

## Yellowstone to Uintas Connection

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[www.yellowstoneuintas.org](http://www.yellowstoneuintas.org)

Mr. Dave Whittekiend  
Forest Supervisor  
Uinta Wasatch Cache National Forest  
857 West South Jordan Parkway  
South Jordan, UT 84095

July 13, 2014

Re: High Uintas Domestic Sheep Grazing Analysis

Dear Mr. Whittekiend:

I previously (6/27/14) sent an email comment to you and the comment line for the Ashley NF on this project (attached). These are supplemental comments and are submitted on behalf of Western Watersheds Project, Wilderness Watch, and Yellowstone to Uintas Connection. I have also included our Report, "Watershed Conditions Uinta Wilderness, Utah", dated October 30, 2006. That report provides ground cover data, sediment data for cutthroat trout spawning areas, photo points documenting eroded and bare soils, bank damage and scouring, alpine and subalpine areas that have had most of the plant cover removed leading into fall. The lack of plant cover in the higher basins result in little ability for the watershed to retain snowmelt, leading to loss of water storage and extreme flow events during snowmelt and storm runoff. We also collected data and photographs in the ungrazed Middle Fork Beaver Creek showing the comparison between grazed and ungrazed uplands. In Middle Fork Beaver Creek, plant communities are healthy with ground cover approaching 100% in all areas, headcuts are healing and streams are healthy. This is not so in the grazed watersheds as you will see if you will review our report and these comments.

We are concerned that the Forest Service is reinventing the baseline for Uinta plant and soil communities and incorporating the damage from thousands of domestic sheep grazing and denuding the area as if there is no impact. This was clearly evident when the WCNF produced its EIS for the West Fork Blacks Fork allotment where gophers, tie hacking and an avalanche debris dam on the West Fork Blacks Fork were blamed, respectively, for reduced ground cover and stream bank scouring. In addition, a long term monitoring site was abandoned in the upper basin using "snowbeds" as the reason. To the experienced eye, the damage is evident. Areas with highly erodible soils that are heavily grazed are classified as "barrens" as if the sheep don't affect them by removing the plant cover and creating accelerated erosion. Sheep are trailed over high passes with steep slopes resulting in additional erosion and loss of any plant cover that might stabilize them. The question is whether the Forest Service will do an objective analysis, or once again obfuscate around the issues in order to perpetuate the status quo. We expect the Agency to conduct an objective and accurate scientific analysis on behalf of the Public trust it is supposed to protect. We expect comparable sites (soil and plant communities) to be assessed in these grazed allotments and in allotments that have been ungrazed by livestock for significant periods of time to demonstrate the differences and impacts.

On the following pages are photographs illustrating the bank scouring issue. The examples are from the West Fork Black's Fork and East Fork Black's Fork, taken from the report cited above.

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West Fork Black's Fork photographs show scoured and caving banks from high flows, and banks destabilized by hoof shear from grazing and trampling by sheep. The Forest Service claimed that tie hacking over a century earlier and/or an avalanche debris pile caused this problem while ignoring the sheep denuded alpine/subalpine basins that lead to the accelerated runoff. Even if the Forest Service were correct in its interpretation, which it is not, sheep should not be allowed to graze these steep, erodible watersheds and exacerbate such problems.





These photographs illustrate bank scour in both the West Fork Blacks Fork (upper photo) and East Fork Blacks Fork (two lower photos). These locations are in areas that would not have been subject to tie hacking and avalanche debris (trees) and are located at the tree line or above. The factors at play are removal of vegetation on slopes and basins upstream of these locations, thus accelerating runoff and flood forces. I camped below the location in the upper photo, and that night a rainfall of less than 0.25" generated a flash flood on this small tributary to the West Fork Blacks Fork. Note the sheep damaged uplands above the stream.



I refer you to the report by Mont Lewis, "Alpine Rangelands of the Uinta Mountains" dated 1970. Mont Lewis was a range conservationist for the Forest Service at the time. His report illustrates many of the sheep related problems in these basins and plant communities, creating excessive bare soil and erosion, and accelerating sedimentation into lakes like the example below from Lake EJOD from our report.



Lake EJOD in upper West Fork Blacks Fork, illustrating the rapid sedimentation of the lake where deltas are growing into the lake from sheep denuded uplands. An area this subject to damage and loss should be sufficient reason to exclude sheep grazing.

In the 1960's the Forest Service engaged in detailed surveys and inventories of the individual plant and soil communities, determined lands that were suitable for sheep and cattle based on ground cover, slope and erosion hazard. They determined stocking rates based on palatable forage and livestock consumption rates. The [R4 Range Analysis Handbook](#) (copy on accompanying CD) was the guiding document produced following the passage of the Multiple Use Sustained Yield Act. Conditions on the ground were assessed using Ocular, Range and Grazing Impact Analyses specified in the handbook. The Uinta Sheep Grazing Analysis you are engaged in currently should be analyzing those data and suitability determinations for presentation in your environmental document. Long term trend sites should be monitored and analyzed as well. Comparisons of current data to historical data and ungrazed locations such as Middle Fork Beaver Creek and other allotments that have been rested from sheep and cattle for the long term should be an absolute necessity or the public can have no confidence in the Forest Service's analysis based on the obfuscation around sheep damage we have experienced to date regarding grazing in the Uintas.



You must determine the historic extent of bighorn sheep range in the Uintas, document historic and current populations and trends, introductions and problems with sustaining these native animals in the Uintas. Based on my decades of exploring and observing conditions here, the entire Uinta wilderness and adjacent areas would be in the range of bighorn sheep as I have observed them in alpine areas and lowlands in the Wind River Range, Frank Church Wilderness and nearby areas. Domestic sheep must be excluded from the habitable range of bighorns to avoid disease transmission and loss of the population. The goal should be recovery of the bighorn sheep population in the Uintas. In addition, the impacts of Rocky Mountain Goats, which have been introduced, on the plant communities as well as their competition with bighorns should be analyzed.

The large numbers of domestic sheep grazing in these allotments consume massive amounts of vegetation. This vegetation, if not grazed, stabilizes soil and streams and provides food and cover for wildlife including elk, deer, bears, moose, bighorn sheep and many small mammals and birds, which also serve as the food base for animals such as Canada lynx and goshawk. As a friend observed when in the West Fork Black's Fork, it sounded like Rachel Carson's "Silent Spring"...there was a deathly silence and absence of bird calls and evidence of other wildlife such as elk. I can vouch for this experience as it is very different in the ungrazed watersheds where you can hear the elk bugle in the fall, see the moose and small mammals such as snowshoe hares upon which goshawk, lynx and other carnivores depend. You must determine the numbers of animal species such as elk, deer, moose, and bighorn sheep that are equivalent to the grazing pressure of domestic sheep (see attached Updating AUM report for current analysis of forage consumption by sheep). In other words, domestic sheep consume thousands of tons of vegetation in these allotments. How many elk, deer, bighorn sheep, bears and other animals would that support? This constitutes a direct loss of wildlife due to sheep grazing and must be accounted for.

Fisheries are impacted by sediment from accelerated erosion which reduces the ability of native cutthroats to spawn successfully, placing them at further disadvantage from competition with brook trout. Our 2006 report estimates mortality to eggs and larvae in grazed and ungrazed watersheds, showing a higher mortality in the grazed West Fork Black's Fork and East Fork Black's Fork. Trends in native cutthroat trout populations must be analyzed. Loss of overhanging vegetation and undercut banks due to sheep trampling, grazing and bank scour reduces habitat for these fish. Native aquatic invertebrates that require clean, sediment free substrate are selected against due to the increased sedimentation from sheep grazing. These must be monitored and analyzed by comparison to ungrazed watersheds and long term trends.

The degradation from sheep and horses is clear and compromises the wilderness experience. The photographs on the next page illustrate trail and stream damage by thousands of sheep in the West Fork Blacks Fork compared to similar locations in the ungrazed Middle Fork Beaver Creek. This destruction by livestock compromises wilderness values, degrades habitat and the visitor experience.

We have used the West Fork Black's Fork as an example of the degradation caused by domestic sheep grazing and trampling in these sensitive places. While the West Fork Black's Fork was analyzed in an EIS a decade ago, the damage continues unabated. It is timely and necessary to now re-analyze the West Fork Black's Fork in conjunction with the ten allotments described in the scoping notice for two



major reasons. Domestic sheep trail in the West Fork and out through the East Fork Black's Fork allotment (or vice versa), which is being scoped for a decision. The cumulative impacts to watersheds, soils and wildlife and this trailing connect these allotments and they should be analyzed in a new EIS, not an EA.



Upper Photographs show trail and habitat damage by thousands of domestic sheep and permittee/herder horses in the West Fork Blacks Fork. The lower photographs show the main trail in the ungrazed Middle Fork Beaver Creek which is used by hikers and recreational horse riders. The West Fork Black's Fork illustrates degradation of habitat, wilderness and recreational values.





Upper photograph shows damage to small stream by domestic sheep in the West Fork Blacks Fork. The lower photograph shows a similar size stream in the Middle Fork Beaver Creek, closed to domestic sheep for decades.



The effect of the bare ground, soil compaction, sheep bedding areas and removal of vegetation on the hydrologic cycle and downstream flows must be analyzed as compared to potential. Flow records from Middle Fork Beaver Creek and other ungrazed watersheds in the Uintas should be compared to those from grazed watersheds and the peak flow to base flow ratios evaluated. The rapid runoff generated by the loss of ground cover and vegetation in grazed areas results in loss of watershed water storage which is needed to replenish stream flows in summer and fall. Models such as RUSLE2 or other suitable models that compare conditions in these ungrazed watersheds with grazed watersheds should be employed. This means using the higher ground cover values such as we found in ungrazed Middle Fork Beaver Creek (near 100% cover) as potential values to compare to actual ground cover values in the grazed watersheds (approximately 50% bare in East Fork Blacks Fork, West Fork Blacks Fork, and Lake Fork).

The Forest Service avoids noticing such features as headcuts and gullies in its monitoring. The photos below illustrate healing headcuts in the upper basin of Middle Fork Beaver Creek compared to active headcuts in the East Fork Blacks Fork which continues to be grazed by domestic sheep. These are altering watershed conditions that lead to increased overland flow events with their associated erosive force.



The upper photo shows active headcutting in a mesic meadow in the grazed East Fork Black's Fork. The lower photo shows healing headcuts in a similar location in the ungrazed Middle Fork Beaver Creek.



The impacts of domestic sheep grazing to carnivores and their prey base due to loss of food and cover for prey animals and mortality from trapping and killing of lynx, goshawk and other carnivores must be evaluated. Black bears have dietary needs very similar to domestic sheep, being mostly herbivores. An analysis of the impact to black bears from competition with sheep and losses to herders and wildlife control actions must be included. Is the “shoot, shovel and shut up” management philosophy being practiced by sheep herder’s and permittees in these allotments? If not, how does the Forest Service know this? It must be assumed that any carnivore seen will be shot by a herder or permittee with the excuse they were “harassing” the sheep. This is a license to kill on sight and it is not ever discussed. But, with the presence of sheep and herders in every watershed, it may explain the absence or near absence of lynx, wolves, bears, wolverines in the Uinta Wilderness. In all the years I have hiked in the high country here I have never seen a bear. I attribute this to unsanctioned predator control by livestock interests and almost nothing left to feed on, which is a direct impact on these animals.

In the West Fork Blacks’ Fork EIS, bare ground was explained away due to the influence of gophers or monitoring sites were moved to find more ground cover. In comments at the time I pointed out some of the ecology of gophers, for example, in undisturbed areas where surface disturbance or soil compaction is not occurring, visible gopher activity is low because they are inhabiting stable tunnel systems and filling old tunnels, not reconstructing and bringing material to the surface. In higher productivity areas where there is sufficient food available, this is even more pronounced as they occupy stable tunnel systems and forage belowground. Livestock trampling, removal of herbaceous standing crop, long lasting snow drifts that result in soil compaction or the need to forage more widely result in more surface activity. I pointed out these factors from research cited in those comments dated September 30, 2005.<sup>1, 2, 3</sup> As part of my research here at Kiesha’s Preserve<sup>4</sup>, I conducted an initial survey of gopher activity in ungrazed meadows, big sage, low sage, snowdrift areas and in a grazed meadow and grazed big sagebrush area. The results of that survey are provided on the next page in the



**Gopher activity and low residual herbaceous vegetation on the West Fork Black’s Fork**

<sup>1</sup> Anderson, Douglas. 1987. *Geomys bursarius* burrowing patterns: influence of season and food patch structure. *Ecology* 68(5):1306-1318.

