogwood. According to the landowner there is some fish present presumably, these fish were stocked.

Disturbance Indicators: There is significant encroachment of buckthorn and amur maple in the fringes of this wetland. Within the wetland transition area, reed canary grass and cattail appear to be gradually encroaching on other species. This wetland has a quality ranking of C.

Community 10-28-20-02

Community 10-28-20-02 is an oak forest – oak woodland dominated by red oak, pin oak, trembling aspen and eastern red cedar. The shrub layer is dominated by buckthorn and in places, amur maple. The ground layer is depauperate and suggestive of an active grazing history.

Disturbance Indicators: According to the landowner, there was very little buckthorn 50 years ago. Today, the shrub and ground layer is dominated by buckthorn and there appears to be little tree regeneration. This community encompasses several adjoining parcels, some of which are currently pasturing horses. Because of the low ground cover diversity, presence of buckthorn and fragmentation present, this community is assigned a quality ranking of D.

Community 10-28-20-11

This area, which was once an agricultural field, has been seeded to mesic prairie grasses and forbs.

Community 10-28-20-12

This community is mapped by the DNR Natural Heritage Program as a high quality dry prairie (sand-gravel subtype). This community, mapped as DNR MCBS Site # 213 is located within and adjacent to an old gravel pit. Based on the MCBS survey conducted in 1988, good quality prairie is present on both the undisturbed portions of the upper slope as well as on the old gravel pit slopes. The graminoid cover is primarily composed of native taxa with such species as porcupine grass, June grass, *Cyperus schweinitzii*, little bluestem, and prairie dropseed. Common forbs include bee balm, gray goldenrod, hoary vervain, whorled milkweed and blazing star. A fair

diversity of woody species is also associated with this prairie including sand cherry, American hazel and wild rose.

Disturbance Indicators: The major management issue for this prairie is encroachment of woody species and spotted knapweed, which is present on most of the sand prairies locally. The quality ranking for this prairie as assigned by the DNR MCBS is B.

Community 10-28-20-15

Community 10-28-20-15 is a conifer plantation, with occasional patches of oak woodland and low quality prairie openings. Most of this community occurs on excessively well-drained, sandy soils and is dominated by 12 to 14-inch diameter red pine. The low-density shrub layer is dominated by buckthorn, wild raspberry, poison ivy, and some red oak and black cherry regeneration. The thick deposit of pine needles is likely the reason that much of this site has very low ground cover and shrub diversity. The pine needles, coupled with the sandy soils that characterize this site, result in acidic soil conditions that are not conducive to establishment of most native woodland-savanna species. As a result, the groundcover is generally depauperate with only a few species such as white snakeroot and introduced grasses present.

Disturbance Indicators: As the pine mature and thinning operations are implemented, the understory and shrub layers are becoming more open. Some of these sites have virtually no ground cover and are susceptible to erosion unless suitable vegetative cover is established.

Community 10-28-20-17

Prairie restoration.

Community 15-28-20-03

Community 15-28-20-03 is a riparian wet meadow situated along Valley Creek. Dominant graminoids include reed canary grass, tussock sedge and saw-beak sedge. Common forbs include angelica, Joe-pye weed, blue vervain, and swamp thistle. The shrub layer is patchy with invasive species such as Tartarian honeysuckle and buckthorn dominant. There are also occasional black willow trees scattered throughout this community.

Disturbance Indicators: Graminoid and forb diversity is low with reed canary dominant. A quality ranking of CD is assigned. This area offers good floodplain wetland restoration opportunities.

