

Glacier National Park

Reconnaissance Trip I - East Side of Continental Divide

September 14 - September 19, 1998

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The field reconnaissance trip for Glacier National Park was conducted Sept 14 -Sept 19, 1998. The purpose of the field trip was to

1. confirm the existence of the vegetation types present in the park using the Glacier National Park Preliminary Classification Alliance/Community List developed by S. Cooper and P. Comer,
2. correlate photo signatures with the appropriate vegetation types,
3. identify vegetation types that may potentially cause photo interpretation problems,
4. understand photo interpretation limitations,
5. discuss initial gradsect analysis and its potential application for use towards mapping and collection of vegetation plots.

Participants were Tom Owens (USGS, Center for Biological Informatics), Pat Comer (The Nature Conservancy), Steve Cooper (Montana Natural Heritage Program), Richard Menicke and Tara Williams (Glacier National Park), and Kevin Hop and Sara Lubinski (USGS, Environmental Management Technical Center). On various days, others joined us including biologist Kevin Van Tighem (Waterton Lakes National Park), several Glacier National Park staff (Jen Asebrook, Shannon Kimball, David Schirokauer) and consultants Steve Barrett (fire history of the park), and Barry Dutton (soils scientist).

Fieldwork involved hiking and driving to many areas on the east side of Glacier Park to begin verification of vegetation types listed in our preliminary classification. Park staff (Richard Menicke and Tara Williams)

created an itinerary that would take us to several locations in the park to provide a broad perspective of vegetation communities. A preliminary gradect, which was begun earlier, provided a useful map for examining relationships of the vegetation to selected physical components.

Preliminary photo interpretation was done on several of the photos within the areas selected for study. The interpreted photos were subsequently used in the field to collect information on each community type encountered, and to confirm the photo signature for each type.

Once a type (either an alliance or association) was found, a formal reconnaissance was usually conducted at the site. Formal reconnaissance consisted of collecting the following information on a data sheet for each community or alliance:

- 1) site description, oblique photographs (35 mm) to provide a visual record of the type,
- 2) UTM coordinates to pinpoint an accurate location for the type,
- 3) a short species list,
- 4) and a description of the photo signature.

Field notes were recorded directly onto Mylar photo sleeves with permanent marker and USGS topographic maps. Areas where reconnaissance data were not collected were often areas where other data exists.

Monday, September 14

Logan Pass to Saint Mary, Going-To-The-Sun-Road

The first stop was at Logan Pass, where a boardwalk extends over alpine meadow (elevation 6650'). We talked about the fragile alpine communities present, existing in a mosaic pattern of rock ridges and lower areas, each microhabitat supporting somewhat different communities. Because of the mosaic pattern, we discussed the necessity of mapping the area as a unit, rather than attempting to pull each rock ridge out as a separate community from the surrounding meadows. Abundant species included *Luzula hitchcockii*, *Poa alpina*, *Gentiana affinis*, *Erythronium grandiflorum*, and *Erigeron peregrinus* (**Recon #1**; ground photos [1-1](#) and [1-3](#); Easting 299795, Northing 5397121). Further discussion revolved around the "krummholz" at the east side of the parking lot. Here, the krummholz is mixed with a meadow of *Luzula*, and across the road the krummholz was

interspersed with a meadow of *Xerophyllum*. While these two sites represent compositionally different communities, we cannot make the distinction between these meadows on the photo. (Ground photos are [1-4](#) for the *Xerophyllum*, [1-5](#) for the *Luzula*; aerial photo [5-17-26](#)). We are interested in obtaining some of Christian Damm's work on alpine meadows so that we may better understand the distribution of these communities.

Our location at Logan Pass provided the opportunity to view the West Side of the Garden Wall and discuss vegetation patterns in relation to how they would be mapped (ground photo 1-2). On these steep, rocky slopes, vegetation appears distributed in finger-like projections, related to slope, aspect, elevation, or stability of the substrate. Our photo interpretation will attempt to follow the fingering pattern of the vegetation as much as possible.