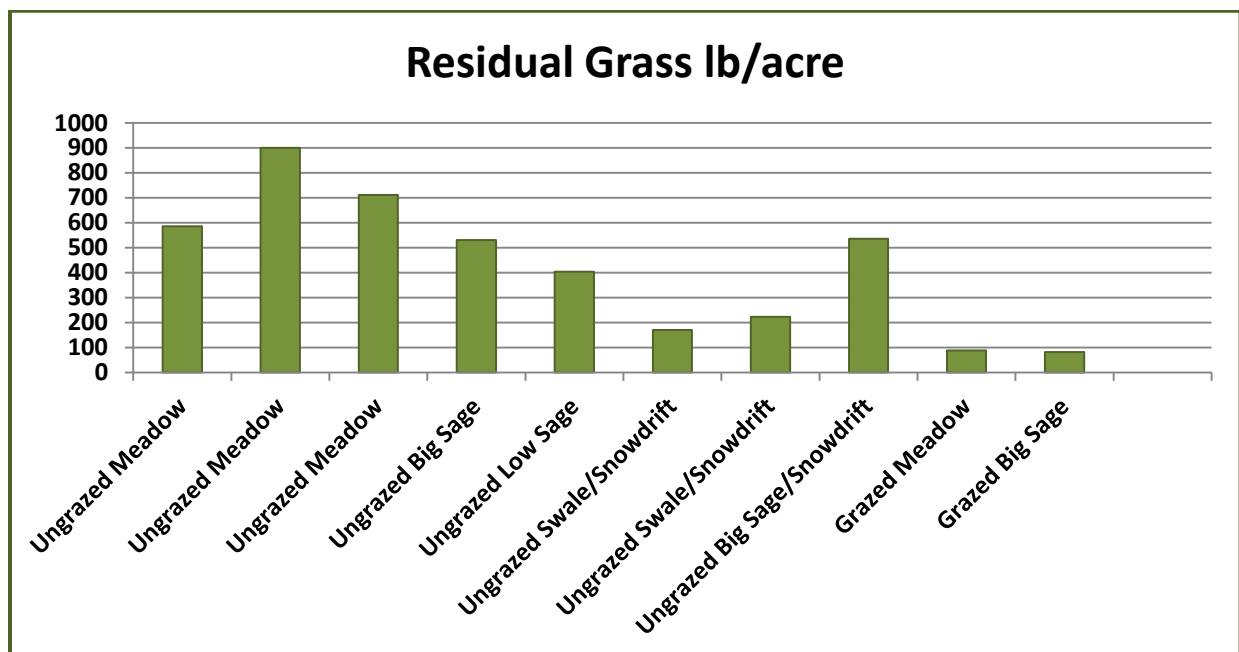
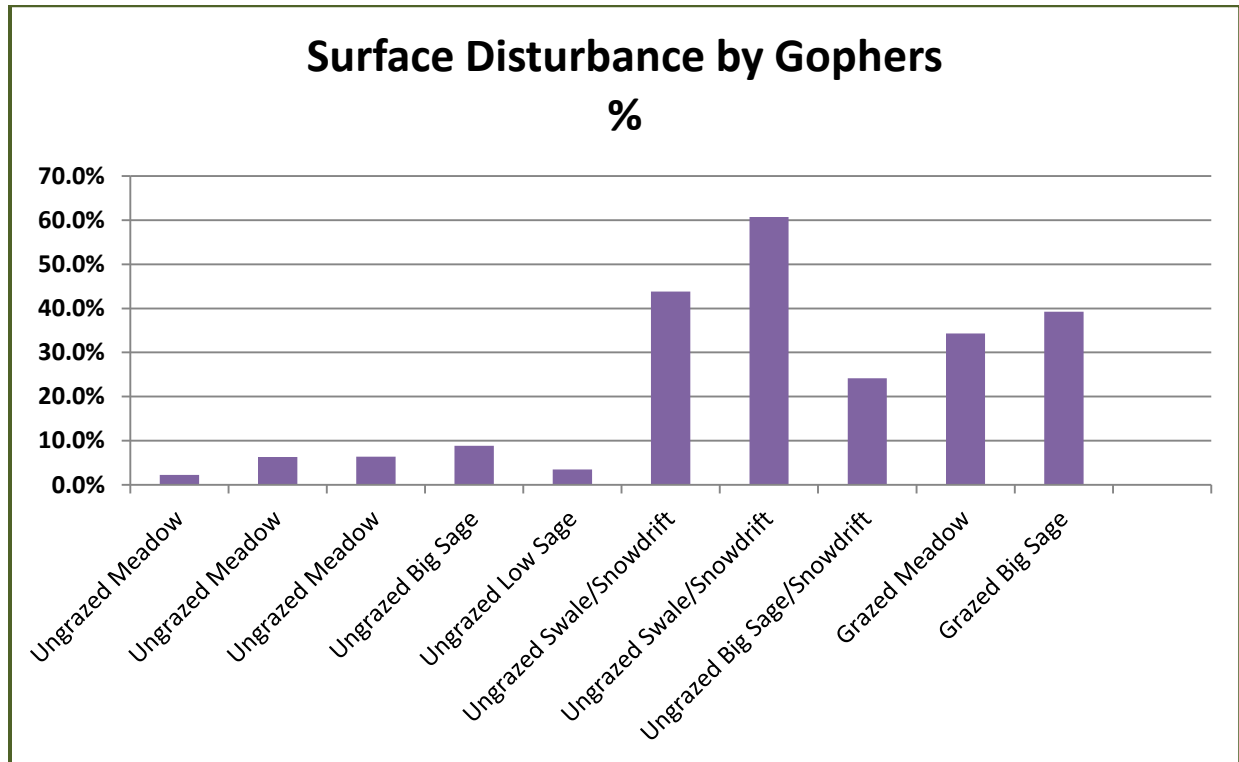
<sup>2</sup> Reichman, O. J., T. Whitham, and G. A. Ruffner. 1982. Adaptive geometry of burrow spacing in two pocket gopher populations. *Ecology* 63:687-695.

<sup>3</sup> Anderson, Douglas. 1988. Tunnel construction methods and forage path of a fossorial herbivore, *Geomys bursarius*. *Journal of Mammalogy* 69(3):565-582.

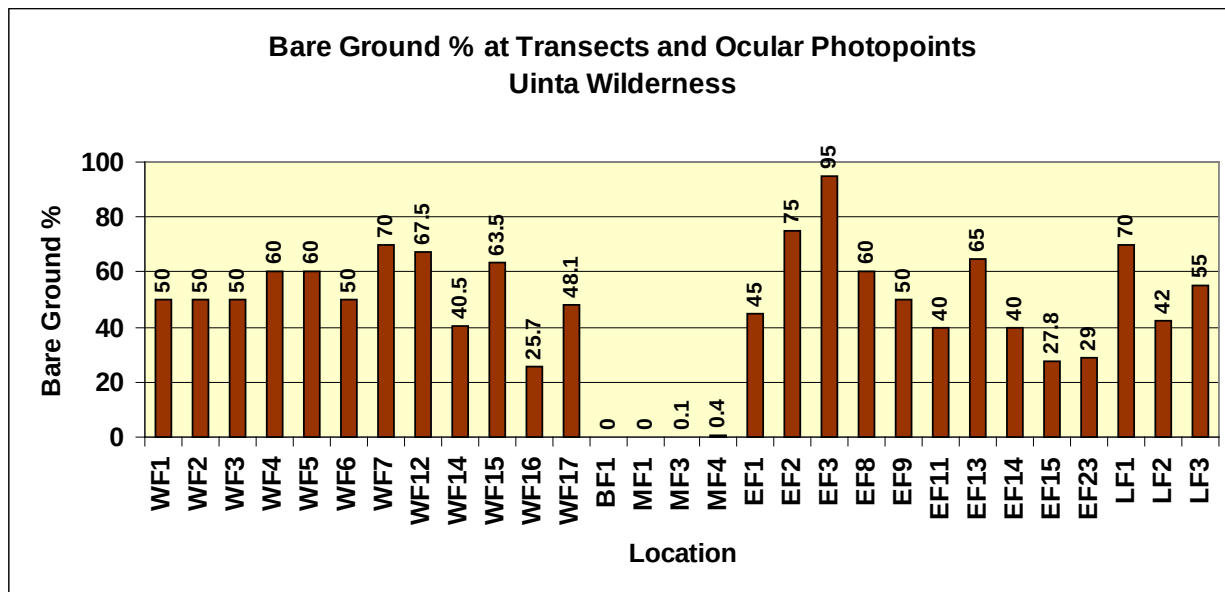
<sup>4</sup> Kiesha’s Preserve is an 890 acre wildlife preserve and research area in SE Idaho from which I removed livestock two decades ago. You can view a powerpoint for Kiesha’s Preserve at <https://app.box.com/s/e2880gwz894nv1nhvegp>



form of charts showing area disturbed by gophers, residual grass in the fall for the different situations. As predicted, areas occupied by snowdrifts or grazed by livestock demonstrate higher surface disturbance by gophers.



The 2006 report we provided (attached), showed high levels of bare ground and gopher activity in meadow areas adjacent to the West Fork Black's Fork River. The Forest Service explained away sheep as a causative factor of high bare ground. The plots we clipped in these areas showed low production (and low residual after grazing), a factor along with the grazing that leads to more visible gopher activity for the reasons cited above. The following chart is from that report showing the bare ground amounts we measured. Clearly the Middle Fork Beaver Creek and Burnt Fork which had been allowed to remain ungrazed for decades demonstrates high ground cover values (near 100%) in similar meadow or forest openings as those found in the grazed allotments<sup>5</sup>. These examples demonstrate that ground cover potential is much higher without sheep than with sheep. It clearly shows that measurement of these factors in grazed and long term rested locations in similar soil/plant community types is needed.



Domestic sheep grazed on public lands serve as vectors and reservoirs for innumerable disease pathogens, many of which are contagious and can affect humans. The EA/EIS needs to analyze the likelihood of human exposure and potential impact of domestic sheep contracting, harboring, and transmitting diseases including but not limited to: Rocky Mountain Spotted Fever (*Rickettsia rickettsii*); Lyme disease; Human granulocytic and monocytic ehrlichiosis; babesiosis; Relapsing fever; Colorado tick fever; tularemia; tick paralysis; Q-fever.

All diseases/pathogens known or reasonably suspected to be transmittable from domestic sheep to humans and from the environment to humans including those listed above as well as transmissible

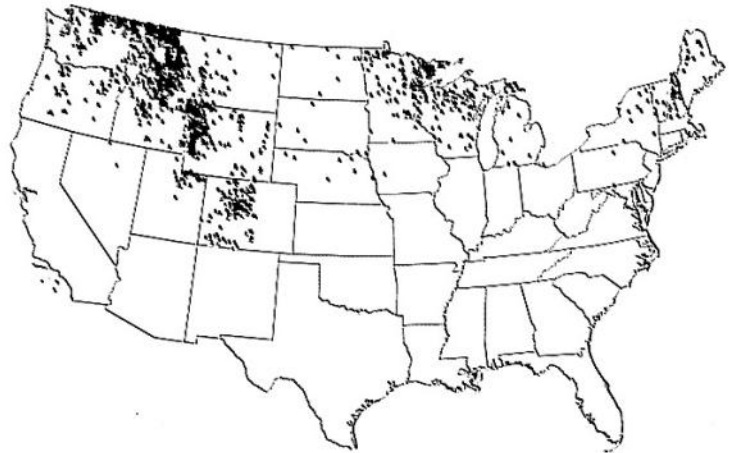
<sup>5</sup> Burnt Fork had cattle grazing and salt blocks along the trail to Fish Lake in 2013 even though I was told ca 1999 by District Ranger Steve Ryberg that it was ungrazed along with the Middle Fork Beaver Creek. I reported the poor condition of the boundary fence in the 2006 report cited. I was told in 2013 that the boundary fence was going to be removed, so it is now unclear just what is going on with Burnt Fork. It may be lost as a reference area due to the apparent resumption of grazing.



spongiform encephalopathies like scrapie, anthrax, and others should be addressed in the alternatives' likely impact to the human environment and human health. For example, domestic sheep carry giardia, a problem for recreational users that can cause serious illness. A friend of mine contracted giardia in a sheep allotment in the Uintas during one of our trips. Campers using the Uinta Wilderness are placed at risk of giardia and these other diseases, another excellent reason, aside from severe environmental degradation and the need for watershed protection, to close these allotments.

Forest Sensitive, MIS and TE species must be analyzed to ensure compliance with NFMA, NEPA, ESA and other applicable regulations. Recent timber harvest activities in Black's Fork, Smith's Fork (proposed), Roughneck (proposed) must be analyzed in the context of the importance of habitat connectivity. For example we recently commented and objected to the Smith's Fork Salvage project due to the historical occupancy of the Uintas by lynx. As our comments and objection to that project showed, lynx occurrences were documented in the Uintas historically and in the 2000's, radio-collared lynx released in Colorado were found in the Uintas. The Regionally Significant Wildlife Corridor connecting the Uintas to the Greater Yellowstone Ecosystem and Southern Rockies makes it an important link for animal movement. The impact of these projects and continued sheep grazing in these allotments must be analyzed in the context of this corridor.

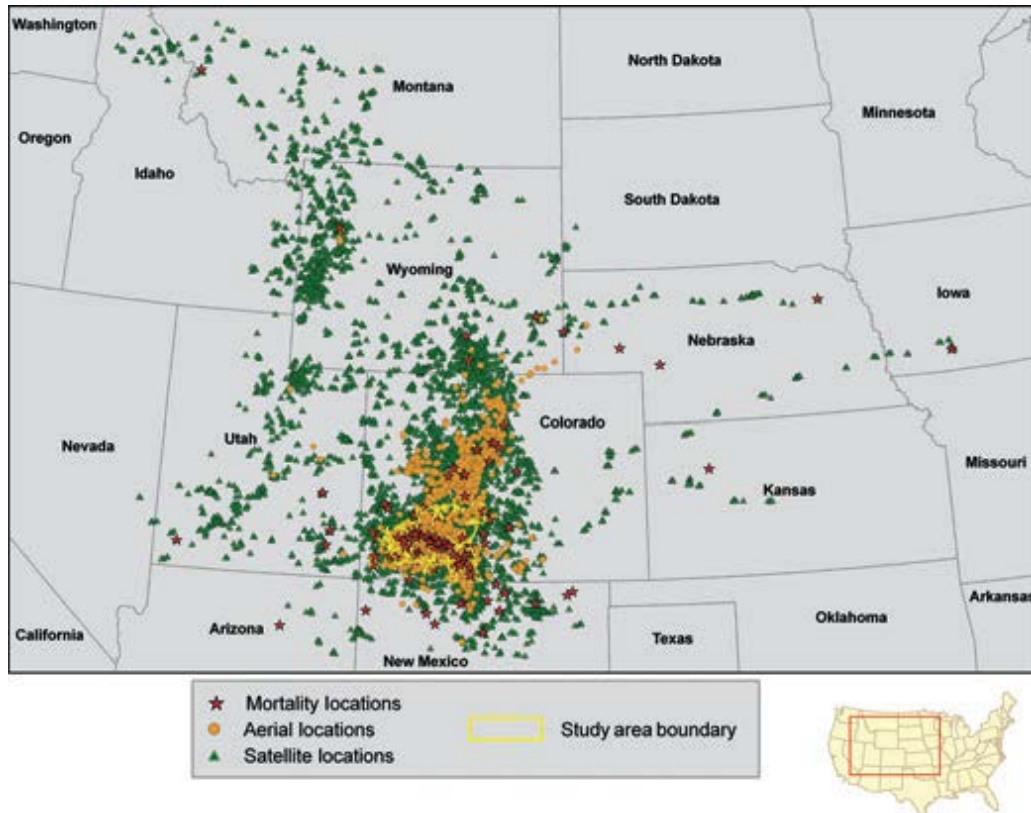
The Forest Service provides a map of historic lynx distribution showing that the Uintas were historically used by Canada lynx. The Uintas are considered a peripheral and linkage area<sup>6</sup>. The Biological Assessment cited in the Smiths Fork FEIS documents the importance of peripheral areas as, "Peripheral populations may contain valuable genetic, physiological or behavioral adaptations that are unique to their ecological success." The Biological Assessment further points out the importance of these populations. "Because suitable habitats in areas where populations act as metapopulations are spatially separated, the persistence of a metapopulation is dependent on the efficiency and success of dispersing animals in reaching isolated patches of suitable habitat. When patches are fragmented and connections between patches do not exist, recolonization becomes problematic and the metapopulation may be unable to persist, even though patches of suitable habitat remain (Meffe and Carroll 1997). Additional fragmentation and isolation of suitable habitat occurring as a result of land management activities can not only affect small isolated habitat patches supporting smaller populations but also large contiguous patches supporting higher population levels."



<sup>6</sup> USDA Forest Service. 2007. Final Environmental Impact Statement Northern Rockies Lynx Management Direction National Forests in Montana, and parts of Idaho, Wyoming and Utah. Figure 1-1.