Community 15-28-20-07

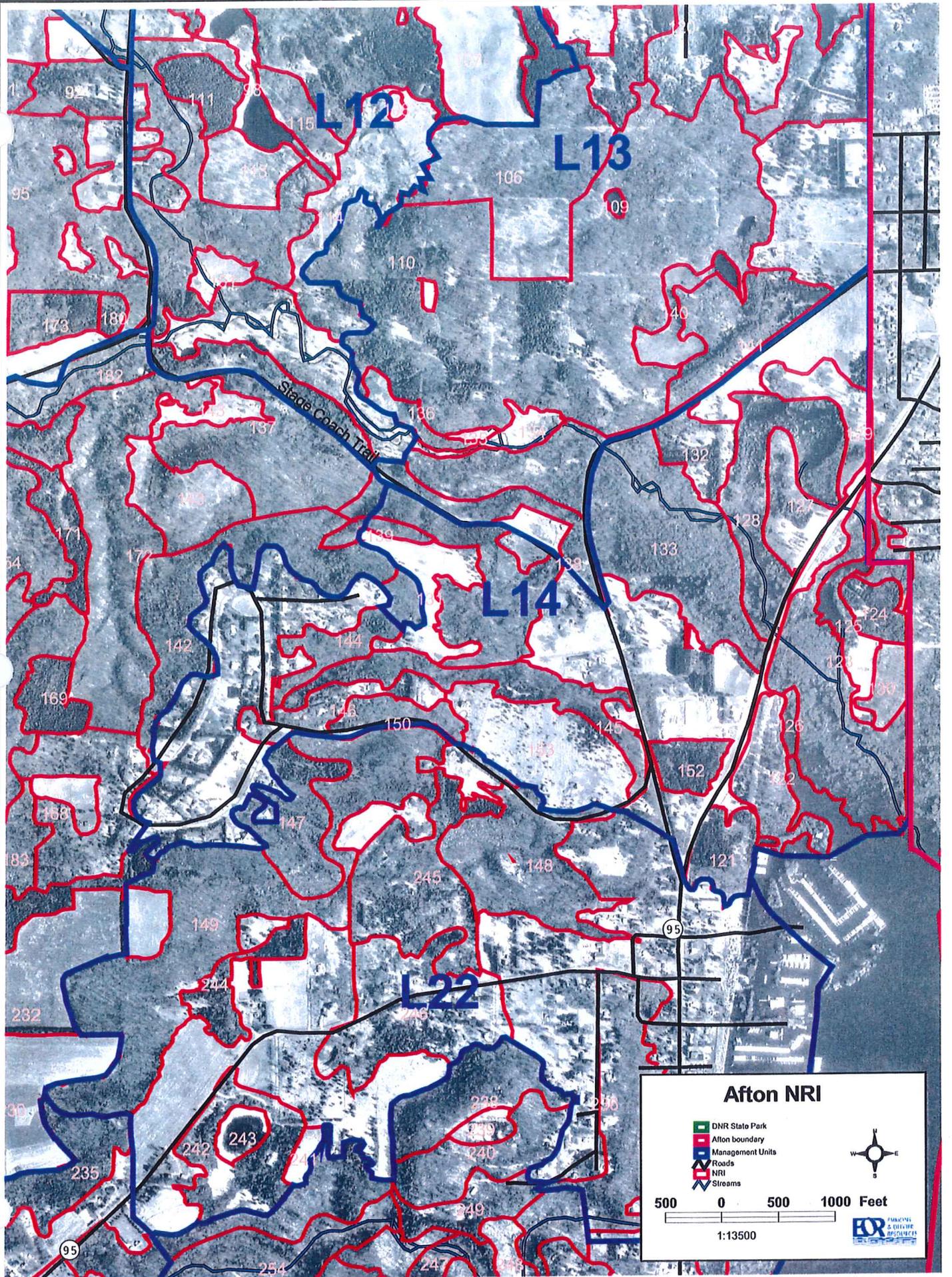
Community 15-28-20-07 is an oak woodland-brushland dominated by 10 to 12 inch diameter pin oak, with patches of brushland dominated by oak seedlings and buckthorn. Also mixed in, are small patches of conifers, especially along Stagecoach Trail. Woody species included in this community include pin oak, black locust, prickly ash, prickly gooseberry, wild raspberry, and ironwood. Big-toothed aspen and quaking aspen occur throughout as small clones. Ground cover consists of a light covering of Pennsylvania sedge and herbs such as purple-stemmed aster. On the upper northeast-facing slope of this community, more of a mesic oak forest community exists, dominated by red and bur oak with a subcanopy of red elm, paper birch, and basswood. The rich understory of this area includes hog peanut, downy rattlesnake plantain, lady fern, interrupted fern, round-lobed hepatica, wood anemone, and pointed-leaved tick-trefoil.

Disturbance Indicators: Buckthorn and other invasive species are quite predominant in the understory shrub layer of this community. In spite of this; however, tree regeneration is generally good. Also the species diversity, especially the rich mesic species composition of its upper slopes, leads us to rank this community overall as having a C quality.

Community 15-28-20-22

Community 15-28-20-22 is a good quality shrub swamp that was surveyed by the DNR MCBS in 1988. This community, which is located just to the north of Valley Creek within Belwin property is mapped as part of DNR Site #63 and is also shown on the *Natural Communities and Rare Species, Washington County, Minnesota* (MN DNR, 1990). According to DNR records this shrub swamp is dominated by speckled alder and bog birch along with some upland taxa. Some small inclusions of sedge meadow dominated by *Carex prairea* are also present.

Disturbance Indicators: Amur maple and buckthorn are present in this community. According to past surveys, beaver trails cut through this wetland. It was also suggested wet conditions due to beaver dams may have an impact on this wetland community. This shrub swamp was assigned a B quality ranking by DNR.

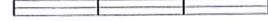


Afton NRI

- DNR State Park
- Afton boundary
- Management Units
- Roads
- NRI
- Streams



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Landscape Unit #13

Summary Table for Landscape Unit #13

Site ID	Community ID	Community Type	Quality Ranking
100	10282003	Juniper Woodland	NA
101	10282004	Dry Oak Forest	C
102	10282005	Mixed Coniferous/Deciduous Forest	NA
104	10282008	Mixed Coniferous/Deciduous Forest	NA
105	10282009	Oak Forest/Woodland	C
106	10282010	Oak Savanna Restoration	NA
109	10282013	Shallow Open Water Marsh	C
110	10282014	Oak Woodland	CD
118	11282001	Old Field	NA
119	11282002	Lowland Hardwood Forest	C
117	11282003	Oak Woodland	D
120	11282004	Oak Savanna/Woodland	D
133	15282002	Floodplain Forest	CD
134	15282003	Wet Meadow	CD
135	15282004	Rich Fen	BC
136	15282005	Shrub Swamp	B
138	15282008	Dry Oak Forest	B
140	15282010	Rich Fen	AB
141	15282011	Conifer Plantation	NA

Landscape Unit Rankings

Ecological Ranking: Landscape unit #13 contains some of the better quality riparian reaches of Valley Creek including good quality rich fens and moderate quality floodplain forest. In addition, this landscape unit contains some significant restoration sites on the Belwin Property. The overall ecological ranking is high for this landscape unit.

Wildlife Habitat Ranking: This landscape unit provides excellent wildlife habitat due to the quality and diversity of natural communities. The Valley Creek riparian corridor also provides a significant connection between the St. Croix River and areas to the West. In general, the same wildlife habitat values detailed in landscape unit #11 and 12 apply to this landscape unit. This landscape unit is given a high wildlife habitat ranking.

Rare Features Ranking: The DNR Natural Heritage Program has mapped several natural communities including floodplain forest, two rich fens, and dry oak forest. In addition, there are records for two State Threatened Species; kittentails (*Besseyia bullii*) and Blanding's turtle (*Emydoidea blandingii*). This landscape unit is assigned a high rare features ranking.

Stewardship Recommendations

1. The rich fen wetlands in this landscape unit are of high quality and should be protected from encroachment of invasive species, especially buckthorn and reed canary grass. Where invasive species are encroaching, hand cut and spot treat with an approved herbicide. A combination of early spring/fall controlled burning and herbicide treatment may set back reed canary grass sufficiently to enable reestablishment of native grasses and forbs.