The second stop was just below Logan Pass at Lunch Creek. This stop provided the opportunity to discuss the woodland vs. forest concept, and we agreed that this stand was a woodland composed of predominately *Abies lasiocarpa*. (Ground photo [1-6](#); aerial photo [5-17-27](#))

We made a brief stop at Siyeh Bend to view the *Abies lasiocarpa* with evidence of dead/infected *Pinus albicaulis* (elevation 6000 - 7200'). It will be necessary to map these forests as subalpine fir woodland even though the community type is the *Abies lasiocarpa* - *Pinus albicaulis* woodland alliance. Although the photos providing evidence of dead trees present, we cannot distinguish whitebark pine from dead subalpine fir; thus the call for subalpine fir woodland (Ground photo [1-7](#); aerial photo [5-18-29](#)).

Recon #2 was taken along the Piegan Pass Trail south of Going-to-the-Sun Road, just north of Reynolds Creek (elevation 5000', no signal for UTM coordinates). This stand, which appears on the photo as woodland, is actually part of a larger polygon of denser *Abies lasiocarpa*/*Clintonia* Forest Type with *Xerophyllum* (ground photo [1-8](#), aerial photo number [5-18-28](#)). In spite of its woodland appearance, we will map it as part of the larger forest polygon.

Recon #3, taken on the north of side Saint. Mary Lake, was a steep, sloping shrub community (elevation 4950'; 312717, Northing 5396702), a heavily browsed stand composed chiefly of *Holodiscus discolor*,

Amelanchier alnifolia, *Ceanothus velutinus*, *Populus tremuloides*, *Vaccinium membranaceum*, and *Rosa woodsii*. There are both mappable units and inclusions (below minimum mapping unit) of *Festuca idahoensis* and *Pseudoroegneria* where this shrub community opens into these herbaceous elements. The grass signatures appear as a light tan signature while the shrubs appear as red and choppy. Ground photo [1-9](#) shows shrubs, [1-10](#) shows grass and shrubs; aerial photo [6-21-29](#). Steve Cooper pointed out that *Festuca idahoensis* and *Pseudoroegneria spicata* are both common grass species of south- and west- facing slopes.

Recon #4 was taken on a southwest-facing calcareous slope on the north side of Saint Mary Lake (elevation 4600'; Easting 313794, Northing 5396288) near the Narrows. The community at this location consisted of an overstory of *Psuedotsuga menziesii* and an understory/ground cover of *Festuca idahoensis*, *Arctostaphylos uva-ursi*, *Amelanchier alnifolia*, *Prunus virginiana*, *Heuchera parvifolia*, *Rosa woodsia*. *Mahonia repens* was also present. This community falls within the *Psuedotsuga menziesii* Woodland Alliance and is a new addition to our list: *Psuedotsuga menziesii*/*Festuca idahoensis* limestone woodand. Signature appeared as exposed rock with a light tan herbaceous understory.

Note: Calcareous rock provides an indication that conifers present are likely *Psuedotsuga* rather than *Abies lasiocarpa*; confirmation of this relationship through further ground-truthing will contribute to mapping these stands more accurately. (Ground photos are [1-11](#) and [1-13](#); aerial photo [6-21-29](#))

Recon #5 was taken in a nearly pure stand of *Populus balsamifera* spp *trichocarpa* bordering Saint Mary Lake, near the boat ramp by Rising Sun campground (Easting 314316, Northing 5396165). Beneath the canopy, *Amelanchier alnifolia*, *Prunus virginiana*, *Rosa woodsia*, and *Symphoricarpos albus* were common. Sparse presence of *Osmorhiza* indicated this type as *Populus Tremuloides* - *Populus balsamifera* spp *trichocarpa*/*Osmorhiza occidentalis* Forest. (Ground photo [1-14](#); aerial photo [6-21-29](#))

Adjacent to this site we observed a *Festuca idahoensis*/*Potentilla (fruticosa?)* community with a few scattered evergreens (this would have been a good recon site). The cinquefoil is very difficult to pick out on the photo, but if other shrubs are sparsely present (such as evergreens) than we have a better indication that cinquefoil might also be present.

Along the roadside, we observed non-native species such as Timothy. Other types noted from the car in the Two Dog Flats area were *Populus tremuloides*-*Symphoricarpos* stands, with the aspen stunted at heights around 15'. This type will be looked at more closely next summer during Reconnaissance Trip 2. The transition zone between the aspen and lodgepole pine (where the two mix) will be mapped as one type or the other as best as possible.