The Forest Service map of historic lynx distribution for 1842 - 1998 is shown in the referenced link.<sup>7</sup>

More recently, the Colorado Division of Wildlife tracked radio-collared lynx released in Colorado. The tracked lynx show a similar pattern of use in the map below.<sup>8</sup>



These maps show the Uintas have historically been used by lynx and when lynx were recently reintroduced in Colorado, they also migrated to the Uintas. This demonstrates that this peripheral area could be a core area if it and its connections were left un-fragmented by roads, timber harvest and human activities that displace lynx. An important consideration for lynx aside from the roads and habitat fragmentation by logging projects is the loss of prey base, particularly snowshoe hares, that are likely affected by the massive removal of herbaceous vegetation in these eleven (including West Fork Black's Fork) allotments by domestic sheep.

Northern goshawks also depend on mammals and birds for prey. Reynolds et al (1992)<sup>9</sup> provide specific recommendations that livestock grazing utilization will average no more than 20% in goshawk

<sup>7</sup> <http://www.fs.usda.gov/detail/r1/landmanagement/resourcemanagement/?cid=stelprdb5160688>

<sup>8</sup> Devineau P, Shenk TM, White GC, Doherty Jr PM, Kahn RH. 2010. Evaluating the Canada lynx reintroduction programme in Colorado: patterns in mortality. *Journal of Applied Ecology*. doi: 10.1111/j.1365-2664.2010.01805.x 8 p.



home range of approximately 6,000 acres, which also includes nesting and post-fledging areas. They also specify forest stand structure needed for goshawk across its home range and the protection of mycorrhizal fungi in the forest floor to aid in nutrient cycling. There must be an analysis of the current state of habitat, forage productivity and livestock utilization of forage in the project area. As Carter et al (2011) found, grazing by livestock reduces ground cover, herbaceous plant production, carbon and nitrogen stored in herbaceous plants and soils when compared to ungrazed areas or reference values<sup>10</sup>. They also found that mycorrhizal fungi in mixed conifer forest was destroyed by livestock trampling, essentially destroying the nutrient cycling of forest litter at the litter/soil interface. Livestock grazing also compacts the soil, reduces infiltration, increases runoff, erosion and sediment yield.<sup>11, 12</sup> The effects of these activities on the nutrient cycle and soil conditions must be analyzed in connection with forest health in goshawk home ranges, and those home ranges mapped in the EA/EIS.

Northern goshawk, as an MIS, must have a determination of capable and suitable habitat. The WCNF Forest Plan is over a decade old and many projects have occurred in goshawk habitat in the intervening years in addition to older projects. In addition, roads continue to expand, both permanent and temporary (which are only gated, not removed, thus engendering additional human activity in areas that were previously interior forest habitat).

The recent Forest Service documentation of wolverine in the Uintas heightens awareness that habitat and prey base for this species needs to be delineated and its forage base protected. As a predator and scavenger, these animals along with lynx, bobcat, bears, and wolves are at risk from being shot or trapped when livestock are present. The Forest Service must address this risk to carnivores in these allotments.

Bighorn sheep are another major concern as a population is present in the Uintas and as we pointed out from our own observations, habitat is present throughout the Uinta wilderness. This presents a direct conflict with domestic sheep, which carry disease(s) that result in the death of bighorn sheep. A science-based buffer or separation must be maintained between bighorn sheep and its habitat or range, and domestic sheep. Population trends, viability and habitat needs must be incorporated into the analysis. The recent decision on the Payette National Forest provides extensive discussions and analysis of disease transmission in relation to BHS and its implementation for domestic sheep grazing. This information can be found at:

[http://www.fs.usda.gov/detailfull/payette/landmanagement/?cid=fsm9\\_033278&width=full](http://www.fs.usda.gov/detailfull/payette/landmanagement/?cid=fsm9_033278&width=full)

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<sup>9</sup> Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwestern United States. Gen. Tech. Rep. GTR-RM-217, Fort Collins, Colorado. U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 90p.

<sup>10</sup> Carter, J. Chard, J. and Chard, B. 2011. Moderating Livestock Grazing Effects on Plant Productivity, Nitrogen and Carbon Storage. In Monaco, T.A. et al. comps. 2011. Proceedings – Threats to Shrubland Ecosystem Integrity; 2010 May 18-20; Logan, UT. Natural Resources and Environmental Issues, Volume XVII. S.J. and Jessie E. Quinney Natural Resources Research Library, Logan Utah, USA. Enclosed.

<sup>11</sup> Trimble, S.W. and A. C. Mendel. 1995. The cow as a geomorphic agent, a critical review. *Geomorphology* 13:233-253.

<sup>12</sup> Kauffman, J. Boone, Andrea S. Thorpe, and E. N. Jack Brookshire. 2004. Livestock exclusion and belowground ecosystem responses in riparian meadows of eastern Oregon. *Ecological Applications* 14:1671–1679.

On November 25<sup>th</sup>, 2008 the Chief of the Forest Service ordered all Regional Foresters “I ask that you seek to provide effective separation between domestic sheep and goats and wild sheep to minimize the likelihood of disease transmission to wild sheep. This includes careful review of the Payette Principles and the Western Association of Fish and Wildlife Agencies (WAFWA) June 21, 2008, report entitled: Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat.”<sup>13</sup> Effective separation under the WAFWA Guidance and the Payette Principles requires a 9 mile buffer or effective geographic barriers.

The RMRS publication, *Rocky Mountain Bighorn Sheep – A Technical Conservation Assessment* states among other things, that “Threats to the long-term viability of bighorn sheep in Region 2 include diseases transmitted by domestic livestock, the lack of connectivity and/or loss of genetic variability (fitness) due to habitat fragmentation, habitat loss, increased human disturbance, competition with domestic livestock, and predation on small, isolated herds. The relative importance of these threats to the persistence of bighorn sheep in Region 2 varies from area to area. However, the risk of disease outbreaks resulting from contact with domestic sheep and goats is widely believed to be the most significant threat facing bighorns in Region 2 and elsewhere across their range.”

This Conservation Assessment also states that management needs to focus on:

- eliminating the potential for contact between bighorn sheep and domestic sheep and goats
- managing bighorns and their habitat in a metapopulation context by maintaining connectivity among subpopulations
- minimizing human disturbance in sensitive habitats (i.e., lambing and winter ranges)

The Conservation Assessment continues “Because disease may represent the most significant threat to bighorn sheep in Region 2, especially on national forests with domestic sheep grazing allotments in or near bighorn sheep habitat, the creation of effective separation between bighorns and domestic sheep and goats is likely critical for preventing disease epizootics in areas where there is potential for contact. BLM Guidelines (Bureau of Land Management 1992) suggest maintaining a minimum buffer of 13.5 km (9 miles) between domestic sheep and goats and wild sheep on BLM lands to minimize the risk of contact between the two groups.” and “One of the more important activities that directly affect bighorns is domestic livestock grazing in bighorn sheep habitat. Bighorns are negatively impacted by disease transmission from domestic livestock, especially domestic sheep and goats. Areas that have been grazed by domestic sheep may not be suitable areas for wild sheep for up to four years after grazing has been discontinued (Jessup 1985). Bunch et al. (1999) suggested that domestic and wild sheep should never be allowed to occupy the same areas because of the potential for disease transmission and the risk of a major die-off.”

It is clear that grazing of any domestic sheep in the Uinta Wilderness will effectively eliminate bighorn sheep from its habitat and any connections to other populations. For this reason alone, domestic sheep grazing should be discontinued in the Uinta Wilderness.

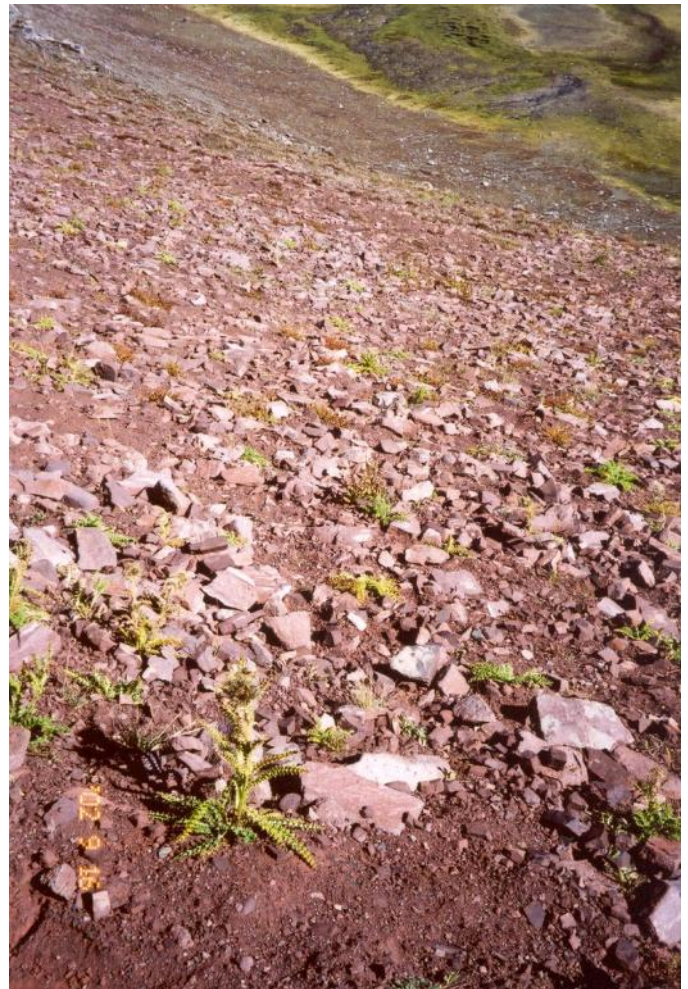
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<sup>13</sup> [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5385708.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5385708.pdf)



The Forest Service must analyze the capability of these lands to provide forage for livestock. This analysis needs to assess the availability and palatability of forage, the distances to water, and slopes not to exceed a certain limit depending on soil types. Capability involves the four major issues of slope, distance to water, highly erodible soils and availability of palatable forage, and the Forest Service needs to assess this at a site specific level. Patches of capable land separated by non-capable lands place these non-capable lands at excessive risk from sheep trailing and grazing. That is one element of capability that is not normally addressed, that is the risk to the land of grazing non-capable, highly erodible and steep areas. No grazing system is acceptable that trails or grazes livestock in these non-capable areas, a prime example of which is the trailing of sheep over Red Knob Pass to Lake Fork and/or the East Fork Black's Fork. As we indicate, our 2006 report documented the impacts to that area showing its lack of suitability for grazing and trailing and calculated the capability based on the best available information. That analysis showed that only 5.8% of the West Fork Black's Fork allotment

was capable for sheep and that it is dominated by highly erodible soils and steep slopes.



Steep, erodible slope with loose soil and rocks leading from Red Knob Pass to Lake Fork Basin, over which several thousand sheep are trailed.

As mentioned, the Forest Service must complete a suitability analysis for the allotments. This process needs to include analysis of a variety of impacts and conflicts that will occur at differing levels of livestock grazing which need to be considered in the alternatives of the EA/EIS. Analysis of suitability necessarily will vary by alternative in the EA/EIS as differing assumptions need to be used with regard to defining protocols for suitability of "capable" lands for livestock grazing according to the level of livestock grazing impacts and conflicts which are deemed to be unsuitable when they conflict with other values such as wilderness, watersheds, stream flows (such as the bank scouring we document) wildlife habitat, wildlife displacement, and negative impacts on recreation, Wilderness values, special status plants and animals including but not limited to Management Indicator Species (MIS) and species listed under the Endangered Species Act (ESA).

For example, even if lands are determined to be capable of supporting livestock grazing, they may be unsuitable for that use if the soils are at risk of compaction, if water quality will be unacceptably degraded, if recreational activities will be compromised, if wildlife habitat will be damaged or

degraded, if native plant ecosystems and rare or sensitive plant species cannot sustain levels of livestock use and flourish, if predators will be routinely killed to protect sheep and cattle, if hikers and other users of these lands will be threatened and perhaps attacked by sheep guard dogs, if bighorn sheep are prevented from reestablishing within these allotments because of the risk of disease transmission from domestic sheep and if livestock serve as unacceptable vectors of weed seed dispersal. These conflicts and others need to be analyzed within a range of levels of livestock grazing as well as in a no- grazing alternative as part of the NEPA analysis.

As described above, the suitability analysis also needs to reveal the impacts of sheep grazing and trailing on lands deemed non-capable but still proposed for bedding, crossing or trailing of livestock. This is especially important for cumulative effects analysis of sheep trailing and trampling on the steep and/or highly erodible soils found on these allotments.

Likewise, a capability analysis for habitat for MIS and other special status species must be done. Is habitat within the range of these species able to support those species? Has past grazing eliminated habitat, compromised soils, created losses of productivity and ground cover and habitat structure for these various species?

A fundamental aspect of NEPA is to take a “hard look” at current management, conditions, assumptions and implementation. A NEPA document that fails to analyze the following violates the purposes of NEPA:

- 1) Validity of assumptions from previous NEPA processes
- 2) Accuracy of predictions from previous NEPA processes
- 3) Adequacy of Forest Service implementation of previous decisions
- 4) Permittee compliance with permit terms and conditions, AMP's, AOIs and other requirements
- 5) effectiveness of actions taken in previous decisions

These above items are absolutely critical to be part of this NEPA process. Without this critical link the validity of the current assumptions are baseless. Without analyzing the accuracy and validity of the assumptions used in previous NEPA processes one has no way to judge the accuracy and effectiveness of the current analysis and proposals. The predictions made in previous NEPA processes also need to be disclosed and analyzed because if these were not accurate, and the agency is making similar decisions, then the process will lead to failure. A review of the adequacy of the FS's implementation of current AMP's and FP direction is essential to a valid NEPA process. For instance, if in previous processes the FS said they were going to do a certain monitoring plan or implement a certain type of management and these were never effectively implemented, it is important for the reader and the decision maker to know. If there have been problems with FS's implementation in the past, it is not logical to assume that implementation will now all of a sudden be appropriate. Another critical component is permittee compliance. If the permittee(s) have failed to properly comply with their permit terms and conditions and AMP requirements, including utilization requirements, rotation requirements and fence maintenance then it is absolutely critical to discuss this in the document and its effects on the proposed action.



The question is whether the Forest Service will value continuation of domestic sheep grazing in these wilderness watersheds above the value of watersheds, water storage, stream flows, fish and wildlife habitat, recreational and wilderness values, or will it finally place the public interest above that of a handful of permittees and cancel these permits and allow the wilderness to heal?

Sincerely,



John Carter, Manager  
Yellowstone to Uintas Connection

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# Yellowstone to Uintas Connection

[www.yellowstoneuintas.org](http://www.yellowstoneuintas.org)

Mr. Dave Whittekiend  
Forest Supervisor  
Uinta Wasatch Cache National Forest  
857 West South Jordan Parkway  
South Jordan, UT 84095

July 16, 2014

Re: High Uintas Domestic Sheep Grazing Analysis – Supplemental Comments

Dear Mr. Whittekiend:

The following are supplemental to our prior comments dated 6/27/14 and 7/13/14. These are submitted on behalf of Western Watersheds Project, Wilderness Watch and Yellowstone to Uintas Connection.

