Appendix 34
Departure from Historic Vegetation Conditions

From: Some Findings from the Historical Range of Variability Study for the Flathead National Forest. Unpublished report. FNF. Kalispell, MT

A historical range of variability study conducted for the Flathead National Forest assessed the departure of forest vegetation from its presettlment condition. The study was based on ecological subregions (ESRs), which were created based upon similar potential vegetation groups (PVGs), temperature, precipitation, and solar radiation (Figure __). A summary of the study follows:

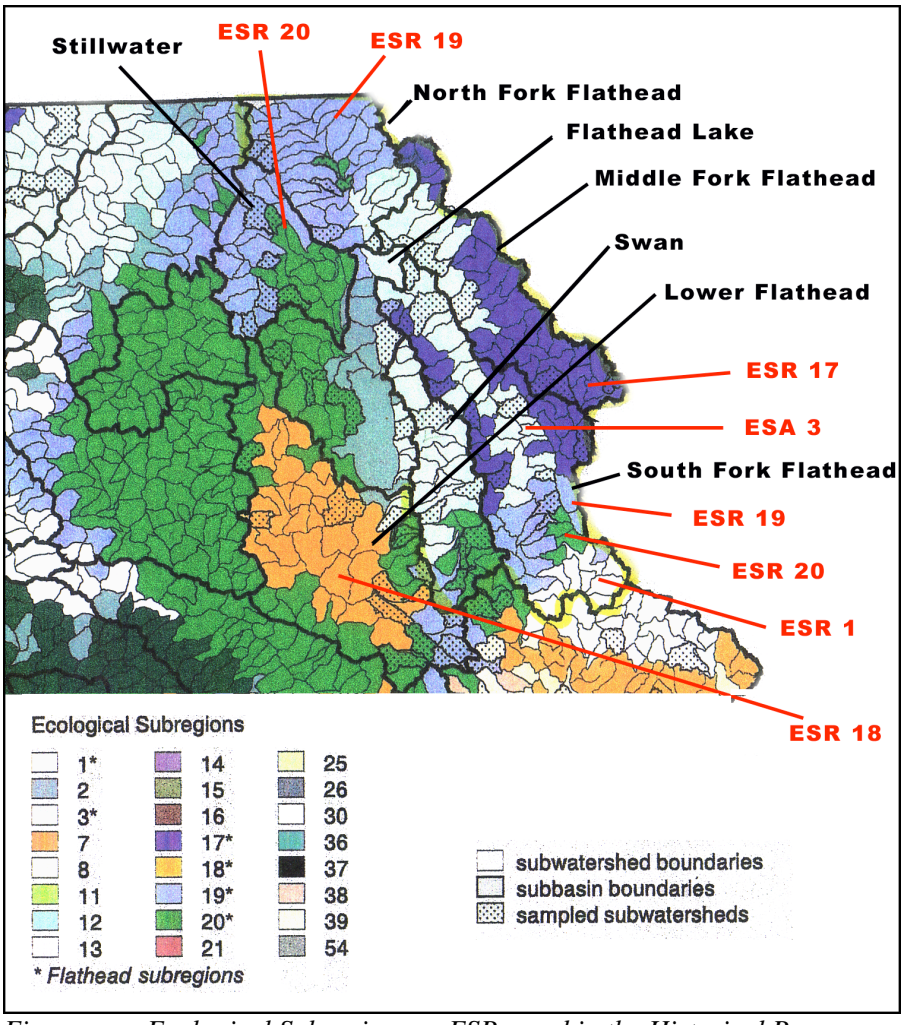

Figure ___. Ecological Subregions or ESRs used in the Historical Range of Variability Study.

ESR 3

Cover Type: The most significant change is the reduction of western larch from nearly 20% of the subwatershed to 13.4%. Most of the change from western larch was to either

subalpine fir or Douglas-fir cover types. Other statistically significant changes are decreases in ponderosa pine and western white pine, and increases in grand fir, herbland and other. This shift in cover types is likely to lead to increased bark beetle/root rot activity in subalpine fir, Douglas-fir and grand fir. Some of these sites were previously dominated by western larch which by comparison is very resistant to bark beetles and most root rots. Fire severity is likely to increase with loss of fire-resistant western larch, ponderosa pine and western white pine.

Structural Class: The current proportion of stand inititiation (12%) is significantly less than the historical amounts (30%). It is approaching the minimum reference value of 3.0%. The minimum reference value is the lowest value of the median 80% range. The historical stand initiation conditions have transitioned to all other structural classes with the exception of old forest. Decreased stand intitiation coverage has been replaced by increasing stem exculsion, understory reinitiation, herbland and other. Fire suppression has be very effective. Wildlife species that use early successional conditions currently have less habitat available than historically.

Patch density and size: The average patch density [patches/l0,000 acres] increased between historical and current conditions for all structural stages. The increased patch density of stand initiation, stem exclusion classes, understory initiation, herbland and other is statistically significant. The size of patches has correspondingly decreased from historical to current conditions for most structure classes. The most significant decrease is in the stand initiation class where the average patch size decreased from about 490 acres to about 175 acres. Contrary to the general trend that there are currently more and smaller patches than historically for most structure classes, in the stem exclusion closed canopy class there are more and significantly larger average patch sizes. This appears to be attributable to the transition of large historical stand initiation patches to current stem exclusion, and to some degree, understory re-initiation classes. Landscapes are more fragmented today with the possible exception of stem exclusion closed canopy and understory re-initiation classes. This is most likely the result of "checkerboard" clearcutting with generally a 40-acre maximum cutting unit size on National Forest lands.