Recon #6 was collected at a prairie grassland at the northeast end of Saint Mary Lake, near the town of Saint Mary (near the visitor center entrance; elevation 4400'; Easting 320804, Northing 5401651). Our recon site was in an area of red signature (moister) than adjacent grey (drier) signature. Also, rough fescue was more common in the moister section. The red prairie signature is not apparently different than other mixes of forbs and grasses, including weedier sites. A number of herbaceous species were abundant throughout including *Festuca idahoensis*, *Festuca campestris*, *Geum triflorum*, *Agropyron spicatum*, *Potentilla fruticosa*, and *Potentilla anserina*. Common species included *Koeleria cristata*, *Arctostaphylos uva-ursi*, and *Agropyron caninum* (Ground photo [1-15](#); aerial photo [6-22-31](#))

Tuesday, September 15

Marias Pass and Firebrand Pass

From the parking lot we observed slope communities on Little Dog and Summit Mountains. We discussed herbaceous communities in avalanche chutes, thinking they might be Idaho Fescue and probably grass and forb mixes with dwarf shrubs (aerial photo [8-24-8](#)).

We hiked the Coonsa, Autumn Creek, and Firebrand Pass Trail up to a cirque (elevation 6500'). We hiked through several communities including lodgepole pine, aspen, shrub, grassland/forbs, and subalpine slopes. **Recon #7**, at the top of our hike, was a dwarf shrubland/Juniper-grass type, not yet linked to our classification (Easting 327509, Northing 5363202). Dominant plants included *Vaccinium membranaceum*, *Juniperus communis*, *Arctostaphylos uva-ursi*, and *Trisetum spicatum*. Other species present included *Abies lasiocarpa* (stunted), *Carex geyeri*, *Vaccinium myrtilloides*, and *Fragaria virginiana*. Signature appeared as grey and red mottled with a tinge of orange specks that might be the *Vaccinium*. This site had some variation in topography, and towards the slopes, the type

became more sparsely distributed. (Ground photo [1-17](#); aerial photo [8-25-9](#) and aerial photo [8-25-10](#))

We also looked at the sparse veg types, and decided that the talus (boulder) and scree (smaller rock) would be included in the sparse veg category. Separation of sparse veg from grass on thin soils can be determined from the photo signatures: light pink or tan signature indicates presence of grasses, but where blue or white rock is all that is apparent on the photo, we'll map as sparse veg. Although we can see a difference in the photo signatures between talus and scree, these two sparse veg communities will likely be classified as the same map class. (Ground photo [1-18](#) shows a scree slope with several small subalpine/alpine plant species)

Recon #13 was located on a convex side slope with a NE aspect (elevation 6100'; Easting 328123, Northing 5363449). Signature appeared as a dark red shrub. Species present were rather short (approximately 10 to 15') *Abies lasiocarpa* with an understory composed of *Luzula hitchcockii*, *Vaccinium membranaceum*, *Vaccinium scoparium*, and *Xerophyllum tenax*. Our preliminary type is *Abies lasiocarpa* -*Luzula* woodland. Ground photo [1-19](#) shows an *Abies lasiocarpa* woodland, with a couple whitebark pine snags.

Recon site #8 was taken at a burned (1910?), thin-soiled rocky hillside, once whitebark pine (elevation 6200'; Easting 328249, Northing 5363343). Dominant plant species consisted of *Festuca idahoensis*, *Festuca campestris*, and *Trisetum campestris*. Species of common occurrence included: *Juncus confusus*, *Senecio canadensis*, *Eriogonum ovalifolium*, and *Potentilla fruticosa*. A smooth pink signature represented the grass-dominated portion of this area. *Vaccinium membranaceum* was also present in portions of the slope, resulting in a reddish-orange, blotchy signature. These blotches indicate a dwarf-shrub type and will be mapped separately from the grass-dominated polygon. However, we will not always be able to separate these two types, depending on the size of area or extent of mixture of the two (ground photo [1-20](#)).

Recon #9 was collected on a sloped (24%, aspect 110) open area of mixed grasses and forbs (elevation 5700'; Easting 329079, Northing 5362966). The photo signature appeared as a smooth pink. Dominant plants included *Rubus parviflorus*, *Amelanchier alnifolia*, *Solidago canadensis*, *Aster conspicuus*, *Angelica arguta*, and *Epilobium angustifolium*. This type, not

yet part of our current classification list, will be added as mixed grass/forb type (aerial photo [8-25-9](#), ground photo [1-22](#)).