## Wilderness Issues

Domestic livestock grazing in Wilderness is a nonconforming use that is allowed to occur where it currently exists in Wilderness. Grazing is a nonconforming use, as are most of the others that harm and damage Wilderness. This fact is well documented in various agency publications dealing with monitoring of wilderness. *Monitoring Selected Conditions Related to Wilderness Character: A National Framework* states:

Section 4(d) of the Wilderness Act contains several special provisions allowing activities that would typically be prohibited in wilderness, such as mining and commercial livestock grazing, or landing of aircraft or use of motorboats, where these uses were already established before wilderness designation.

In *Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System* it notes, "Livestock grazing may be allowed in wilderness, yet may contribute to soil disturbance and the spread of non-indigenous plants (Belsky and Blumenthal 1997<sup>1</sup>)." The same document also notes, "Grazing by large non-indigenous herbivores such as domestic cattle, horses, and sheep may significantly degrade diminish the natural quality."

Further Forest Service guidance hones in on the problems that grazing presents in Wilderness. The *Technical Guide for Monitoring Selected Conditions Related to Wilderness Character* clearly explains why monitoring livestock grazing in Wilderness is crucial:

Grazing allotments introduce large nonindigenous herbivores such as domestic cattle,

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<sup>1</sup> Belsky, A.J. and Dana M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the interior West. *Conservation Biology* 11(2):315-327.

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horses, and sheep in a wilderness. By their grazing and trampling activities, these nonindigenous herbivores may significantly diminish the natural quality of wilderness character by directly altering habitat for wildlife, reducing populations of rare or at-risk plants, introducing disease and other pathogens, increasing soil erosion, and altering hydrologic flow regimes (Belsky and Blumenthal 1997, Belsky and others 1999<sup>2</sup>, Fleischner 1994<sup>3</sup>). A decrease over time in the number of acres of grazing allotments with authorized use in a wilderness would indicate an increase in the natural quality. Conversely, an increase over time of the number of acres of grazing allotments with authorized use would indicate a decrease in the natural quality.

There is no question that grazing damages wilderness and the NEPA document needs to address this issue. Aside from the documented damage that sheep grazing due to the vegetation and watershed of the High Uintas Wilderness in our prior comments on this project, there are three issues that greatly affect the Wilderness. We address each of these briefly below.

### Bighorn Sheep

Bighorn are a native species and do contribute to the wilderness values in the Wilderness. The Uintas were perhaps one of the best ranges for Rocky Mountain bighorn sheep prior to the arrival of domestic sheep. The scoping letter notes:

The UWCNF and Ashley National Forest recognize that since the original decision was signed, Rocky Mountain bighorn sheep have been listed as an Intermountain Regional Forester's Sensitive Species and are known to spend time in the Henrys Fork and Uinta River Drainages. Parts of these drainages are included in the Gilbert Peak, Hessie Lake-Henrys Fork, and Painter Basin allotments. Understanding the risk of contact between bighorn and domestic sheep to mitigate potential disease transmission is believed to be an important issue that will need to be considered as the effects of domestic sheep grazing are analyzed.

The problem with that is that we have known for forty years the impacts of domestic sheep on wild sheep. Mountains of research and evidence already exist to show bighorns and domestic sheep can't coexist, and that bighorns will travel dozens of miles across their range. Whether bighorns in the High Uintas Wilderness will continue to die because of domestic sheep diseases is a political question, not a biological one.

The EA/EIS should also look at impact from non-native mountain goats on bighorn sheep.

### Predators

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<sup>2</sup> Belsky AJ, Matzke A, Uselman S. 1999. Survey of livestock influences on stream and riparian ecosystems in the western US. *Journal of Soil and Water Conservation* 54:419-431.

<sup>3</sup> Fleischner TL. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8:629-644.

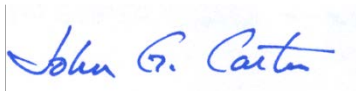
The Forest Service Manual 2323.33c - Predator Control states, "Predacious mammals and birds play a critical role in maintaining the integrity of natural ecosystems. Consider the benefits of a predator species in the ecosystem before approving control actions." The NEPA document needs to address this issue. The High Uintas Wilderness should be great habitat for wolves, wolverines, cougars and bears. However, largely because of the sheep grazing, these predators are either absent or exist in very low numbers.

## Driveways

The sheep driveways within the and outside the Wilderness suffer from extreme damage. Anyone who has visited the East and West Fork Blacks Fork sees the damage. We find it hard to imagine grazing can continue to be approved with the kind of damage that takes place and meet forest plan or regional direction. This is true inside or outside the Wilderness.

## Summary

The language in the Wilderness Act and the subsequent grazing guidelines do not mean it must occur at any cost, rather, decisions about livestock grazing won't rest solely on whether an area is designated as Wilderness. For example, a decision to close sheep allotments to protect bighorn sheep, as was done on the Payette national Forest, was made regardless of whether the allotments in question were Wilderness or not (most if not all were not). The same situation exists in the High Uintas Wilderness. The current conditions, including the threat to bighorn sheep, calls for closing these allotments.



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**From:** [John Carter](#)  
**To:** ["dwhittekiend@fs.fed.us"](mailto:dwhittekiend@fs.fed.us); ["comments-intermtn-ashley@fs.fed.us"](mailto:comments-intermtn-ashley@fs.fed.us)  
**Cc:** ["Jonathan B Ratner"](#); ["Travis Bruner"](#); ["Kevin Mueller"](#)  
**Subject:** High Uintas Domestic Sheep Analysis  
**Date:** Friday, June 27, 2014 10:05:00 AM  
**Attachments:** [UpdatingAUM.pdf](#)

I received a scoping notice for this project and am submitting these comments:

I have backpacked and conducted surveys of allotments in the project area since the 1970's, most recently collecting data comparing grazed and ungrazed watersheds and the effects of sheep grazing in the Uinta wilderness. A report is provided for download at the following link:

<https://app.box.com/shared/0ppryt9puh> . That report provides examples of the denudation of plant communities in upper elevations, which accelerate runoff and erosion, causing sedimentation problems in lakes and streams. Bank erosion is also occurring due to the destabilization of susceptible stream banks by sheep combined with the extreme flood forces generated by the accelerated runoff. The appendices provide photographs of the many degraded areas found with tabulation of ground cover values at the sites surveyed. Should you be unable to download this report, please inform us and we will provide it on CD.

We are concerned about continued sheep grazing on the ecosystem, displacement of wildlife, destruction of fish and wildlife habitat and impacts to recreation. While grazing is permitted to occur under the Wilderness Act, it is not allowed to degrade wilderness values. Sheep, their damage, their manure, their smells, their bleating and noise as well as the killing of carnivores by herders and other entities on behalf of livestock grazers are destructive not only to wildlife, but recreational values and the values those who visit wilderness come to experience.

Another issue that is never addressed is the destruction up uplands by the bedding of sheep. During a 90 day period, they can be bedded in 90 separate areas, causing the denuding of the soil surface, which over time is like an eraser, erasing the plant communities, biological crusts and soil cover, thus impairing productivity. Sheep bedding must be addressed specifically, with an analysis of the condition of sheep bedding areas from past use. They should be identified on maps and ground cover, plant community condition analysed in comparison to potential.

Further, as Mont Lewis described, the suitability of grazing sheep in these allotments needs analysis on a site specific basis, considering soil erosion hazard, slope, plant community productivity and available forage. Available forage would only include those plant species preferred by sheep. In addition, the current forage consumption rates of sheep must be used as we outline in the attached report, "Updating the AUM".

I also note that Mont Lewis, Range Conservationist, published a report titled, "Alpine Rangelands of the Uinta Mountains – Ashley and Wasatch National Forests" dated 1970. That report provides insight into the sensitivity of these areas to grazing, pointing out the damage caused by sheep grazing on these steep slopes and erodible soils.

During the EIS preparation for renewal of the West Fork Black's Fork permit ca 2000, Soil scientists from the Ashley NF also were pointing out the problems with grazing on these steep and erodible areas. Their analysis, reports, memos, emails and other input should become part of the project record here as should the West Fork Black's Fork EIS/Permit due to the trailing of sheep thru the West Fork and East Forks in combination.



For all the listed reasons, we oppose renewing these permits. We

look forward to receiving your analysis for further comment.

John Carter, Manager Yellowstone

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April 21, 2016

David Whittekiend, Supervisor  
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857 West South Jordan Parkway  
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John Erickson, Supervisor  
Ashley National Forest  
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Re: High Uintas Wilderness Domestic Sheep Analysis – Third Scoping

Dear Supervisors Erickson and Whittekiend:

Wild Utah Project, Yellowstone to Uintas Connection, Gallatin Wildlife Association, WildEarth Guardians, Wilderness Watch, Western Watersheds Project, Grand Canyon Trust, Grand Canyon Wildlands Council, Wildlands Network, Western Wildlife Ecology, Western Wildlife Conservancy, and Philip Jiricko are providing these comments in response to the February 16, 2016 Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the High Uintas Wilderness Domestic Sheep Analysis. These parties have previously submitted scoping comments in response to your December 1, 2015 scoping notice and the prior scoping period in 2014. Those comments should be part of this project file, remain valid and are incorporated here by reference to avoid duplication (note links provided). The Forest Service must address these previously submitted comments and information. They include:

- Yellowstone to Uintas Connection:
  - [Email comment](#) dated June 27, 2014
  - [Letter comment](#) on behalf of Western Watersheds Project, Wilderness Watch and Yellowstone to Uintas Connection dated July 13, 2014
  - [Supplemental comment](#) on behalf of Western Watersheds Project, Wilderness Watch and Yellowstone to Uintas Connection dated July 16, 2014
  - [Letter](#) regarding the “Alpine Plant Community Classification for the Uinta Mountains, Utah” dated February 8, 2015
  - Additional letters requesting information under FOIA have been submitted and are not included here.
- Bear River Watershed Council email comment dated July 3, 2014
- Jonathan Ratner of Western Watersheds Project submitted comments separately.

- Gallatin Wildlife Association has submitted separate [comments](#) on this current scoping period.

According to the Scoping Notice, the Forest Service is planning to re-authorize grazing domestic sheep on 10 allotments in the High Uintas Wilderness (Table 1).

**Table 1. Scoping Notice Allotment Statistics**

| National Forest     | Allotment               | Acres  | Livestock Number-Class                    | Grazing Season     |
|---------------------|-------------------------|--------|-------------------------------------------|--------------------|
| Uinta-Wasatch-Cache | Gilbert Peak            | 11,896 | 1400 ewe/lamb                             | 7/11 – 9/10        |
| Uinta-Wasatch-Cache | Hessie Lake-Henrys Fork | 14,539 | 1400 ewe/lamb                             | 7/11 – 9/10        |
| Uinta-Wasatch-Cache | Red Castle              | 14,857 | 1300 – ewe/lamb                           | July 6 – Sept. 10  |
| Uinta-Wasatch-Cache | East Fork-Blacks Fork   | 25,440 | 1350 – ewe/lamb                           | July 6 – Sept. 10  |
| Uinta-Wasatch-Cache | Middle Fork-Blacks Fork | 13,395 | 1200 – ewe/lamb                           | July 11 – Sept. 10 |
| Ashley              | Painter Basin           | 14,756 | 1,200 ewe/lamb or 1500 ewes without lambs | July 12 – Sept 6   |
| Ashley              | Tungsten                | 16,149 | 1,200 ewe/lamb or 1500 ewes without lambs | July 12 – Sept 6   |
| Ashley              | Oweep                   | 16,686 | 1,400 ewe/lamb                            | July 15 – Sept 10  |
| Ashley              | Ottoson                 | 12,620 | 1,300 ewe/lamb or 1500 ewes without lambs | July 15 – Sept 10  |
| Ashley              | Fall Creek              | 16,612 | 1,100 ewe/lamb                            | July 1 – Sept 30   |

## Bighorn Sheep

We have previously requested that the West Fork Black's Fork allotment adjacent to the East and Middle Fork Blacks Fork allotments be included in this analysis due to its potential for bighorn sheep and its use for trailing domestic sheep into and out of one or more of these 10 allotments. In addition, the DEIS for the West Fork Black's Fork allotment dismissed bighorn sheep as a non-significant issue *"Due to needs including analysis of both winter and summer range and maintaining adequate separation between domestic and wild sheep, an area much larger than the WFBF would need to be analyzed for wild sheep management."* That DEIS described 1075 ewe/lamb pairs grazing for 71 days (7/6 – 9/15) plus 1,000 ewe/lamb pairs trailing for 8 days.



Now is the time for this analysis to happen. As pointed out in the March 11, 2016 comments by the Gallatin Wildlife Association, these ten allotments and other nearby allotments such as the West Fork Black's Fork limit the USFS's ability to provide enough interconnected habitat within the High Uintas Mountain Range and Wilderness Area to ensure long term bighorn sheep viability.

The blanket reauthorization of grazing permits will mean up to 38,550 domestic sheep (12,850 permitted x 3 for ewe and 2 lambs) will be authorized to graze this Wilderness Area. The additional 3,225 in the West Fork Blacks Fork will bring this total to 41,775 being grazed in these three allotments. This does not include additional trailing. This will have unacceptable impacts on the resident bighorn sheep herd, which currently exists in the Uinta Mountains. In this local herd, a mere 136 adult bighorn sheep comprise the largest bighorn sheep herd on National Forest lands in Utah (USFS Undated, Utah Division of Wildlife Resources 2013), and in fact is also the only herd currently meeting the minimum viable population level for bighorn sheep set by the UDWR, which is >125 animals.<sup>1</sup>

While historical bighorn numbers were estimated to be between 1.5 to 2 million west-wide, today only about 35,000 Rocky Mountain bighorn sheep are found in North America (Toweill and Geist 1999) representing a loss of over 98% of the historic bighorn population across the West. About 90% of Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) in the United States spend all or part of their lives on National Forest System lands (Schommer and Woolever 2001). Currently there are only about 2,000 Rocky Mountain bighorn sheep in seven different populations (and about the same number of Desert bighorn sheep) in Utah (Utah DWR 2013).

The Utah Division of Wildlife Resources (2013) maps a significant amount of the Uintas Domestic Sheep Grazing authorization area as bighorn sheep habitat and/or currently occupied distribution. Furthermore, the North Slope - Summit, Three Corners, and West Daggett; and the South Slope – Diamond Mountain, Vernal and Yellowstone bighorn herds are targeted for additional sheep reintroductions (UDWR 2013).