2. This section of Valley Creek contains good vegetative cover within the riparian zone. In addition, numerous logjams and other woody debris improve fish habitat and helps to shade the water surface.

Community Description

Community 10-28-20-03

Community 10-28-20-03 is an eastern red cedar woodland with scattered, 12-inch diameter red pine. Prickly ash, box elder regeneration, smooth sumac, wild raspberry, amur maple, sand cherry, Virginia creeper and wild grape dominated the shrub layer. Understory species include spotted knapweed, common mullein, asters, Canada goldenrod, common strawberry, yarrow, and dandelion. This community appears to have once been an agricultural field, based on the presence of plow furrows.

Community 10-28-20-04

Community 10-28-20-04 is an oak forest dominated by 12-16 inch diameter bur oak, with scattered clones of quaking aspen along with pin oak and American elm. Buckthorn, amur maple, American elm and prickly ash dominate the shrub layer. Ground layer species include sweet cicely, sweet scented bedstraw, yellow avens, and rose twisted stalk.

Disturbance Indicators: This community contains some nice oaks in the overstory, but shows signs of severe erosion. This community includes several check dams that were likely constructed during the WPA days to address erosion problems. Today, the check dams do not retain water because they are silted in. This community is assigned a quality ranking of C.

Community 10-28-20-05

Community 10-28-20-05 is a mixed coniferous/deciduous forest dominated by red pine, black locust, and widely scattered bur oak. Red pines average about 12 to 14 inches in diameter, and the black locust trees are generally 6 to 10 inches in diameter. Buckthorn dominates the shrub layer, which also includes black cherry, amur maple, and American elm. The ground layer is very sparse and includes interrupted fern.

Disturbance Indicators: This community contains some nice trees in the overstory, but shows signs of heavy ground erosion.

There are numerous gullies, borrow pits, and failed check dams. Therefore we assigned a D quality ranking.

Community 10-28-20-08

Community 10-28-20-08 is a mixed coniferous/deciduous forest with an overstory dominated by amur maple, and scattered red cedar, bur oak, cottonwood, and boxelder. The thick shrub layer includes prickly ash, poison ivy, amur maple, white pine and buckthorn. The ground cover layer is mostly cool season grasses such as blue grass and brome.

Community 10-28-20-09

Community 10-28-20-09 is a variable quality oak forest-woodland located along a southeast-facing terrace slope above the St. Croix River Valley. The best quality portion of this community occurs within a north-south running ravine. Within this area, mesic oak forest dominated by large red oak occurs. Elsewhere, this community is more woodland-like and is dominated by bur oak, pin oak, trembling aspen, and eastern red cedar. Near the bottom of some slopes, basswood is the

dominant tree species. Within areas where basswood is present, scattered, large American elm snags remain, probably the result of Dutch Elm Disease mortality. The shrub layer is generally sparse and dominated by buckthorn and Virginia creeper. In a few of the more level areas, dense patches of buckthorn and prickly ash occur. The patchy herbaceous layer includes sweet cicely, violets, lady fern, yellow avens, and Pennsylvania sedge.

Disturbance Indicators: This community appears to have a long grazing history on the flatter areas both above and below the terrace slope. It is these same areas where thorny shrubs and low groundcover diversity is most apparent. On the slopes; however, invasive shrubs are not as dominant and diversity is higher. Overall, the quality ranking for this oak forest-woodland is C.

Community 10-28-20-10

This area is currently undergoing oak savanna restoration. Belwin has removed woody trees and shrubs and is conducting a program of prescribed burns and herbicide treatments, primarily to control buckthorn.

Community 10-28-20-13

Community 10-28-20-13 is a shallow, open water marsh set within a deep depression. This wetland appears to be groundwater dependent, since little runoff would be expected from the largely forested drainage area and highly permeable soils in the wetland's drainage area. The fringes of this wetland include a narrow band of rich fen that extends out into the wetland as a floating mat. Dominant graminoids include wool grass, prairie cordgrass, rice cut-grass, river bulrush, tussock sedge, bluejoint grass and reed canary grass. Common forbs include blue vervain, bugleweed, yellow avens, boneset, smartweed, beggar-ticks and aster species.

Disturbance Indicators: The primary disturbance is related to trail and dock placement. While these structures have caused only minimal damage thus far, a trail bypass around this wetland would help to minimize the potential for future impacts. Reed canary grass appears to be increasing within this wetland. Spot treatment with an approved herbicide, followed by prescribed burning may help to favor native species, while setting back the reed canary grass.

Community 10-28-20-14

Community 10-28-20-14 is a low to moderate quality oak woodland dominated by bur oak, pin oak, black cherry and occasional American elm. Although variable, the canopy cover is generally about 50%. The shrub layer is quite tall and composed of amur maple, pagoda dogwood, wild raspberry, black cherry, American hazelnut, poison ivy, prickly ash and Virginia creeper. The ground layer ranges from sparse where the shrub layer is dense to abundant where shrub density is lower. Common ground cover species include pointed-leaved tick-trefoil, sweet cicely, yellow avens, false rue anemone, lady fern, wild sarsaparilla, common strawberry, rose twisted stalk, Canada mayflower, wild geranium, and sweet scented bedstraw.

Disturbance Indicators: This community is variable in quality with some areas of severe buckthorn/amur maple infestation, while other areas are relatively free of invasive species. A quality ranking of CD is assigned.

Community 11-28-20-01

This community is an old field or pasture that has succeeded to a young, mixed hardwood forest. Common tree species include trembling aspen, eastern red cedar and occasional bur oak. The shrub layer is moderately dense and comprised of buckthorn, amur maple, Tartarian honeysuckle, prickly gooseberry, prickly ash, raspberry and poisoning ivy. The ground cover was very sparse

under the dense cover of the canopy and shrub species. Sweet cicely and a *Pyrola sp.* are present in the groundcover.