Recon #10 was located in a mixture of shrubs and grasses and forbs (elevation 5600'; Easting 329123, Northing 5362747). Dominant species are *Salix drummondiana*, *Alnus incana*, *Epilobium angustifolium*, and *Angelica arguta*. Common plants included *Thalictrum occidentale*, *Disporum hookeri*, *Rubus parviflorus*, *Urtica dioica*, and *Elymus glaucus*. (No ground photo, aerial photo [8-25-9](#)). Photo signature is a mixture of pink (grasses and forbs) with red shrub mottled throughout. From this site we could see distant spruce-fir forest that were mottled with dead snags. Extensive *Pinus contorta* forests were also visible.

Recon #11 was located a *Populus tremuloides* - *Calamagrostis canadensis* type (elevation 5500'; Easting 329450, Northing 5362173). The signature appeared as a red, plumpy tree/shrub signature with pink understory. Dominant species included *Populus tremuloides*, *Calamagrostis canadensis*, and *Populus trichocarpa*. Common species included *Elymus glaucus*, *Thalictrum occidentale*, *Symphoricarpos albus*. These wet aspen stands are common but not distinguishable on the photos from other aspen communities- we need to use gradsect to key us into the presence of clay soils so that we can map them separately from other aspen types (ground photo [1-23](#)).

Recon #12 was a forest with slightly sloping topography and a generally south-facing aspect (elevation 5500'; Easting 329260, Northing 5361300). The signature appeared as a very dense deep magenta conifer cover. *Pinus contorta* was the dominant tree species. Understory species include *Xerophyllum tenax*, *Vaccinium membranaceum*, *Spiraea betulifolia*, and *Arnica cordifolia*. Common species included *Chimaphila umbellata*, and *Alnus incana*. This forest will be mapped at the Alliance level since we are unable to distinguish between associations that are based on understory species (Ground photo [1-24](#), aerial photo [8-25-9](#))

Recon # 14 was collected at a streamside wetland (elevation 5150'; Easting 330383, Northing 5360293). Dominant plants included *Salix geyeriana*, *Calamagrostis canadensis*, *Carex uticulata*, and *Agrostis stolonifera*. Other species included *Juncus* sp., *Epilobium watsonii* and *Eleocharis palustris*. The photo signature appears as a light red shrub with a pink understory. This alliance (*Salix geyeriana* Seasonally Flooded

Shrubland Alliance) will be combined with *Salix Drummondiana* Seasonally flooded Shrubland Alliance for mapping (ground photo [1-25](#), aerial photo [8-25-9](#)).

Wednesday, September 16, 1998 **Waterton Valley (Kootenai Lakes)**

We traveled to Waterton, Canada, where we were joined by Kevin Van Tighem for the ferryboat ride across Waterton Lake to Goat Haunt. We hiked the Waterton Valley Trail to the Kootenia Lakes area (elevation 4400'). **Recon # 15** (Easting 287325, Northing 5422306) was collected in a sedge meadow, where *Calamagrostis* ringed the periphery and *Carex* spp occupied the wetter center. Dominant plants were *Carex uticulata* and *Calamagrostis stricta*. The signature is a bright red to dark olive brown herbaceous veg. This sedge meadow is part of what will become a mapping complex/mosaic unit, composed of several alliances under the seasonally flooded herbaceous alliance group (ground photo [2-5](#), aerial photo [1-13-30](#)).

Recon # 16 was collected in a wet shrubland with scattered spruce trees (Easting 286938, Northing 5421812). The signature appeared as a reddish orange signature with scattered dark red conifers. Dominant species included *Equisetum fluviatile*, *Carex utricularia*, *Picea engelmannii*, *Salix candida*. Common species were *Petasites sagittatus*, *Rhamnus alnifolia*, *Glyceria striata*, and *Geum macrophyllum*. This type, a shrub/herbaceous wetland hasn't been placed within the current classification list (ground photos [2-6](#) and [2-7](#), aerial photo [1-13-30](#)). To the east and adjacent to the shrubland, we found a spruce wetland woodland, essentially the same species were present but with a stronger component of trees. This type also needs placement within our classification (ground photo [2-7](#)).