In 2009, because of declining bighorn sheep numbers, the Forest Service designated bighorn sheep a sensitive species in the Intermountain Region. As the USFS knows, this designation requires the USFS to maintain viable populations of the Sensitive species in habitats distributed through their geographic range, and also requires that the agency must seek to avoid, minimize or reverse negative impacts to bighorn habitat and populations whose viability has been

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<sup>1</sup>Larger populations of bighorn sheep with connected habitat persist longer than smaller isolated populations (Berger 1990, Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Wehausen et al. 2011). The same is true for other species in general (Traill et al. 2010). While there is some debate about what constitutes a MVP for any given species (Flather et al. 2011) and for bighorns in particular (Cassaigne et al. 2010, Singer et al. 2001(b), Smith et al. 1991), there is growing consensus that multiple populations totaling thousands (not hundreds) of individuals will be needed to ensure long-term persistence of most mammals (Brook et al. 2006, Dratch and Gogan 2010, Flather et al. 2011, Reed et al. 2003, Traill et al. 2010). Furthermore, reintroduced bighorn sheep that are limited to small, isolated populations can lead to severe genetic bottlenecks (Ramey et al. 2001) and these habitat deficiencies hamper bighorn herd growth and persistence over time (Butler et al. 2013, Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Wehausen et al. 2011).

identified as a concern within the Region. The USFS has a primary responsibility to develop and implement management objectives that ensure sufficient habitat is available to provide for viable populations of bighorn sheep moving forward. We believe the continuation of domestic sheep use and trailing on or near bighorn sheep habitat in the High Uintas Wilderness and surrounding landscape are in direct conflict with these responsibilities.

In 2014 the USFS began work on the Intermountain Region BHS/Domestic Sheep-Risk Assessment for Region 4 National Forests, and this was made available to the public at the end of last year. This review was completed because of the overwhelming scientific evidence that domestic sheep contact with bighorn sheep can have dramatic deleterious effects at the population level.

The Risk Assessment verified that rams can foray up to 22 km from their core herd home ranges (O'Brien et al. 2014), and that there is compelling evidence in the scientific literature indicating that BHS and domestic sheep should not concurrently occupy habitats where the goal is the management of BHS (WAFWA 2012). In fact, the Payette Risk Analysis<sup>2</sup> noted that there should be four years between occupancy of domestic sheep and bighorn sheep reintroductions. The Region 4 Risk Assessment concluded that Gilbert Peak, Painter, and Tungsten allotments all had unsuitable Risk of Contact scores (scores over 0.80). In addition, the Red Castle allotment came very close to the 0.80 cut-off, with a Risk of Contact score of 0.609.

We requested the database for bighorn sheep observations in our FOIA dated 11/10/15 in order to determine the areas where bighorn sheep use or have used the High Uintas Wilderness and to evaluate what data were included/excluded in the Regions' Risk of Contact Assessment. That data has not been provided. Furthermore, these risk scores are misleading in that they do not identify historic or potential range, migration routes and the liability to bighorns of grazing domestic sheep in what it presumes are areas with ROC < 0.8. Even one bighorn coming into contact with one domestic sheep or moving through areas occupied by domestic sheep within the past 4 years may constitute an unacceptable risk to the population and its persistence. From our own observations, habitat for bighorn sheep is present throughout the High Uintas Wilderness and adjacent areas, including roadless land. This presents a direct conflict with domestic sheep, which carry disease(s) that result in the death of bighorn sheep.

On November 25<sup>th</sup>, 2008 the Chief of the Forest Service ordered all Regional Foresters *"I ask that you seek to provide effective separation between domestic sheep and goats and wild sheep to minimize the likelihood of disease transmission to wild sheep. This includes careful review of the Payette Principles and the Western Association of Fish and Wildlife Agencies (WAFWA) June*

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<sup>2</sup> USDA Payette National Forest. 2006. Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn Sheep on the Payette National Forest.

21, 2008, report entitled: Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat.<sup>3</sup> Effective separation under the WAFWA Guidance and the Payette Principles requires a 9 mile buffer or effective geographic barriers. In our view after exploring these areas on foot for over 40 years, there are few, if any, geographic barriers in the Uinta Wilderness that would limit bighorn sheep movement.

The RMRS publication, Rocky Mountain Bighorn Sheep – A Technical Conservation Assessment states among other things, that *“Threats to the long-term viability of bighorn sheep in Region 2 include diseases transmitted by domestic livestock, the lack of connectivity and/or loss of genetic variability (fitness) due to habitat fragmentation, habitat loss, increased human disturbance, competition with domestic livestock, and predation on small, isolated herds. The relative importance of these threats to the persistence of bighorn sheep in Region 2 varies from area to area. However, the risk of disease outbreaks resulting from contact with domestic sheep and goats is widely believed to be the most significant threat facing bighorns in Region 2 and elsewhere across their range.”*

This Conservation Assessment also states that management needs to focus on:

- eliminating the potential for contact between bighorn sheep and domestic sheep and goats
- managing bighorns and their habitat in a metapopulation context by maintaining connectivity among subpopulations
- minimizing human disturbance in sensitive habitats (i.e., lambing and winter ranges)

The Conservation Assessment continues *“Because disease may represent the most significant threat to bighorn sheep in Region 2, especially on national forests with domestic sheep grazing allotments in or near bighorn sheep habitat, the creation of effective separation between bighorns and domestic sheep and goats is likely critical for preventing disease epizootics in areas where there is potential for contact. BLM Guidelines (Bureau of Land Management 1992) suggest maintaining a minimum buffer of 13.5 km (9 miles) between domestic sheep and goats and wild sheep on BLM lands to minimize the risk of contact between the two groups.”* and *“One of the more important activities that directly affect bighorns is domestic livestock grazing in bighorn sheep habitat. Bighorns are negatively impacted by disease transmission from domestic livestock, especially domestic sheep and goats. Areas that have been grazed by domestic sheep may not be suitable areas for wild sheep for up to four years after grazing has been discontinued (Jessup 1985). Bunch et al. (1999) suggested that domestic and wild sheep*

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<sup>3</sup> [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5385708.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5385708.pdf)



*should never be allowed to occupy the same areas because of the potential for disease transmission and the risk of a major die-off.”*

It is clear that grazing of any domestic sheep in the High Uintas Wilderness will effectively eliminate bighorn sheep from its habitat and any connections to other populations. For this reason alone, domestic sheep grazing should be discontinued in the High Uintas Wilderness.

The need for large wild landscape conservation of connected habitat for bighorn sheep is apparent. While the politics of removing domestic sheep from public lands bighorn habitat might be daunting, the scientific research is clear, the mere presence of domestic sheep results in the loss of bighorn sheep use of the area and the fragmentation and degradation of surrounding habitat and populations (Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Suminski 1991, Toweill and Geist 1999, Wehausen et al. 2011).

We are concerned that the presence of domestic sheep (including trailing routes) in the High Uintas Wilderness and adjacent national forest or other public lands in or near existing bighorn sheep herds or historic habitat pose a serious threat to the viability of existing herds as well as the suitability of historic bighorn sheep habitat in the area. Moreover, it would be well within the agency’s discretion, and in accordance with its Forest Plans, to retire any allotments that have risk of contact with bighorn sheep, especially since the Record of Decision for the Forest Plan identified these allotments for closure to expand bighorn sheep habitat in the case of permit waiver back to the Forest Service (USFS 2016).

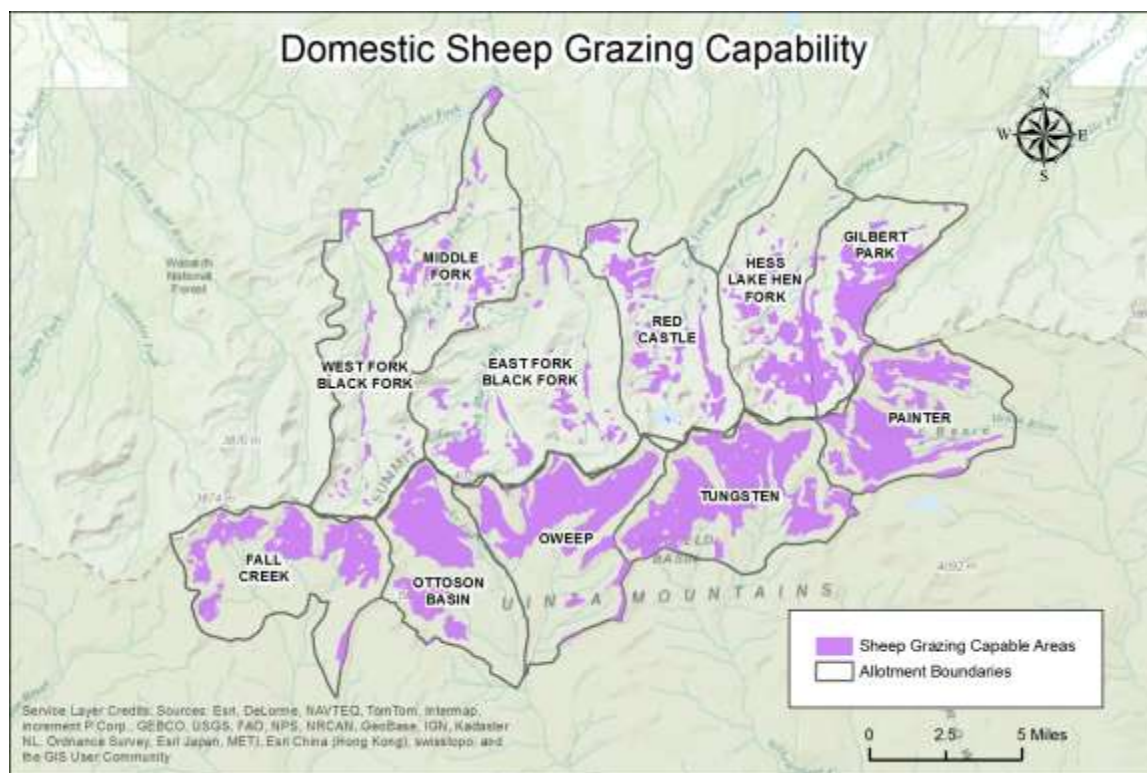
### **Capability, Suitability and Stocking Rate**

Based on Forest Service data received under the Freedom of Information Act, these 11 allotments are considered to contain land capable for domestic sheep grazing in the following amounts (Table 2). The extent of Forest Service determined capable acres for the allotments is shown in the map below. That map shows the limited and disconnected nature of capable lands.

We have not received information requested under our FOIAs to allow us to ascertain the accuracy or scientific validity of these acreages. Such things as soil survey data providing K factors for determination of erosion hazard as slopes increase or decrease, whether the Forest Service has a listing of soil types that are not considered capable or suitable for livestock grazing are unknown to us. We have not received adequate descriptions of the plant communities or vegetation types that would provide the production values for forbs, grasses and shrubs and the relative palatability or preference by domestic sheep. This is important because the most preferred plants will be consumed before the least preferable and be lost from the system.

**Table 2. USFS Capable Acres for Sheep**

| Allotment Name       | Capable Sheep Acres |
|----------------------|---------------------|
| East Fork Black Fork | 2536                |
| Fall Creek           | 5708                |
| Gilbert Park         | 4145                |
| Hess Lake Hen Fork   | 2991                |
| Middle Fork          | 2120                |
| Ottoson Basin        | 6141                |
| Oweep                | 8711                |
| Painter              | 7867                |
| Red Castle           | 2907                |
| Tungsten             | 15337               |
| West Fork Black Fork | 795                 |



The map shows the capable lands are limited to lower slopes and valley bottoms. The ridges and steep slopes and areas further than one mile from water are not capable, yet domestic sheep are grazed and trailed up to, along and across these steep slopes and ridges.

Determining forage capacity based on the antiquated and unscientific current allowable use (50 – 60%)<sup>4</sup> will lead to the depletion of the most preferred and sensitive plants. These kinds of criteria lead to the severe denudation of the upland and alpine areas as shown in the Forest Service photo from Lake Fork Basin (see below) where nearly all herbaceous vegetation is removed in moist and drier upland sites, while the stream channel is obviously suffering bank scour and erosion.

According to government statistics, in 2015, the average live weight of sheep and lambs for slaughter was 144 pounds.<sup>5</sup> The average forage consumption rate is 3% of body weight on an air-dry basis.<sup>6</sup> Since three sheep (ewe/lamb pair) can be grazed under these permits, the forage consumption by each permitted pair is 144 lb x 3 sheep x 3%, or 13 lb/day of air dry weight. Using a sustainable forage utilization rate of 25%<sup>7</sup>, the numbers of sheep and time grazed, the amount of desirable forage/capable acre (not total vegetation production) needed to support domestic sheep in each allotment would be as shown in Table 3.



**Sheep Grazing Lake Fork Basin – Forest Service Photo**

<sup>4</sup> West Fork Black's Fork AOI for 2015

<sup>5</sup> <http://www.usda.gov/nass/PUBS/TODAYRPT/lstk0315.pdf>

<sup>6</sup> [http://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/idpmstn9390.pdf](http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmstn9390.pdf)

<sup>7</sup> JL Holechek, RD Pieper, CH Herbel. 2004. Range Management Principles and Practices, Table 8.8.

**Table 3. Estimated Desirable Forage Needed to Support Permitted Numbers**

| Allotment Name       | Ewe Lamb Pairs | Days Grazed | Pounds Forage Demand | Capable Sheep Acres according to USFS | Pounds Desirable Forage needed/acre |
|----------------------|----------------|-------------|----------------------|---------------------------------------|-------------------------------------|
| East Fork Black Fork | 1350           | 66          | 1158300              | 2536                                  | 1827                                |
| Fall Creek           | 1100           | 92          | 1315600              | 5708                                  | 922                                 |
| Gilbert Park         | 1400           | 61          | 1110200              | 4145                                  | 1071                                |
| Hess Lake Hen Fork   | 1400           | 61          | 1110200              | 2991                                  | 1485                                |
| Middle Fork          | 1200           | 61          | 951600               | 2120                                  | 1795                                |
| Ottoson Basin        | 1300           | 57          | 963300               | 6141                                  | 627                                 |
| Oweep                | 1400           | 57          | 1037400              | 8711                                  | 476                                 |
| Painter              | 1200           | 56          | 873600               | 7867                                  | 444                                 |
| Red Castle           | 1300           | 76          | 1284400              | 2907                                  | 1767                                |
| Tungsten             | 1200           | 56          | 873600               | 15337                                 | 228                                 |
| West Fork Black Fork | 1075           | 71          | 992225               | 795                                   | 4991                                |

It is incumbent on the Forest Service to make a scientifically valid determination of the forage capacity and demand to determine a sustainable stocking rate. In addition, it is incumbent on the Forest Service to determine the numbers of deer, elk, moose, bighorn sheep and other herbivores displaced or potentially supported by the forage consumed by domestic sheep. The loss of populations of these other herbivores due to domestic sheep grazing is a loss of values expected in a Wilderness Area. Note that the forage consumption rates for elk (14 lb/day), bighorn sheep (3.6 lb/day), deer (3 lb/day) and moose (24 lb/day) can be used to determine the numbers potentially lost due to domestic sheep grazing.<sup>8</sup>

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<sup>8</sup> JL Holechek, RD Pieper, CH Herbel. 2004. Range Management Principles and Practices, Table 8.11.