Community 11-28-20-02

Community 11-28-20-11 is a lowland hardwood forest that surrounds a mixed emergent marsh. Black willow, cottonwood, boxelder, and paper birch. The shrub layer includes buckthorn, amur maple, red oak, Tartarian honeysuckle, American elm, and red osier dogwood. Narrow-leaved cattail dominates the mixed emergent marsh within this wooded fringe. Other groundlayer species in the marsh include leafy beggar-ticks, purple-leaved willow-herb, giant goldenrod, Joe-pye weed, smartweed, sensitive fern, wood nettle, water plantain, duckweed, common milkweed, common arrowhead, lake sedge, and bottle-brush sedge. Also included within this community is a rich fen surrounding a cattail marsh on the south side of 15th Street. This very small, shallow, open water wetland was probably once part of the larger mixed emergent marsh, but was cut off when the road was constructed.

Disturbance Indicators: This complex of mixed emergent marsh surrounded by lowland hardwood forest is located directly on 15th Street, near residential areas. Therefore it will be influenced by disturbance patterns, and continually invaded by less desired species. This community does however, contain a diversity of wetland species, therefore we assigned a C quality ranking.

Community 11-28-20-03

Community 11-28-20-12 is an oak woodland dominated by bur oak, quaking aspen, pin oak, and red cedar. The shrub layer is generally dense and dominated by buckthorn, American hazelnut, prickly ash, poison ivy, and Virginia creeper. Because of the dense shrub layer and tree canopy, little light penetrates to the forest floor, resulting in low density and diversity of groundcover species. Ground flora noted at the time of the survey included white snakeroot, common strawberry, and sweet cicely. It is likely that small areas of this woodland, particularly on steeper slopes, contain better diversity of groundcover flora; however, most of the site probably contains low overall diversity. Permission was not granted for access to the eastern one half of this site. Based on aerial photography, the eastern half is probably more open with a greater diversity and density of shrub and groundcover species.

Disturbance Indicators: This community was probably grazed extensively at one time, and is generally dominated by grazing increaser species such as buckthorn and prickly ash. Like many forest and woodland communities near residential areas, deer use is high and likely results in loss of desirable shrub and groundcover species as well as tree regeneration. This community is assigned a quality ranking of D.

Community 11-28-20-04

This community is a mixture of oak savanna-woodland with scattered conifers planted throughout. There are numerous residential homes within this area. No ranking is provided.

Community 15-28-20-02

Community 15-28-20-02 is a floodplain forest dominated by black willow. This floodplain forest extends from near the confluence of the North and South Forks of Valley Creek, downstream to Highway 95, and is mapped as MCBS Site #61. A unique feature of this floodplain forest is that it is dominated by large black willow averaging between 14 and 20 inches in diameter. In recent years, many of the larger trees have died and now provide excellent snag habitat for a variety of wildlife as well as contributing woody structure to Valley Creek. Other tree species in the canopy include red elm, black ash, cottonwood, hackberry, paper birch, and bur oak. The shrub layer is

generally dominated by invasive or thorny species such as buckthorn, hawthorn, Japanese barberry, and wild raspberry. A fairly diverse graminoid and herbaceous layer along the creek includes lake sedge, sneezeweed, violets, pointed-leaved tick-trefoil, wood nettle, jewel weed, smaller forget-me-not, swamp buttercup, stinging nettle, Virginia waterleaf, yellow avens, and sweet cicely.

Disturbance Indicators: It is probable that this river bottom was at one time grazed based on the number of thorny shrubs and presence of weedy forbs such as wood and stinging nettle. Infrequent floods, may have also impacted this area during the same period. Regeneration of floodplain forest trees is generally poor, with canopy gaps created by tree mortality generally being filled in by buckthorn or reed canary grass. When surveyed by DNR Ecologists in 1987, this floodplain forest was assigned a ranking of C. Because of increased invasion by buckthorn and the decline of black willow, we have assigned a lower quality ranking of CD. Because of the proximity of this community to Valley Creek, restoration efforts may be warranted.

Community 15-28-20-03

Community 15-28-20-03 is a riparian wet meadow situated along Valley Creek. Dominant graminoids include reed canary grass, tussock sedge and saw-beak sedge. Common forbs include angelica, Joe-pye weed, blue vervain and swamp thistle. The shrub layer is patchy with invasive species such as Tartarian honeysuckle and buckthorn with dominant. There are also occasional black willow trees scattered throughout this community.

Disturbance Indicators: Graminoid and forb diversity is low with reed canary dominant. A quality ranking of CD is assigned. This area offers good floodplain wetland restoration opportunities.

Community 15-28-20-04

15-28-20-04 is a small, rich fen seepage located at the base of a steep, south-facing slope along Valley Creek. Common graminoids include reed canary grass, *Carex stricta*, *Carex comosa*, *Carex diandra*, *Carex striata*, cattail, Canada bluejoint grass, giant manna grass and green bulrush. The herbaceous layer is very diverse and includes: swamp dock, Joe-pye weed, purple-leaved willow-herb, duckweed, boneset, bugleweed, sweet scented bedstraw, blue vervain, marsh marigold, smartweed, fringed loosestrife, beggar-ticks, and water dock. Red osier dogwood occurs around the margins of this fen. This community was noted during the MCBS survey in 1987 and included as part of MCBS Site #61.

Disturbance Indicators: This community was ranked B during the 1987 survey. We have downgraded the ranking to BC due to the presence of reed canary grass.