We spent some time in the Kootenai Lakes area ground-truthing *Salix* wetlands, grass/forb meadows, and the east face of Porcupine Ridge where krummholz, subalpine fir woodlands, alder/maple avalanche chutes, and dwarf shrub/ shrub communities occur. *Festuca* spp., *Danthonia*, and mosses were components of grasslands that quickly changed to fir woodland types, contributing to the complexity of slopes above the wetlands (ground photos [2-8](#), [2-9](#), [2-10](#) and [2-11](#), aerial photo [1-13-30](#)).

Recon #17 was collected in a mesic spruce-fir forest with trees to 100 feet (Easting 288061, Northing 5423528). Dominant species were *Picea engelmannii* and *Abies lasiocarpa*. Understory plants included *Rubus parviflorus*, *Tiarella trifoliata*, *Gymnocarpium dryopteris*, *Clintonia uniflora*, *Galium triflorum*, and *Smilacena stellata*. The photo signature appears as a dark red conical forest signature. Initial NVCS will be a spruce-fir type.

Thursday, September 17

Swiftcurrent Pass

We hiked the Swiftcurrent Pass Trail from Many Glacier to the Loop. Barry Dutton provided useful commentary (and useful cookies) about the geology and soils, and their relationships to plant communities. Since the hike was relatively long, we did not stop to collect recon data, except at our lunch break in an alpine meadow. The following summarize some of our discussions along the way.

Along Wilbur Creek (elevation 5000'), we discovered a woodland-type mix of evergreen and deciduous trees with an understory of grasses and forbs. For now, we do not have a name for this mixture, but will likely need to create a mixed category to reflect its composition and position within the landscape (Ground photo [2-14](#), aerial photo [5-18-33](#)).

Upland aspen stands and lodgepole/aspen mix (with spruce) forest types were discovered along the trail as we continued west. We will attempt to map these types in their purer forms whenever possible but will also need to map as aspen/lodgepole mix where the composition hovers around 50/50 (aerial photo [5-18-33](#)).

We also walked through woodland on exposed bedrock composed of lodgepole and small aspens and shrubs. We have interest in observing more of this community type before we attempt to place it within our classification (aerial photo [5-18-33](#)).

We traveled through similar stands as above and then moved into an aspen woodland with conifers (ground photo [5-17-31](#)). Because the signatures were somewhat indistinct between mostly aspen and various percentages of mixed aspen and lodgepole, we (the mappers) found it difficult to decide where to make the split between a mix and a more pure stand. Again, we will try to map these situations as individual types rather than mixes when

possible.

At Redrock Falls we found a nondistinct signature that we identified on the ground as short (10-15'tall) subalpine fir/aspen woodland. Before we started our steep ascent to the pass, we traversed through large areas of shrub/grasses/forbs and into various combinations of spruce/fir woodlands. At this point in time, we are not sure how these communities will fall within the classification. Once we started the steep ascent (around 5600'), we began to travel through more varieties of shrub/grass/forbs, often mixtures of mountain ash, huckleberry, alder, willow, and beargrass (ground photos [2-18](#) and [2-19](#)).

Recon # 18 was collected near Swiftcurrent Pass in an alpine meadow (elevation 7200'; no UTM). Dominant species were composed of various herbaceous and dwarf shrub species including *Poa alpinus*, *Luzula campestris*, and various species of *Carex*. Also present were *Phyllodoce empetriformis*, *Dryas octopetala* and *Arnica mollis*. The photo signature appeared as a red and brown signature with rock inclusions. The rocky substrates, which included the dwarf shrub *Dryas octopetala*, will be mapped as inclusions to the rest of the polygon. This site was a relatively dry, grass-like alpine meadow with many species of *Juncus*, *Carex*, and Grasses. We have yet to determine if this alpine meadow community can be distinguished on the photo from either dwarf-shrub alpine meadows or those with a greater component of forbs (ground photo [2-24](#), aerial photo [5-16-26](#)).

We visited a nearby stand of stunted subalpine fir, and debated about height categories. We decided to alter the tree/shrub height modifier so that the shrub height will be 1.5 feet to 6 feet (instead of 1.5 feet to 16 feet). Six feet and above will be tree form so that woodlands in these high elevation areas can remain in a tree category (rather than overlap with Krummholz).