The Forest Service must analyze the capability of these lands to provide forage for livestock. This analysis needs to assess the availability and palatability of forage, the distances to water, and slopes not to exceed a certain limit depending on soil types. Capability involves the four major issues of slope, distance to water, highly erodible soils and availability of palatable forage, and the Forest Service needs to assess this at a site specific level. Patches of capable land separated by non-capable lands place these non-capable lands at excessive risk from sheep trailing and grazing. That is one element of capability that is not normally addressed, that is the risk to the land of grazing non-capable, highly erodible and steep areas. No grazing system is acceptable that trails or grazes livestock in these non-capable areas, a prime example of which is the trailing of sheep over Red Knob Pass to Lake Fork and/or the East Fork Black's Fork. As we indicate, our 2006 report documented the impacts to that area showing its lack of suitability for grazing and trailing and calculated the capability based on the best available information. That analysis showed that only 5.8% of the West Fork Black's Fork allotment was capable for sheep and that it is dominated by highly erodible soils and steep slopes.



**Steep, erodible slope with loose soil and rocks leading from Red Knob Pass to Lake Fork Basin, over which several thousand sheep are trailed.**

The Forest Service must complete a suitability analysis for the allotments. This process needs to include analysis of a variety of impacts and conflicts that will occur at differing levels of livestock grazing which need to be considered in the alternatives of the EIS. Analysis of suitability necessarily will vary by alternative in the EIS as differing assumptions need to be used with regard to defining protocols for suitability of "capable" lands for livestock grazing according to the level of livestock grazing impacts and conflicts which are deemed to be unsuitable when they conflict with other values such as wilderness, watersheds, stream flows (such as the bank scouring we document), wildlife habitat, wildlife displacement, and negative impacts on recreation, Wilderness values, special status plants and animals including but not limited to Management Indicator Species (MIS) and species listed under the Endangered Species Act (ESA).

Even if lands are determined to be capable of supporting livestock grazing, they may be unsuitable for that use if the soils are at risk of compaction, if water quality will be

unacceptably degraded, if recreational activities will be compromised, if wildlife habitat will be damaged or degraded, if native plant ecosystems and rare or sensitive plant species cannot sustain levels of livestock use and flourish, if predators will be routinely killed to protect sheep and cattle, if hikers and other users of these lands will be threatened and perhaps attacked by sheep guard dogs, if bighorn sheep are prevented from reestablishing within these allotments because of the risk of disease transmission from domestic sheep and if livestock serve as unacceptable vectors of weed seed dispersal. These conflicts and others need to be analyzed within a range of levels of livestock grazing as well as in a no- grazing alternative as part of the NEPA analysis.

As described above, the suitability analysis also needs to reveal the impacts of sheep grazing and trailing on lands deemed non-capable but still proposed for bedding, crossing or trailing of livestock. This is especially important for cumulative effects analysis of sheep trailing and trampling on the steep and/or highly erodible soils found on these allotments. Our observations are that domestic sheep are heavily grazed on steep slopes, on ridge tops and other areas that analysis would show are not capable. Furthermore, these slopes and ridges are also bighorn sheep habitat.

Likewise, a capability analysis for habitat for MIS and other special status species must be done. Is habitat within the range of these species able to support those species? Has past grazing eliminated habitat, compromised soils, created losses of productivity and ground cover and habitat structure for these various species?

### **Reality of Domestic Sheep Impacts on Watersheds and Wilderness (excerpted and edited from July 13, 2014 comments)**

In our comments dated July 13, 2014, we included reference to Dr. Carter's Report, "[Watershed Conditions Uinta Wilderness, Utah](#)", dated October 30, 2006. That report provides ground cover data, sediment data for cutthroat trout spawning areas, photo points documenting eroded and bare soils, stream bank damage and scouring, alpine and subalpine areas that have had most of the plant cover removed leading into fall. The lack of plant cover in the higher basins results in little ability for the watershed to retain snowmelt. This leads to loss of water storage and extreme flow events during snowmelt and storm runoff. Data and photographs in the ungrazed Middle Fork Beaver Creek compared these grazed and ungrazed uplands. In Middle Fork Beaver Creek, plant communities are healthy with ground cover approaching 100% in all areas, headcuts are healing and streams are healthy. This is not so in the grazed watersheds as you will see if you will review our report and these comments.

We are concerned that the Forest Service is reinventing the baseline for Uinta plant and soil communities and incorporating the damage from thousands of domestic sheep grazing and

denuding the area as if there is no impact.<sup>9</sup> This was clearly evident when the WCNF produced its EIS for the West Fork Blacks Fork allotment where gophers, tie hacking and an avalanche debris dam on the West Fork Blacks Fork were blamed, respectively, for reduced ground cover and stream bank scouring. In addition, a long term monitoring site was abandoned in the upper basin using “snowbeds” as the reason. To the experienced eye, the damage is evident. Areas with highly erodible soils that are heavily grazed are classified as “barrens” as if the sheep don’t affect them by removing the plant cover and creating accelerated erosion. Sheep are trailed over high passes with steep slopes resulting in additional erosion and loss of any plant cover that might stabilize them. The question is whether the Forest Service will do an objective analysis, or once again obfuscate around the issues in order to perpetuate the status quo. We expect the Agency to conduct an objective and accurate scientific analysis on behalf of the Public Trust it is supposed to protect. We expect comparable sites (soil and plant communities) to be assessed in these grazed allotments and in allotments that have been ungrazed by livestock for significant periods of time to demonstrate the differences and impacts.

On the following pages are photographs illustrating the bank scouring issue. The examples are from the West Fork Black’s Fork and East Fork Black’s Fork, taken from the report cited above.

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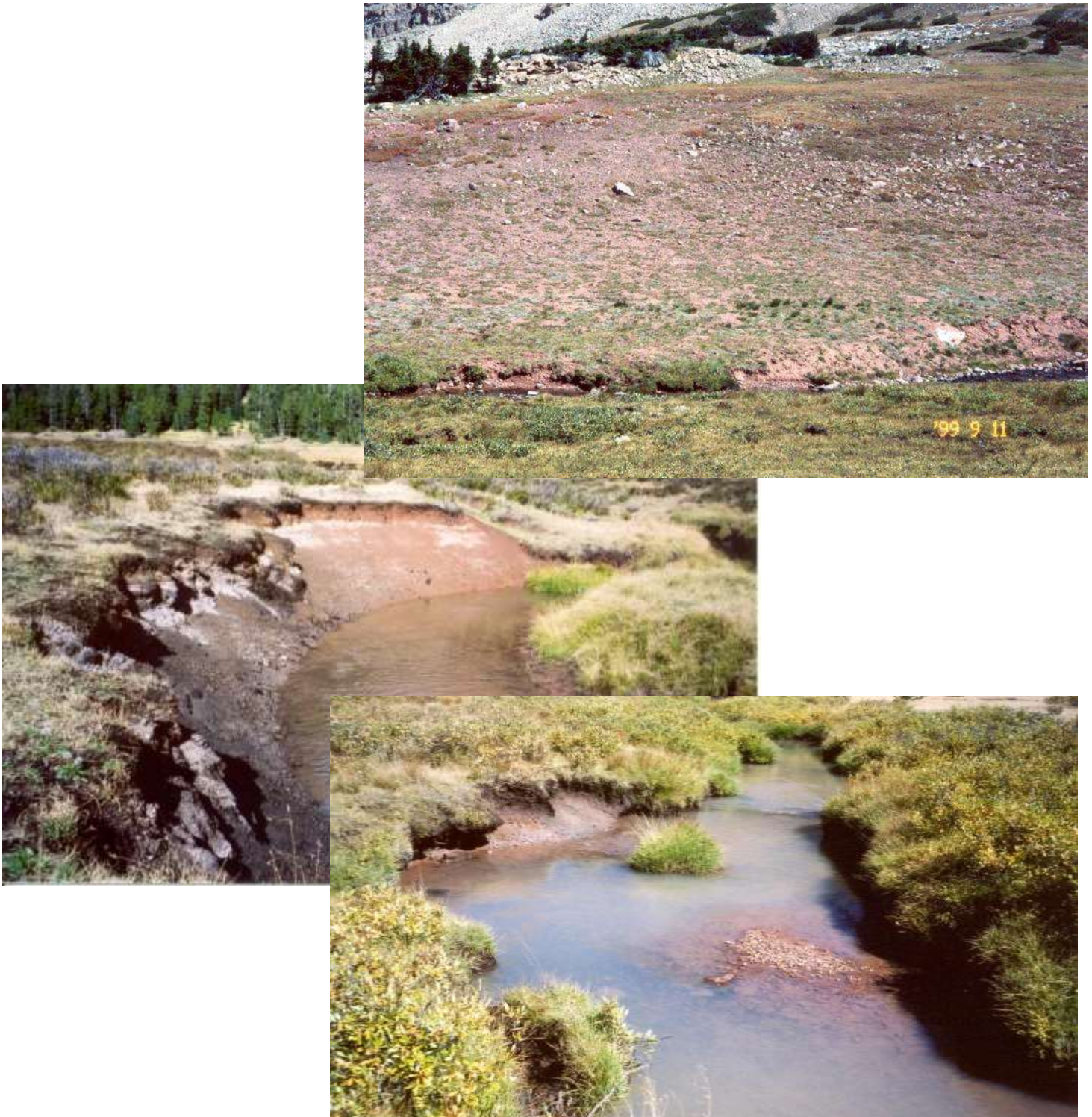
<sup>9</sup> Brown, Garry D. 2006. 2006. [An Alpine Plant Community Classification for the Uinta Mountains, Utah](#). USDA Forest Service Intermountain Region, Ashley and Wasatch-Cache National Forests.





West Fork Black's Fork photographs show scoured and caving banks from high flows, and banks destabilized by hoof shear from grazing and trampling by sheep. The Forest Service claimed that tie hacking over a century earlier and/or an avalanche debris pile caused this problem while ignoring the sheep denuded alpine/subalpine basins that lead to the accelerated runoff.

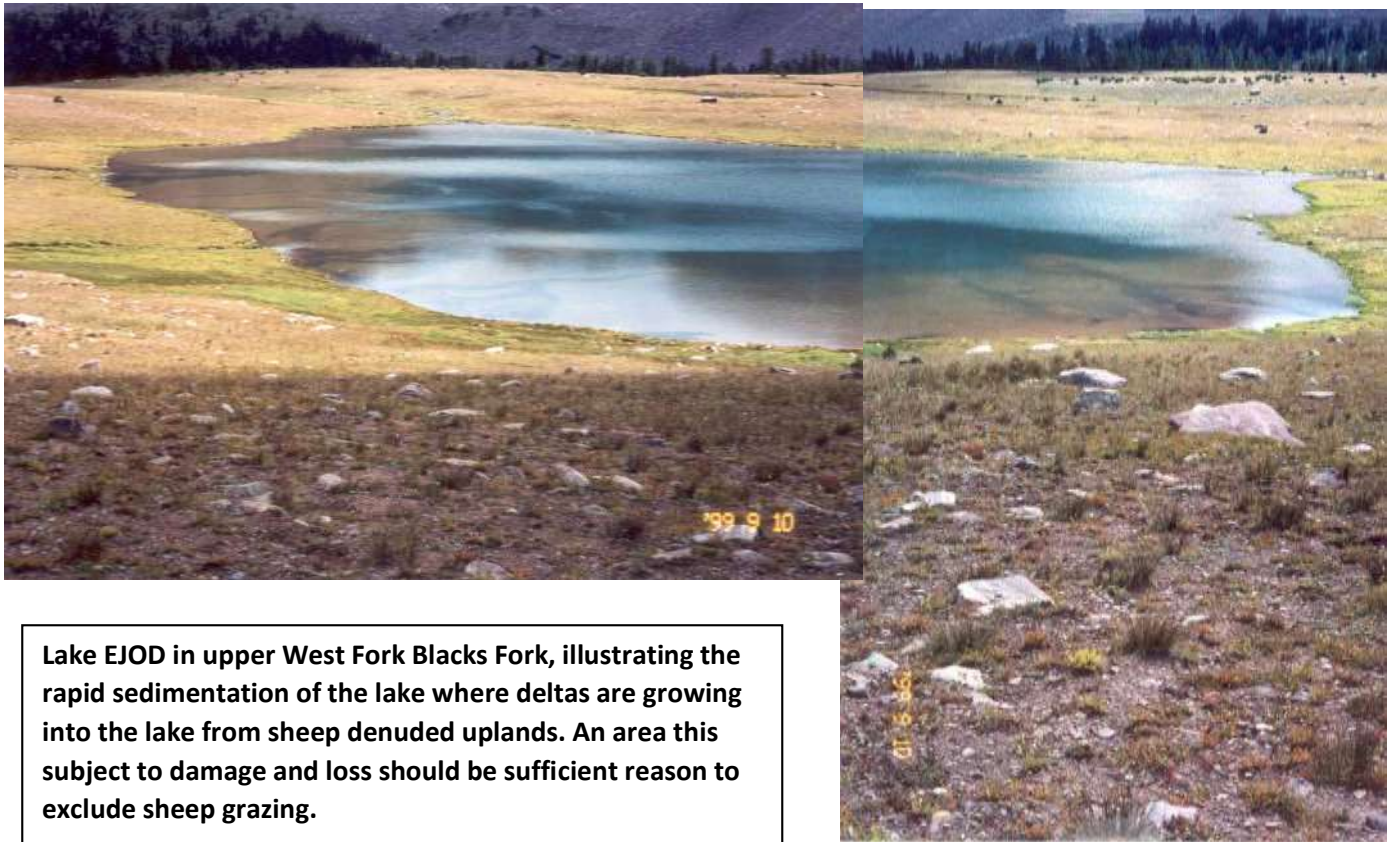




These photographs illustrate bank scour in both the West Fork Blacks Fork (upper photo) and East Fork Blacks Fork (two lower photos). These locations are in areas that would not have been subject to tie hacking and avalanche debris (trees) and are located at the tree line or above. The factors at play are removal of vegetation on slopes and basins upstream of these locations, thus accelerating runoff and flood forces and depleting water storage in the watersheds.



We also refer you to the report by Mont Lewis, Alpine Rangelands of the Uinta Mountains dated 1970. Mont Lewis was a range conservationist for the Forest Service at the time. His report illustrates many of the sheep-grazing-related problems in these basins and plant communities, creating excessive bare soil and erosion, and accelerating sedimentation into lakes like the example below from Lake EJOD from our 2006 report.