Community 15-28-20-05

Community 15-28-20-05 is an alder shrub swamp dominated by speckled alder, paper birch, and buckthorn. Buckthorn, amur maple, quaking aspen, and long beaked willow also occur in the shrub layer. A small spring creek drains through the middle of this community, to the east into the rich fen community 15-28-20-04. Soils are saturated with numerous spring seeps along the adjacent hillside, and the upper part of the community transitions back to rich fen dominated by cattails, with many of the same ground layer species as found in community 15-28-20-04. Other graminoid species include lake sedge, rice cut grass, Virginia wild rye, Canada bluejoint grass, reed canary grass, tussock sedge, and prairie cordgrass. A high diversity of herbaceous species exist in the ground layer, including marsh marigold, avens, wood nettle, enchanter's nightshade, marsh fern, sensitive fern, giant goldenrod, Joe-pye weed, boneset, blue vervain, swamp milkweed, beggar-ticks, and water dock.

Disturbance Indicators: Buckthorn invasion is the primary management issue for this community. In spite of the buckthorn, this is a high quality, unique natural community and is awarded a ranking of B.

Community 15-28-20-08

Community 15-28-20-08 is a dry oak forest dominated by 15 to 20 inch diameter red oak and paper birch. This community is located on a steep, 40 degree, north facing slope, rising sharply above Stagecoach Trail. This site is mapped by the DNR as MCBS Site #62 and is referred to as the "Stage Coach Trail Oak Woods". This dry oak forest is relatively undisturbed due to steep, inaccessible slopes and contains large-diameter oak trees, and rich diversity of understory shrub and forb species. Based on a coring of one 16-inch diameter red oak, ages of smaller oak trees are approximately 85 years. Other common tree species include basswood, white oak, and unusually large ironwood. The shrub layer is round-leaf dogwood, prickly gooseberry and wild raspberry, along with occasional buckthorn, wild grape, black cherry, and red berried elder. The rich ground layer includes herbaceous species such as largeflower bellwort, white snake root, stinging nettle, sweet cicely, wild columbine, greenbrier, bracken fern, one-sided pyrola, sweet scented bedstraw, maidenhair fern, zig-zag goldenrod, big leaved aster, round-lobed hepatica, shining clubmoss, hog peanut, and common strawberry.

Disturbance Indicators: This community contains a low density of invasive shrubs such as buckthorn. Old fence lines run along portions of the hill suggesting some history of grazing. This community was given a quality ranking of B by the DNR.

Community 15-28-20-10

This community is part of DNR MCBS Site #61. This community is a rich fen mosaic of sedge meadow, open sphagnum bog and emergent marsh. The central portion of this fen is predominantly sphagnum moss with a cover of *Carex lasiocarpa*, marsh fern and cattail. Generally, wetlands with sphagnum moss contain ericaceous shrubs; however, no such shrubs are present in this wetland. Some of the more unusual species present include jack pine, which is often found in bogs and fens to the north.

According to *Vascular Plants of Minnesota* (Ownbey and Morley, 1991), there are no records for native jack pine in Washington County, so it is unclear how this species made it into this fen. Another interesting species noted in this fen is sundew, an insectivorous plant of bogs.

Disturbance Indicators: Portions of this fen complex contain reed canary grass and in general, diversity is low, although low diversity may be due to low nutrient conditions that favor such species as sphagnum moss. This community was given a ranking of AB during the DNR MCBS in 1988.

Community 15-28-20-11

Community 15-28-20-11 is a mixed conifer/hardwood plantation dominated by 12 to 14 inch red pine and black locust. There are some thickets of white pine in the overstory, and scattered boxelder, basswood and elm. Buckthorn dominates the shrub layer, along with boxelder and black cherry regeneration. The ground cover mainly consists of needle duff with occasional Virginia creeper growing along the forest floor. Like many of the conifer plantations within the City of Afton, these trees were planted approximately 45 years ago. Although there is not a lot of plant diversity in this plantation, it serves as a good, local amenity.

Disturbance Indicators: The acidic conditions in the thick needle duff do not accommodate native grasses and forbs.

Landscape Unit #14

Summary Table for Landscape Unit #14

Site ID	Community ID	Community Type	Quality Ranking
121	14282001	Mixed Coniferous/Deciduous Plantation	NA
122	14282002	Oak Woodland/Savanna	C
123	14282003	Floodplain Forest	B
124	14282004	Mixed Coniferous/Deciduous Plantation	NA
125	14282005	Wet Meadow/Floodplain Forest	C
126	14282006	Mixed Emergent Marsh/Rich Fen	AB
127	14282007	Dry Oak Forest	C
128	14282008	Wet Meadow	CD
129	14282009	Oak Savanna/Pasture	NA
130	14282010	Oak Woodland	C
132	15282001	Oak Woodland/Conifer Plantation	NA
133	15282002	Floodplain Forest	CD
139	15282009	Deciduous Plantation	NA
144	15282015	Oak Savanna	CD
145	15282016	Lowland Hardwood Forest	CD
146	15282017	Mixed Hardwood/Pine Forest	NA
150	15282021	Black Locust Plantation	NA
152	15282023	Coniferous Plantation	NA
153	15282024	Old Field/Brushland	NA

Landscape Unit Rankings

Ecological Ranking: Landscape unit #14 includes a good diversity of mostly moderate quality and several high quality natural communities. The most important segment of this landscape unit is in the general vicinity of the Valley Creek – St. Croix River confluence. This area contains high quality floodplain forest, rich fen and mixed emergent marsh. In addition, this area includes a dry oak savanna that although somewhat disturbed, provides an important buffer to the wetland communities along the St. Croix River. Other portions of this landscape unit are generally of moderate quality and border what is probably, the least disturbed reach of Valley Creek. This landscape unit is given a high ecological ranking.

Wildlife Habitat Ranking: This landscape unit ranks among the most important areas for wildlife habitat in the City. This is due to the combination of moderate to high quality floodplain forest, emergent marsh, river beach and dry, sandy river terraces with oak woodland and savanna. This landscape unit also provides a critical link between the St. Croix River and extensive forested areas to the west. In this regard, it is fortunate that the bridge crossing at St. Croix Trail (Highway 18) provides sufficient room for wildlife movement between the St. Croix River and areas to the west along Valley Creek. West of St. Croix Trail, natural communities are generally of moderate quality; however, this area provides high quality riparian habitat for a variety of fur bearing mammals, birds, reptiles and amphibians associated with oak forest, floodplain forest and wetland communities along Valley Creek.