Friday, September 18 **Preston Park and Siyeh Pass**

Steve Barrett (fire history expert) joined us for the day. The majority of the area was burned in a 1765 fire, with some stands dating back to a fire in the 1850's. The forests appear to be different on the photos, both in tree height and in texture, with the older fire stand appearing less dense and more open and reaching greater heights (up to 90') than the younger stands (40 -

65 ft). Further up the trail, the forest changed to subalpine woodland, and in places, whitebark pine was an associate. Much of the woodland and forest occurred in an alternating pattern with open meadows or grasses and forbs. Several meadows also contained young scattered subalpine fir. The trail intersected avalanche chutes, where we observed scattered firs, shrubs, and grasses. Much of the whitebark pine is dead or dying, and because the park has strong interest in knowing where these areas are, we will add a modifier to reflect stands where we can see dead snags or branches on the photos. We will not differentiate between the species of snag because of photo limitations. Thus, the park will have information on where dead/dying conifers occur (at least to the extent we can see on the photo) but it will be their task to determine which are whitebark stands (ground photos [3-2](#), [3-5](#), [3-6](#) show whitebark pine; ground photos [3-3](#) and [3-4](#) show meadows; aerial photo [5-18-29](#)).

We visited a small stand of subalpine larch (approximately 1 hectare) with subalpine fir. Attempts to core the oldest tree in the stand were not successful so we could not age the stand. The stand averaged 40' tall (ground photos [3-8](#), [3-9](#), aerial photo [5-18-29](#)).

Both dwarf shrub meadows and grass/forb subalpine meadows appeared as dense red signatures on our photos, so discrimination between these two different communities may not be possible (aerial photo [5-18-29](#)).

Saturday, September 19

Two Medicine and Scenic Point Trail.

We collected recon data in a spruce fir forest not far from the parking lot (**Recon # 19**, elevation 5280'; Easting 325670, Northing 5372920) The canopy was dominated by *Abies lasiocarpa* and *Picea engelmannii* (to 65'). Mature (approximately 100-120-yr.) lodgepole is dying out in this stand. Understory contained a substantial moss layer. Dominant vascular plants were *Xerophyllum tenax* and *Vaccinium membranaceum*. Other common plants below the canopy were *Chimaphila umbellata*, *Pyrola secunda*, *Goodyera repens*, and *Lonicera utahensis*. The signature appeared as a dark red gray conical evergreen forest (ground photo [3-12](#), aerial photo [8-24-15](#)).

We walked through a *Populus balsamifera* spp *trichocarpa*, *Abies*

lasiocarpa community near the creek. Trees were 20 to 30 feet tall, and percent cover approximately 35%. This open stand also had scattered spruce and fir.

Recon # 20 was collected further up the Scenic Point Trail along a steep west-facing slope (5600'; Easting 326268, Northing 5372405). The slope had scattered, dead, whitebark pine trees, several appearing as magnificent white twisted sculptures (Ground photo 3-17). Abundant species were *Arctostaphylos uva-ursi*, *Juncus communis*, *Festuca campestris*, *Trisetum*, *Amelanchier alnifolia*. Common plants included *Shepherdia canadensis*, *Potentilla fruticosa*, and *Lupinus sericeus*. The signature for this slope was blue with mottling of red and dark red. A shadow on this photo makes this signature difficult to read (ground photos [3-14](#), [3-16](#), ground photo [3-15](#) is view to transitional zones on the slopes of Appistoki Peak; aerial photo [8-24-15](#)).

Our last stop was near Two Medicine Lake, where we went off trail to reach a willow wetland with sparse spruce. We also observed adjoining wet spruce woodland that was similar to one of the wetlands we visited in Waterton Valley/Kootenai Lakes.

Concluding Thoughts

The week was very informative and provided an important avenue for relating vegetation patterns to the aerial photos and to the preliminary classification. We anticipate at least one additional reconnaissance trip next summer before the classification can be solidified and map units created. Preliminary gradsect appears very promising as a tool for both ecologists and mappers. An elevation layer will be added to the model.

Photo limitations are many. While not completely reviewed at this date, some limitations are:

1. Scale of photography may likely limit our ability to pick out many whitebark pine problem areas.
2. Film type and time of year photos were taken present photointerpretation problems. We may not be able to differentiate many associations and alliances from one another. Further, nearly all associations that are based on differences between understory indicator species will not be recognizable on the photos. Pat

suggested creating a rule-based spreadsheet that will link vegetation alliance/community types to physical features, primarily elevation, location in the park (east, west) and habitat features. Information contained within the spreadsheet can then be applied during the mapping process or used to create models following the mapping process. Further thought and discussion will help sort out these approaches.

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