**Lake EJOD in upper West Fork Blacks Fork, illustrating the rapid sedimentation of the lake where deltas are growing into the lake from sheep denuded uplands. An area this subject to damage and loss should be sufficient reason to exclude sheep grazing.**

In the 1960's the Forest Service engaged in detailed surveys and inventories of the individual plant and soil communities and determined lands that were suitable for sheep and cattle based on ground cover, slope and erosion hazard. They determined stocking rates based on palatable forage and livestock consumption rates. The [R4 Range Analysis Handbook](#) was the guiding document produced following the passage of the Multiple Use Sustained Yield Act. Conditions on the ground were assessed using Ocular, Range and Grazing Impact Analyses specified in the handbook. The EIS should be analyzing those data and comparing them with current data, assessing long term trend, and vegetation production for presentation in your environmental document. Comparisons of current data to historical data and ungrazed locations such as Middle Fork Beaver Creek and other allotments that have been rested from sheep and cattle for the long term should be an absolute necessity or the public can have no confidence in the Forest Service's analysis based on the obfuscation around sheep damage we have experienced to date regarding grazing in the Uintas.

You must determine the historic extent of bighorn sheep range in the Uintas, document historic and current observations, populations and trends, introductions, and problems with sustaining these native animals in the Uintas. In Dr. Carter's decades of exploring and observing conditions here, the entire Uinta wilderness and adjacent areas would be in the range of bighorn sheep. In previous comments, he pointed out having observed them in alpine areas and valleys in the Wind River Range and Frank Church Wilderness. There is no reason other than domestic sheep grazing that this would not be the case in the Uintas and surrounding areas. Domestic sheep must be excluded from the habitable range of bighorns to avoid disease transmission and loss of the population. The goal should be recovery of the bighorn sheep population in the Uintas. In addition, the impacts of non-native Rocky Mountain Goats, which have been introduced, on the plant communities as well as their competition with bighorns should be analyzed.

The large numbers of domestic sheep grazing in these allotments consume massive amounts of vegetation. This vegetation, if not grazed, stabilizes soil and streams and provides food and cover for wildlife including elk, deer, bears, moose, bighorn sheep and many small mammals and birds, which also serve as the food base for animals such as Canada lynx and goshawk. Soils are restored, carbon is stored and climate change lessened as a result. As a friend of Dr. Carter's observed when in the West Fork Black's Fork, it sounded like Rachel Carson's Silent Spring...there was a deathly silence and absence of bird calls and evidence of other wildlife such as elk. It is very different in the ungrazed watersheds where you can hear the elk bugle in the fall, see the moose and small mammals such as snowshoe hares upon which goshawk, lynx and other carnivores depend.

Fisheries are impacted by sediment from accelerated erosion which reduces the ability of native cutthroats to spawn successfully, placing them at further disadvantage from competition with brook trout. The 2006 report referenced above estimates mortality greater than 95% to eggs and larvae in grazed watersheds, showing a higher mortality in the grazed West Fork Black's Fork and East Fork Black's Fork than in the ungrazed Middle Fork Beaver Creek and Burnt Fork. Trends in native cutthroat trout populations must be analyzed. Loss of overhanging vegetation and undercut banks due to sheep trampling, grazing and bank scour reduces habitat for these fish and should be characterized. Native aquatic invertebrates that require clean, sediment free substrate are selected against due to the increased sedimentation and habitat alteration from sheep grazing. These must be monitored and analyzed by comparison to ungrazed watersheds and long term trends.

The degradation from sheep and horses is clear and compromises the wilderness experience. The photographs on the next page illustrate trail and stream damage by thousands of sheep in the West Fork Blacks Fork compared to similar locations in the ungrazed Middle Fork Beaver Creek. This destruction by livestock compromises wilderness values, degrades habitat and the visitor experience. It is inconsistent with the Wilderness Act.





Upper Photographs show trail and habitat damage by thousands of domestic sheep and permittee/herder horses in the West Fork Blacks Fork. The lower photographs show the main trail in the ungrazed Middle Fork Beaver Creek which is used by hikers and recreational horse riders. The West Fork Black's Fork illustrates degradation of habitat, wilderness and recreational values.



We have used the West Fork Black's Fork as an example of the degradation caused by domestic sheep grazing and trampling in these sensitive places. While the West Fork Black's Fork was analyzed in an EIS a decade ago, it has less than 10% capable acres, yet continues to be grazed by several thousand sheep while the damage continues unabated. It is timely and necessary to now re-analyze the West Fork Black's Fork in conjunction with the ten allotments described in the scoping notice for two major reasons. Domestic sheep trail in the West Fork and out through the East Fork Black's Fork allotment (or vice versa), which is being scoped for a decision. The cumulative impacts to watersheds, soils and wildlife (including bighorn sheep) and this trailing connect these allotments.

The effect of the bare ground, soil compaction, sheep bedding areas and removal of vegetation on the hydrologic cycle and downstream flows must be analyzed as compared to potential. Flow records from Middle Fork Beaver Creek and other ungrazed watersheds in the Uintas should be compared to those from grazed watersheds and the peak flow to base flow ratios evaluated. The rapid runoff generated by the loss of ground cover and vegetation in grazed areas results in loss of watershed water storage which is needed to replenish stream flows in summer and fall. Models such as RUSLE2 or other suitable models that compare conditions in these ungrazed watersheds with grazed watersheds should be employed. This means using the higher ground cover values such as found in ungrazed Middle Fork Beaver Creek (near 100% cover) as potential values to compare to actual ground cover values in the grazed watersheds (approximately 50% bare in East Fork Blacks Fork, West Fork Blacks Fork, and Lake Fork).

The Forest Service avoids noticing such features as headcuts and gullies in its monitoring. The photos below illustrate healing headcuts in the upper basin of Middle Fork Beaver Creek compared to active headcuts in the East Fork Blacks Fork which continues to be grazed by domestic sheep. These are altering watershed conditions that lead to increased overland flow events with their associated erosive force.

The impacts of domestic sheep grazing to carnivores and their prey base due to loss of food and cover for prey animals and mortality from trapping and killing of lynx, goshawk and other carnivores must be evaluated. Black bears have dietary needs very similar to domestic sheep, being mostly herbivores. An analysis of the impact to black bears from competition with sheep and losses to herders and wildlife control actions must be included. Is the "shoot, shovel and shut up" management philosophy being practiced by sheep herders and permittees in these allotments? If not, how does the Forest Service know this? It must be assumed that any carnivore seen will be shot by a herder or permittee with the excuse they were "harassing" the sheep. This is a license to kill on sight and it is not ever discussed. But, with the presence of sheep and herders in every watershed, it may explain the absence or near absence of lynx, wolves, bears, wolverines in the Uinta Wilderness.



Upper photograph shows damage to small stream by domestic sheep in the West Fork Blacks Fork. The lower photograph shows a similar size stream in the Middle Fork Beaver Creek, closed to domestic sheep for decades.



The upper photo shows active headcutting in a mesic meadow in the grazed East Fork Black's Fork. The lower photo shows healing headcuts in a similar location in the ungrazed Middle Fork Beaver Creek.



In the West Fork Blacks' Fork EIS, bare ground was explained away due to the influence of gophers or monitoring sites were moved to find more ground cover. In comments at the time Dr. Carter pointed out some of the ecology of gophers, for example, in undisturbed areas where surface disturbance or soil compaction is not occurring, visible gopher activity is low because they are inhabiting stable tunnel systems and filling old tunnels, not reconstructing and bringing material to the surface. In higher productivity areas where there is sufficient food available, this is even more pronounced as they occupy stable tunnel systems and forage belowground. Livestock trampling, removal of herbaceous standing crop, long lasting snow drifts that result in soil compaction or the need to forage more widely result in more surface activity. He pointed out these factors from research cited in those comments on the West Fork Black's Fork dated September 30, 2005.<sup>10, 11, 12</sup> As part of his research at Kiesha's Preserve<sup>13</sup>, he has conducted surveys of gopher activity in ungrazed meadows, big sage, low sage, snowdrift areas and in a grazed meadow and grazed big sagebrush area. The results of that survey are provided on the next page in the form of charts showing area disturbed by gophers and residual grass in the fall for the different situations.



**Gopher activity and low residual herbaceous vegetation on the West Fork Black's Fork**

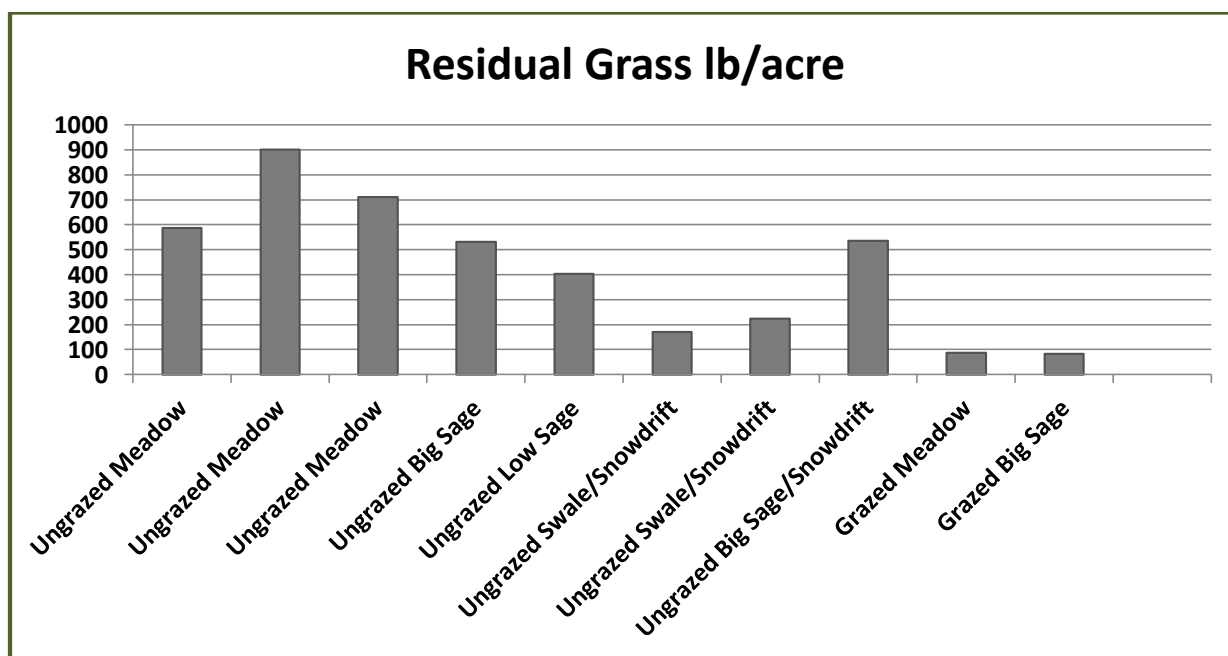
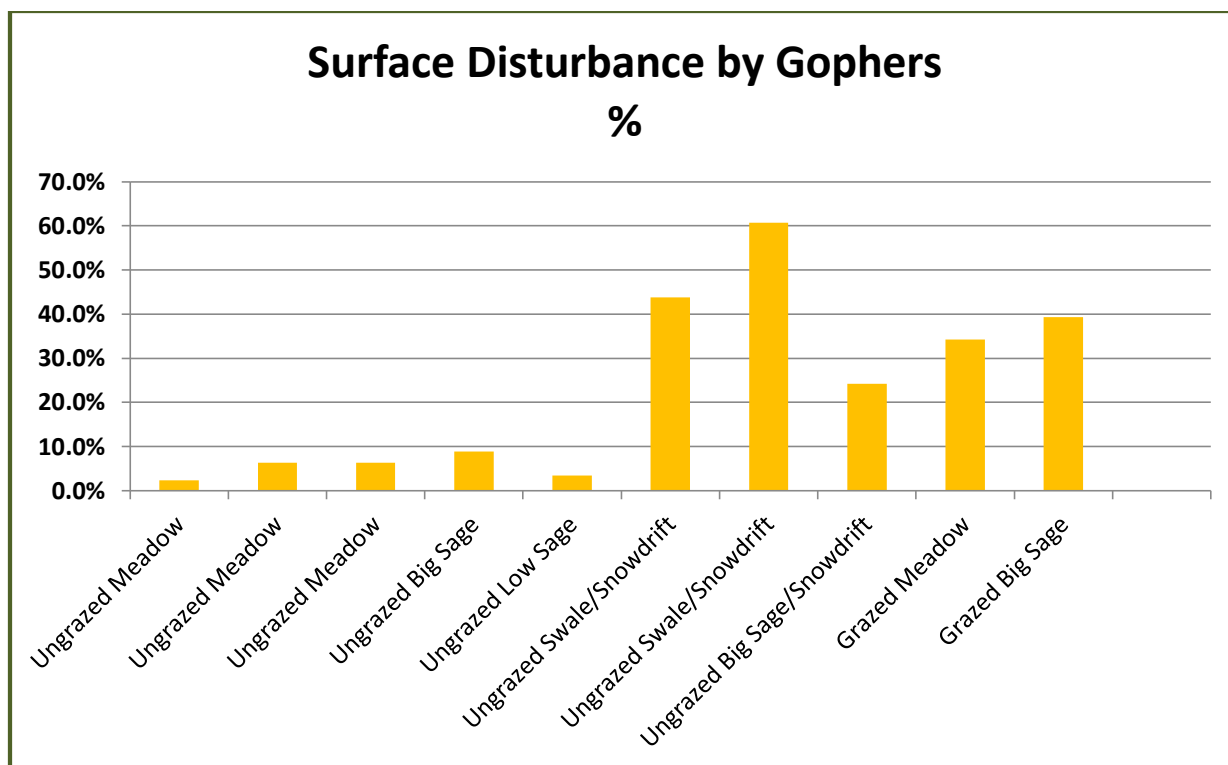
As predicted, areas occupied by snowdrifts or grazed by livestock demonstrate higher surface disturbance by gophers.

<sup>10</sup> Anderson, Douglas. 1987. *Geomys bursarius* burrowing patterns: influence of season and food patch structure. *Ecology* 68(5):1306-1318.

<sup>11</sup> Reichman, O. J., T. Whitham, and G. A. Ruffner. 1982. Adaptive geometry of burrow spacing in two pocket gopher populations. *Ecology* 63:687-695.