Rare Features Ranking: This landscape unit has been surveyed extensively over the years and contains numerous records for rare features. The DNR Natural Heritage Program shows records for five plant species, three natural communities and one fish species. Rare plants known to occur include: white wild indigo (*Baptisia alba*) State Special Concern, forked chickweed

(*Paronychia fastigiata*) State Endangered, lilia-leaved twayblade (*Liparis lilifolia*) No Status, old field toadflax (*Linaria canadensis*) No Status, beard-tongue (*Penstemon digitalis*) No Status. Natural communities mapped by the DNR Natural Heritage Program include two areas of floodplain forest and mixed emergent marsh. American brook lamprey (*Lampetra appendix*) has been documented in this reach of Valley Creek. This landscape unit is given a rare features ranking of high.

Stewardship Recommendations

1. The area lying between St. Croix Trail and the St. Croix River is a significant area worthy of protection. Since most of this area lies within the floodplain of the St. Croix River and is wetland, development possibilities would appear limited. The small area of oak savanna offers an excellent opportunity for restoration. Plant species associated with dry oak savanna will do well at this location. A site-specific management plan should be developed in cooperation with the landowner.
2. The bridge crossing over Valley Creek at St. Croix Trail should be further evaluated to maintain/improve its function as a wildlife crossing. Improvements might include vegetative plantings to provide improved cover and serve as a funnel to wildlife movement and fencing along the highway to reduce incidents of wildlife collisions. There are a number of rare species known locally that depend on moving between floodplain forest and upland habitat. An example is the fox snake (*Elaphe vulpina*), this species spends most of the summer within floodplain habitat, but winters in adjacent upland areas.
3. The lower reaches of Valley Creek benefit from numerous piles of woody debris within the stream channel. Woody debris improves instream diversity by creating scour pools and cover. Encourage landowners to not clear this material from the stream channel unless necessary.

Community Descriptions

Community 14-28-20-01

Community 14-28-20-01 is a mixed conifer/hardwood plantation dominated by 12 to 14 inch red pine and black locust. There are some thickets of white pine in the overstory, and scattered boxelder, basswood and elm. Buckthorn dominates the shrub layer, along with boxelder and black cherry regeneration. The ground cover mainly consists of needle duff with occasional Virginia creeper growing along the forest floor. Like many of the conifer plantations within the City of Afton, these trees were planted approximately 45 years ago.

Disturbance Indicators: The acidic condition in the thick needle duff does not accommodate native grasses and forbs.

Community 14-28-20-02

Community 14-28-20-02 is an oak woodland-savanna located along the edge of river floodplain forest. This community, along with the adjacent mixed emergent marsh and floodplain forest encompass DNR MCBS Site # 221.

Multi-stemmed, 6 to 8 inch diameter pin oak are scattered throughout the community, mixed with occasional 20 inch bur oak, 6 to 8 inch green ash, jack pine, and red pine. The shrub layer consists of buckthorn, prickly ash, wild raspberry, Tartarian honeysuckle, black cherry, amur maple, and prickly gooseberry. Much of the area has a depauperate groundcover, but toward the

northern portion there is moderate native prairie diversity. Ground layer species include Indian grass, prairie dropseed, porcupine grass, little bluestem, side oats grama, switchgrass, leadplant, partridge-pea, yarrow, dotted blazing star, thimbleweed, sky-blue aster, butterfly milkweed and field mint.

Disturbance Indicators:

Management Issues: A flood control berm appears to have been constructed years ago on this site along with several small borrow pits. In spite of these alterations, this community offers excellent potential as a restoration/demonstration site due to its proximity to the Valley Creek/St. Croix River confluence. As with most oak woodland/savanna communities in the City of Afton, invasive shrubs such as buckthorn and Tartarian honeysuckle are present. Due to the diversity of savanna/prairie species, this community is assigned a quality ranking of C.

Community 14-28-20-03

Community 14-28-20-03 is a mature floodplain forest (silver maple subtype) dominated by 14 to 20 inch silver maple and occasional black willow, American elm and black cherry. This floodplain forest is mapped as part of DNR MCBS Site #221 and encompasses the confluence of Valley Creek and the St. Croix River. Many standing and downed snags from a recent storm are present in this community. The ground cover includes rice cut grass, Virginia wild rye, bottle-brush sedge, Bebb's sedge, and tussock sedge. Common forbs include wood nettle, water pennywort, creeping charlie, stinging nettle, impatiens, chickweed. There is also some rattlesnake fern located near Valley Branch Creek that runs through this community and exits to the St. Croix River.

Disturbance Indicators: This area is located off of the St. Croix Trail and runs southeast to the St. Croix River shoreline. Although there are invasive species present indicating influence of disturbance, this community has high quality characteristics based on its large-sized silver maple component and lack of logging or major human disturbance. Therefore we assigned a high B to BC quality ranking. During the 1998 MCBS survey, this community was given a B ranking.

Community 14-28-20-04

Community 14-28-20-04 is a mixed conifer-hardwood plantation. This plantation is similar to, and was likely established at the same time that community 14-28-20-04 was established.

Community 14-28-20-05

Community 14-28-20-05 is a wetland complex occupying a groundwater discharge flowage. The wetland complex includes a mixture of wet meadow, shallow open water marsh and floodplain forest (silver maple subtype). The southern-most part of the complex is a wet meadow occurring on saturated peat soils with small open water pockets. Dominant grasses include: rice cut grass, soft-stem bulrush, river bulrush and *Carex stipata*. Common forbs include: beggar-ticks, Joe-pye weed, arrowhead, water dock, water smartweed, and water plantain. Steeplebush occurs throughout this community in small clumps. Open water areas are dominated by duckweed and arrowhead.