ESR 17

Cover Type: The most significant change is the reduction of lodgepole pine [PICO] from slightly more than 15% of the subwatershed to 11.4%. Most of the change from lodgepole pine is made up of a significant increase in subalpine fir cover type. Other statistically significant changes are decreases in shrubland and other. In both cases, there is a corresponding transition to subalpine fir. Altogether, subalpine fir increased from nearly 50% of the subwatershed to nearly 60%. This shift in cover type will likely lead to increased bark beetle/root rot activity in subalpine fir. Fire severity is likely to increase proportionally with the increase in subalpine fir.

Structural Class: The current proportion of stand initiation (approx. 35%) is significantly

less than the historical amounts (approx 50%). The historical stand initiation conditions have transitioned to all other structural classes with the exception of old forest. Decreased stand initiation is replaced by increases in stem exclusion, understory re-initiation, young forest multistory, herbland and other. Younger-aged, lodgepole cover types are moving into older, subalpine fir cover types through mountain pine beetle mortality and succession. Fire suppression has been very effective in reducing the amount of early seral conditions. Wildlife species that use early successional conditions currently have less habitat available than historically.

Patch density and size: The density of patches increased for all structural stages. The increase in understory initiation and young forest multistory were statistically significant. The size of patches has correspondingly decreased from historical to current conditions for most structure classes. The most significant decrease is in the stand initiation class where the average patch size decreased from about 1665 acres to about 440 acres. Contrary to the general trend that there are currently more and smaller patches than historically for most structure classes, in the understory re-initiation class there are more and larger patches. This appears to be attributable to the transition of large historical stand initiation patches to current understory re-initiation classes. Landscapes are more fragmented today with the possible exception of understory re-initiation classes.

ESR19

Cover Type: The most significant change is the reduction of shrubland from 7% of the subwatershed to 3% and the reduction of hardwood from 3% to 1.4%. These changes contribute to a small, yet statistically significant increase in subalpine fir from an average of 39.3% of the subwatersheds to 43.5%. This small increase in subalpine cover type will likely lead to slightly increased bark-beetle/root-rot activity. Fire severity is likely to increase proportionally with the increase in subalpine fir.

Structural Class: The current proportion of stand initiation (approx. 12%) is signifi&ntly less than the historical amounts (approx 20%). Nearly all other forested structure classes have corresponding increases above historic conditions. Similar to stand initiation there has been a loss of more than half of the historic shrublands. They too have transitioned into later seral-forested structural classes. There has been a small, but statistically significant, increase in old forest classes. Fire suppression has been very effective in reducing the amount of early seral conditions. Wildlife species that use early successional conditions currently have less habitat available than historically.

Patch density and size: The increase in patch density is statistically significant for all forested structural stages. The increase in stand initiation patch density from about 45 patches per 10,000 acres to 85 patches per 10,000 acres is considered to be ecologically significant. The current value is greater than the maximum reference value of 71.7 patches per 10,000 acres. Values outside the estimated reference variation, which is nominally the sample median 80% range of the metric, are considered ecologically significant or a departure from historical conditions. There have been statistically significant decreases in patch size for most forested classes. The exception is a significant

increase in stem exclusion-closed canopy patch size. This appears to be attributable to the transition of large historical stand initiation patches to current understory re-initiation classes. Staggered-set regeneration harvest, using 40-acre maximum size cutting blocks on National Forest lands, has resulted in landscapes that are more fragmented today than historically, with the possible exception of stem exclusion-closed canopy.

ESR20

Cover Type: There are no significant changes in the average cover type conditions between the historical and current periods. This ESR is generally at lower elevations than other ESRs on the FNF. Where other ESR indicate little visible logging in the historical time period [<l0%], this ESR indicates that nearly 25% of the subwatershed had evidence of logging visible on the historical aerial photography. It may be that shifts in covertype had already occurred prior to the historical photography and these proportions have been maintained by harvest.

Structural Class: In contrast to other ESRs, the current average proportion of stand initiation (approx. 15%) is not significantly less than the historical amounts (approx 17%). There has been a small, but statistically significant, increase in old forest classes and in understory re-initiation. In contrast to other ESRs, there has been a significant decrease in young forest multistory. Perhaps fire suppression has been effective longer in this ESR than other ESRs as the amount of historical stand initiation is much lower than the other ESRs. Another possible explanation is that this low-elevation ESR was likely dominated by low- and moderate-intensity fire regimes. These disturbances may have not resulted in stand initiation conditions and may have instead perpetuated young forest multistoried conditions with repeated underbuming. Selective and regeneration harvest appears to be reducing historically young-forest multistory structures and replacing it with earlier seral, simplified, single-storied structures.

Patch density and size: The increase in average patch density is statistically significant for all forested and non-forested structural stages between historical and current conditions, except old forest multistoried. The increase in stand initiation patch density from about 40 patches per 10,000 acres to 72 patches per 10,000 acres is considered to be ecologically significant. The current value is greater than the maximum reference value of 59.3 patches per 10,000 acres. The increase in stem exclusion average patch density from about 22 patches per 10,000 acres to 42 patches per 10,000 acres is also considered to be ecologically significant. The current value is greater than the maximum reference value of 35 patches per 10,000 acres. Values outside the estimated reference variation, which is nominally the sample median 80% range of the metric, are considered ecologically significant or a departure from historical conditions. There have been statistically significant decreases in patch size for stem exclusion classes, young forest multistory, old forest single story, shrubland and other types. The decrease in average patch size of young forest multistory from 875 acres to about 215 acres is considered to be ecologically significant. The exception is a significant increase in stem exclusion –

closed-canopy patch size. This appears to be attributable to the transition of large historical stand initiation patches to current understory re-initiation classes. Harvest on both National Forest and other lands has increased patch density and decreased patch size. Landscapes are more fragmented today, especially young forest multistory structure classes.