To the north of the driveway that bisects this wetland, wet meadow gives way to shallow, open water marsh. This open water area appears to have been created by placement of a driveway and a resultant change in hydrology. Many of the same species found within the wet meadow to the south also occur here; although in lower numbers. In general, open water areas are dominated by duckweed, while the margins are dominated by reed canary grass. The entire wetland complex contains a continuous fringe of floodplain forest with silver maple the dominant species.

Disturbance Indicators: The road crossing culvert appears to restrict flows; thereby increasing the magnitude of bounce upstream of the road. Invasive species such as reed canary grass are generally favored at the expense of native species when bounce is increased. Although variable in quality, this wetland community is given an overall ranking of C.

Community 14-28-20-06

Community 14-28-20-06 is mapped as part of DNR MCBS Site #221. This mixed emergent marsh/rich fen is located on the Valley Branch Creek delta. Where this wetland meets the St. Croix River, an expansive river beach community is exposed during lower water levels providing exceptional habitat for shorebirds. Common graminoids include soft-stemmed bulrush, tussock sedge, spike-rush, river bulrush, love-grass, *Juncus nodosus*, Virginia wild-rye, *Spartina* and *Cyperus strigosus*. Common forbs include: arrowhead, beggar-ticks, wood nettle, bur-cucumber, water smartweed, blue flag, water hemlock, horsetail, chickweed, northern bedstraw, purple-leaved willow-herb, and water scorpion-grass and monkey flower. Scattered shrubby pockets are dominated by red osier dogwood, willow, prickly ash, and smooth buckthorn. The margins along the west side of this wetland contain numerous seeps where tussock sedge is dominant along with scattered black willow and silver maple trees.

Disturbance Indicators: The primary disturbance to this community is reed canary and buckthorn along the margins. During the 1998 MCBS survey, this wetland was ranked AB. Our ranking is a little lower (B), due the presence of reed canary grass.

Community 14-28-20-07

Community 14-28-20-07 is a moderate quality dry oak forest dominated by bur, pin and red oak, with occasional green ash and eastern red cedar. The shrub layer is dominated by buckthorn and prickly ash, with chokecherry, wild raspberry, beaked hazelnut, prickly gooseberry and poison ivy also present. The sparse groundcover is dominated by white snake root and Pennsylvania sedge. The northern portion of this community transitions into oak woodland and savanna and is dominated by large, open-grown bur oaks.

Disturbance Indicators: The ground cover in this community is depauperate, probably because historically, this site supported a dry, oak savanna. Today, the dense shrub and canopy layers all but shade out native savanna grasses and forbs. This community is variable in quality depending on adjacent land uses. A ranking of C has been assigned to this community.

Community 14-28-20-08

Community 14-28-20-08 is a wet meadow dominated by reed canary grass and scattered, 12-inch diameter black willow. This community is part of DNR MCBS Site #61, which includes an expansive floodplain area along the lower reaches of Valley Creek. Other tree species noted on this site include silver maple, red elm, boxelder, and shrub species such as wild raspberry, European buckthorn, and smooth buckthorn. Although reed canary grass dominates the ground layer, other scattered clumps of graminoids include wood reedgrass, tussock sedge, Virginia wild rye, Canada bluejoint grass and *Carex stipata* are present. Common herbaceous species include stinging nettle, white snake root, giant goldenrod, boneset, swamp thistle and water hemlock.

Disturbance Indicators: This area appears to have been grazed in the past. Reed canary grass along with buckthorn is the major invasive species. This community is assigned a ranking of CD.

Community 15-28-20-01

Community 15-28-20-01 is a mosaic of oak woodland and conifer plantation. The primary conifers planted include white spruce. This community also includes occasional, small, grassy

openings. Rows of planted white spruce are mixed with pin oak, red cedar, and quaking aspen, with several areas near the center of the community where white spruce are dominant. Where crown density is not high, buckthorn dominates the shrub layer along with wild raspberry, prickly ash, American hazelnut. Along the edges, white spruce regeneration is common. Nonnative grass and weedy species dominate the open areas of this community. Herbaceous species include white snake root, common strawberry, yellow avens, sweet scented bedstraw, yarrow, goldenrod, and common mullein.

Community 15-28-20-02

Community 15-28-20-02 is a floodplain forest dominated by black willow. This floodplain forest extends from near the confluence of the North and South Forks of Valley Creek, downstream to Highway 95, and is mapped as MCBS Site #61. A unique feature of this floodplain forest is that it is dominated by large black willow averaging between 14 and 20 inches in diameter. In recent years, many of the larger trees have died and now provide excellent snag habitat for a variety of wildlife as well as contributing woody structure to Valley Creek. Other tree species in the canopy include red elm, black ash, cottonwood, hackberry, paper birch, and bur oak. The shrub layer is generally dominated by invasive or thorny species such as buckthorn, hawthorn, Japanese barberry, and wild raspberry. A fairly diverse graminoid and herbaceous layer along the creek includes lake sedge, sneezeweed, violets, pointed-leaved tick-trefoil, wood nettle, jewel weed, smaller forget-me-not, swamp buttercup, stinging nettle, Virginia waterleaf, yellow avens, and sweet cicely.

Disturbance Indicators: It is probable that this river bottom was at one time grazed based on the number of thorny shrubs and presence of weedy forbs such as wood and stinging nettle. Infrequent floods, may have also impacted this area during the same period. Regeneration of floodplain forest trees is generally poor, with canopy gaps created by tree mortality generally being filled in by buckthorn or reed canary grass. When surveyed by DNR Ecologists in 1987, this floodplain forest was assigned a ranking of C. Because of increased invasion by buckthorn and the decline of black willow, we have assigned a lower quality ranking of CD. Because of the proximity of this community to Valley Creek, restoration efforts may be warranted.

Community 15-28-20-09

Community 15-28-20-09 is a black locust plantation along the top a bluff overlooking Valley Creek and Stagecoach Trail. This community appears to have been planted to control erosion along the crest of the bluff adjacent to an agricultural field.

Community 15-28-20-15

This community occurs to the east and south of Afton Hills Lane loop and an associated residential area. Community 15-28-20-15 is an overgrown oak savanna-woodland with scattered bedrock-bluff prairie openings. The canopy species include open grown bur oak with younger eastern red cedar and butternut that have filled in canopy gaps. The upper crest of its slope has shallow sandy soil over limestone outcrops from the Prairie Du Chein formation. This topography of this community drops steeply into a ravine, where a more forest-like community is present. As a general rule, the entire slope is overgrown with buckthorn and eastern red cedar with dense thickets of wild raspberry, prickly gooseberry, prickly ash, and Virginia creeper. Understory species in the wooded areas include yellow avens, violets, and Pennsylvania sedge. Open prairie patches include hairy grama, little bluestem, prairie dropseed, Muhly grass, and Kentucky bluegrass. Prairie forb species were not evident at the time of the survey, although they are likely present.

Disturbance Indicators: This community was likely a large, bedrock bluff prairie and oak savanna prior to invasion by woody species. Although generally of low quality, this site has significant restoration potential though removal of woody vegetation and appears to have a significant reserve of native prairie species (probable seed bank and scattered prairie grasses and forbs). The quality ranking for this community is CD.

Community 15-28-20-16

This community extends east to west between residential areas of Afton Hills Lane and Stagecoach Trail and is bordered to the north and south by open fields and tree plantations. Community 15-28-20-16 is a long, narrow strip of lowland hardwood forest dominated by 14 to 20-inch diameter black walnut, boxelder, and cottonwood trees. The area of black walnut is the only sizable occurrence of this species noted within the City of Afton. It was unclear during our survey whether the walnut trees were planted or naturally occurring.

Other canopy species include hackberry, black ash, paper birch, American elm, and red maple. The shrub layer is dominated by a low, patchy layer of buckthorn, wild raspberry, choke-cherry and common elder. Although somewhat weedy, the groundcover layer contains a fair diversity of lowland hardwood species including yellow avens, interrupted fern, sweet scented bedstraw, and sweet cicely.

Disturbance Indicators: An old road runs though this community, but has generally grown over with brush. Invasive shrubs and weedy forbs suggest a history of grazing, although none recently. This community is assigned a CD quality ranking.

Community 15-28-20-17

Community 15-28-20-17 is a mixed pine-hardwood forest dominated by young, 10 to 14-inch diameter birch, red pine and white pine. Scattered white pine (up to 25 inch in diameter) occur throughout the community. Other canopy species include red maple, red cedar, red oak, cottonwood, crab-apple, American elm, and black cherry. Together, these trees comprise a 70 % total canopy cover. The shrub layer is dominated by buckthorn, chokecherry, wild grape, and younger paper birch. Herbaceous plants are relatively low in diversity, but in some places are dominated by lady fern. Other ground layer species include Pennsylvania sedge, yellow avens, strawberry, and violets. As the community extends west toward residential homes, the usual mix of woody trees and shrubs occurs.

Community 15-28-20-21

Community 15-28-20-21 is a black locust plantation.

Community 15-28-20-23

Community 15-28-20-23 is a conifer plantation by boat storage facility in town.

Community 15-28-20-24

Community 15-28-20-24 is an old field/brushland.

Landscape Unit #15

Summary Table for Landscape Unit #15

Site ID	Community ID	Community Type	Quality Ranking
137	15282007	Oak Woodland	C
142	15282012	Oak Woodland/Forest	CD
143	15282014	Oak Savanna Restoration	NA
154	16282001	Lowland Hardwood Forest	D
155	16282002	Mesic Oak Forest	CD
156	16282003	Conifer Plantation	NA
157	16282004	Mesic Oak Forest	C
158	16282005	Conifer Plantation	NA
159	16282006	Old Field	NA
160	16282007	Old Field	NA
161	16282008	Mesic Oak Forest	C
162	16282009	Mesic Oak Forest	BC
163	16282010	Aspen Woodland	C
164	16282011	Dry Prairie (Sand-Gravel Subtype)	CD
165	16282012	Lowland Hardwood Forest	D
166	16282013	Oak Woodland	D
167	16282014	Oak Woodland	D
168	16282015	Mixed Coniferous/Deciduous Woodland	NA
169	16282016	Conifer Plantation	NA
170	16282017	Oak Woodland	C
171	16282018	Conifer Plantation	NA
172	16282019	Mesic Oak Forest	C
181	16282029	Mesic Oak Forest	D
182	16282030	Mixed Coniferous/Deciduous Woodland	NA
221	21282003	Mesic Oak Forest	CD
230	21282012	Old Field	NA
232	21282014	Conifer Plantation	NA
234	21282016	Old Field	NA

Landscape Unit Ranking

Ecological Ranking: This landscape unit encompasses one of the larger contiguous tracts of forest and woodland in the City of Afton. Although there are some scattered good quality forest communities, most are of poor to moderate quality due to invasion by buckthorn and in some cases, severe erosion. The ecological ranking assigned to this landscape unit is moderate.

Wildlife Habitat Ranking: This landscape unit contains some areas of relatively isolated, interior habitat that includes good quality forest communities. During our survey, numerous deer and turkey were seen in this area. This landscape unit is assigned a wildlife habitat ranking of high.

Rare Features Ranking: There are several rare feature records along the border of this landscape unit. Presumably, field surveys within this landscape unit would show that some rare features are present. For this reason, a rare features ranking of moderate is assigned.

Stewardship Recommendations

Three communities along the West side of Trading Post Trail (16282004, 16282008, 16282009) are moderate to good quality oak forests. Portions of these oak forests are within a deep ravine