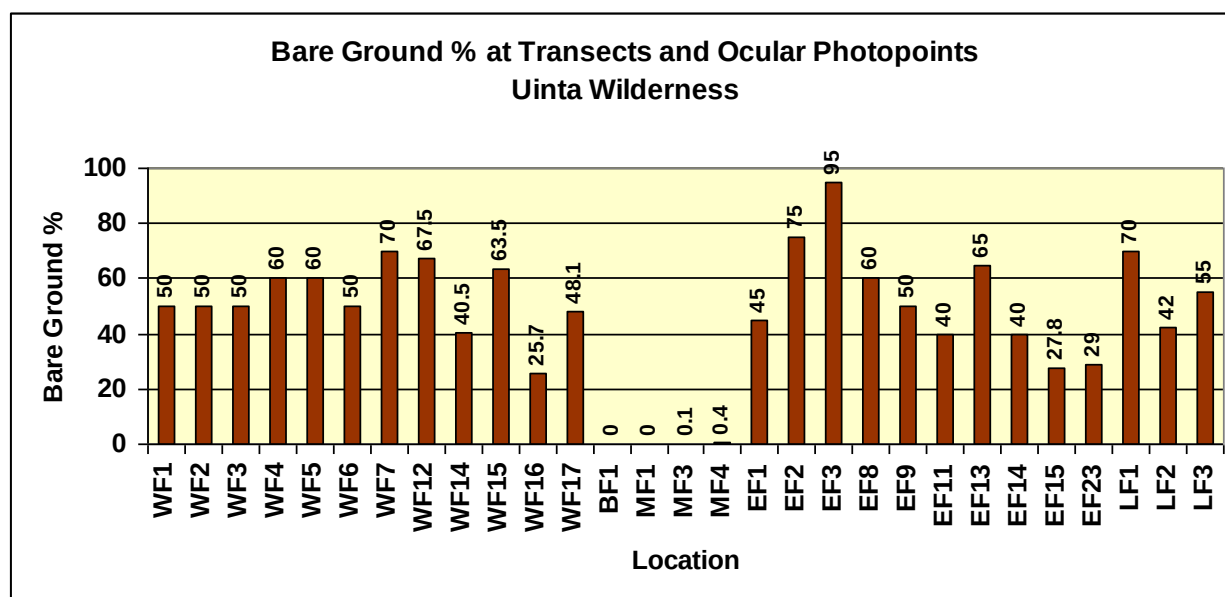
<sup>12</sup> Anderson, Douglas. 1988. Tunnel construction methods and forage path of a fossorial herbivore, *Geomys bursarius*. *Journal of Mammalogy* 69(3):565-582.

<sup>13</sup> Kiesha's Preserve is an 890 acre wildlife preserve and research area in SE Idaho from which I removed livestock two decades ago. You can view a powerpoint for Kiesha's Preserve at <https://app.box.com/s/e2880gwz894nv1nhvegp>



The 2006 report referenced above showed high levels of bare ground and gopher activity in meadow areas adjacent to the West Fork Black's Fork River. The Forest Service explained away sheep as a causative factor of high bare ground. The plots clipped in these areas showed low production (and low residual after grazing), a factor along with the grazing that leads to more

visible gopher activity for the reasons cited above. The following chart is from that report showing the bare ground amounts measured. Clearly the Middle Fork Beaver Creek and Burnt Fork which had been allowed to remain ungrazed for decades demonstrate high ground cover values (near 100%) in similar meadow or forest openings as those found in the grazed allotments<sup>14</sup>. These examples demonstrate that ground cover potential is much higher without sheep than with sheep. It clearly shows that measurement of these factors in grazed and long term rested locations in similar soil/plant community types is needed.



### Pathogens and Disease Related to Domestic Sheep

Domestic sheep grazed on public lands serve as vectors and reservoirs for innumerable disease pathogens, many of which are contagious and can affect humans. The EIS needs to analyze the likelihood of human exposure and potential impact of domestic sheep contracting, harboring, and transmitting diseases including but not limited to: Rocky Mountain Spotted Fever (*Rickettsia rickettsii*), Lyme disease, Human granulocytic and monocytic ehrlichiosis, babesiosis, Relapsing fever, Colorado tick fever, tularemia, tick paralysis, and Q-fever.

All diseases/pathogens known or reasonably suspected to be transmittable from domestic sheep to humans and from the environment to humans including those listed above as well as

<sup>14</sup> Burnt Fork had cattle grazing and salt blocks along the trail to Fish Lake in 2013 even though Dr. Carter was told ca 1999 by District Ranger Steve Ryberg that it was ungrazed along with the Middle Fork Beaver Creek. He reported the poor condition of the boundary fence in the 2006 report and was told in 2013 that the boundary fence was going to be removed, so it is now unclear just what is going on with Burnt Fork. It may be lost as a reference area due to the apparent resumption of grazing.

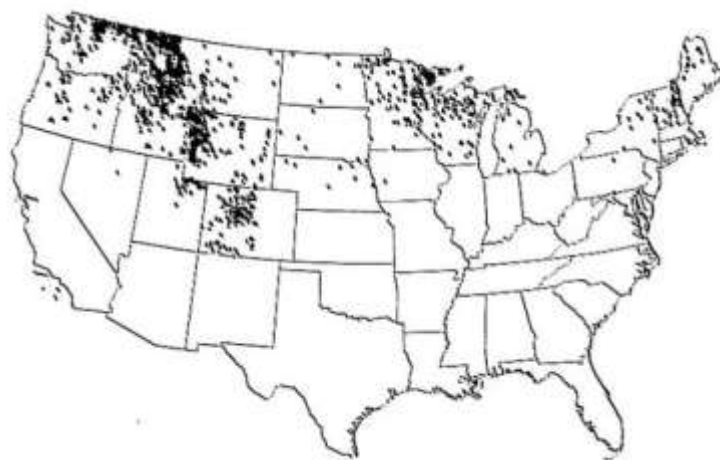


transmissible spongiform encephalopathies like scrapie, anthrax, and others should be addressed in the alternatives' likely impact to the human environment and human health. For example, domestic sheep carry giardia, a problem for recreational users that can cause serious illness. A friend of Dr. Carter's contracted giardia in a sheep allotment in the Uinta Wilderness from drinking water in the Henry's Fork drainage. Campers using the Uinta Wilderness are placed at risk of giardia and these other diseases, another excellent reason, aside from severe environmental degradation, the need for watershed protection, the need for protection of bighorn sheep, lynx and wolverine, to close these allotments.

### **MIS, T&E, Sensitive Species**

Forest Sensitive, MIS and TE species must be analyzed to ensure compliance with NFMA, NEPA, ESA and other applicable regulations. Recent timber harvest activities in Black's Fork, Smith's Fork, Roughneck Timber Sales and others must be analyzed in the context of the importance of habitat connectivity. In recent comments and objection to the Smith's Fork Salvage project, we made the point of historical occupancy of the Uintas by lynx. As our comments and objection to that project showed, lynx occurrences were documented in the Uintas historically and in the 2000's, radio-collared lynx released in Colorado were found in the Uintas. Yet, recent efforts have not found lynx in the Uintas, an area of over one million acres that should be a core area for Canada lynx. Why is it not? Sheep grazing? Habitat fragmentation from timber, oil and gas, roads and off-road vehicles? The Regionally Significant Wildlife Corridor connecting the Uintas to the Greater Yellowstone Ecosystem and Southern Rockies also makes it an important link for animal movement. The impact of these projects, other current projects such as the Platte Petroleum project combined with continued sheep grazing in these allotments must be analyzed in the context of this corridor.

The Forest Service provides a map of historic lynx distribution showing that the Uintas were historically used by Canada lynx (at right). The Uintas are considered a peripheral and linkage area<sup>15</sup>. The Biological Assessment cited in the Smiths Fork FEIS documents the importance of peripheral areas as, *"Peripheral populations may contain valuable genetic, physiological or behavioral adaptations that are unique to their ecological success."* The Biological Assessment further points out the importance of these populations. *"Because suitable habitats in areas where populations act as metapopulations are spatially separated, the persistence of a*

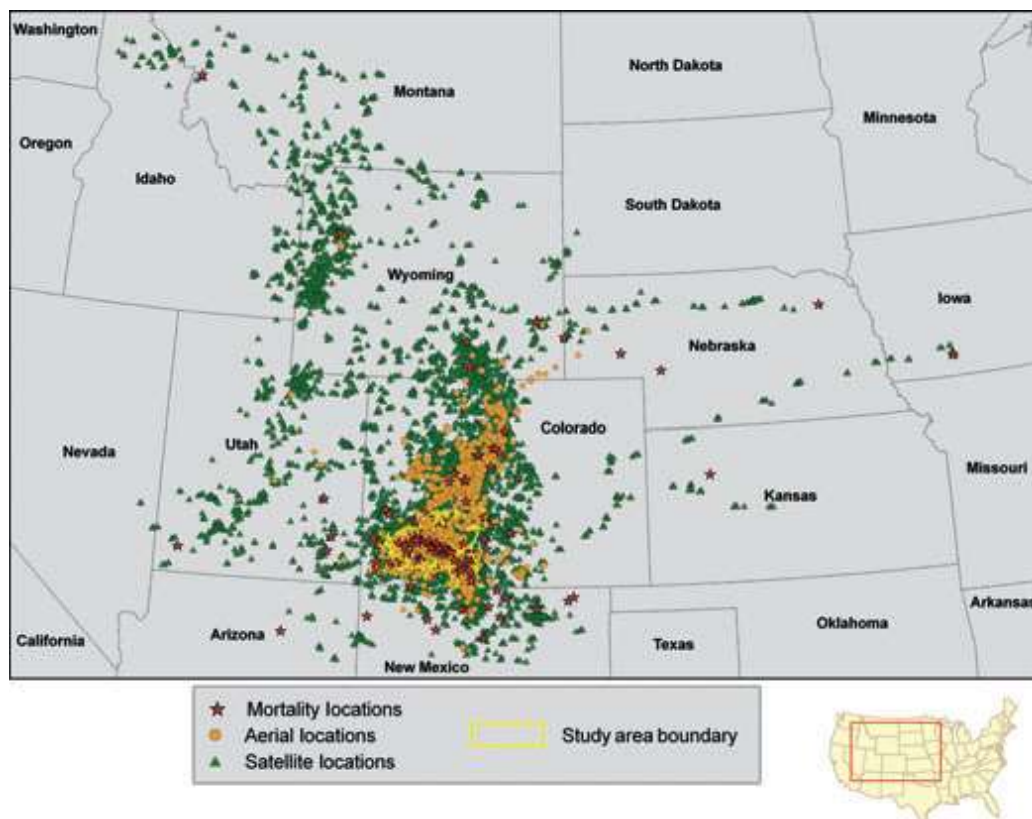


<sup>15</sup> USDA Forest Service. 2007. Final Environmental Impact Statement Northern Rockies Lynx Management Direction National Forests in Montana, and parts of Idaho, Wyoming and Utah. Figure 1-1.

*metapopulation is dependent on the efficiency and success of dispersing animals in reaching isolated patches of suitable habitat. When patches are fragmented and connections between patches do not exist, recolonization becomes problematic and the metapopulation may be unable to persist, even though patches of suitable habitat remain (Meffe and Carroll 1997). Additional fragmentation and isolation of suitable habitat occurring as a result of land management activities can not only affect small isolated habitat patches supporting smaller populations but also large contiguous patches supporting higher population levels.”*

The Forest Service map of historic lynx distribution for 1842 - 1998 is shown in the referenced link.<sup>16</sup>

More recently, the Colorado Division of Wildlife tracked radio-collared lynx released in Colorado. The tracked lynx show a similar pattern of use in the map below.<sup>17</sup>



<sup>16</sup> <http://www.fs.usda.gov/detail/r1/landmanagement/resourcemanagement/?cid=stelprdb5160688>

<sup>17</sup> Devineau P, Shenk TM, White GC, Doherty Jr PM, Kahn RH. 2010. Evaluating the Canada lynx reintroduction programme in Colorado: patterns in mortality. *Journal of Applied Ecology*. doi: 10.1111/j.1365-2664.2010.01805.x 8 p.

These maps show the Uintas have historically been used by lynx and when lynx were recently reintroduced in Colorado, they also migrated to the Uintas. This demonstrates that this peripheral area could be a core area if it and its connections were left un-fragmented by roads, timber harvest and human activities such as livestock grazing that displace lynx. An important consideration for lynx aside from the roads and habitat fragmentation by logging projects is the loss of prey base, particularly snowshoe hare, that are no doubt affected by the massive removal of herbaceous vegetation in these eleven allotments by domestic sheep.

The ["Least-Cost Corridor Analysis for Evaluation of Lynx Habitat Connectivity in the Middle Rockies"](#) by Bates and Jones (2007) may be accessed at the link shown. That quantitative analysis of lynx habitat connectivity for lynx moving north from the Colorado population to the northern Rockies population provides science-based criteria and analysis. This paper and its associated maps demonstrate how habitat and connectivity should be addressed in the EIS. The resultant map (Figure 8 of that report) is shown on the following page.

Northern goshawks also depend on mammals and birds for prey. Reynolds et al (1992)<sup>18</sup> provide specific recommendations that livestock grazing utilization will average no more than 20% in goshawk home range of approximately 6,000 acres, which also includes nesting and post-fledging areas. They also specify forest stand structure needed for goshawk across its home range and the protection of mycorrhizal fungi in the forest floor to aid in nutrient cycling. There must be an analysis of the current state of habitat, forage productivity and livestock utilization of forage in the project area. As Carter et al (2011) found, grazing by livestock reduces ground cover, herbaceous plant production, carbon and nitrogen stored in herbaceous plants and soils when compared to ungrazed areas or reference values<sup>19</sup>. They also found that mycorrhizal fungi in mixed conifer forest was destroyed by livestock trampling, essentially destroying the nutrient cycling of forest litter at the litter/soil interface. Livestock grazing also compacts the soil, reduces infiltration, increases runoff, erosion and sediment yield.<sup>20, 21</sup> The effects of these activities on the nutrient cycle and soil conditions must be analyzed in connection with forest health in goshawk home ranges, habitats suitable for goshawk and these should be mapped in the EIS. Northern goshawk, as an MIS, must have a determination of capable and suitable habitat. The Forest Plans are over a decade old and many projects have

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<sup>18</sup> Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwestern United States. Gen. Tech. Rep. GTR-RM-217, Fort Collins, Colorado. U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 90p.

<sup>19</sup> Carter, J. Chard, J. and Chard, B. 2011. Moderating Livestock Grazing Effects on Plant Productivity, Nitrogen and Carbon Storage. In Monaco, T.A. et al. comps. 2011. Proceedings – Threats to Shrubland Ecosystem Integrity; 2010 May 18-20; Logan, UT. Natural Resources and Environmental Issues, Volume XVII. S.J. and Jessie E. Quinney Natural Resources Research Library, Logan Utah, USA. Enclosed.

<sup>20</sup> Trimble, S.W. and A. C. Mendel. 1995. The cow as a geomorphic agent, a critical review. *Geomorphology* 13:233-253.

<sup>21</sup> Kauffman, J. Boone, Andrea S. Thorpe, and E. N. Jack Brookshire. 2004. Livestock exclusion and belowground ecosystem responses in riparian meadows of eastern Oregon. *Ecological Applications* 14:1671–1679.



occurred in goshawk habitat in the intervening years in addition to older projects. In addition, roads continue to expand, both permanent and temporary, which engender additional human activity in areas that were previously interior forest habitat.

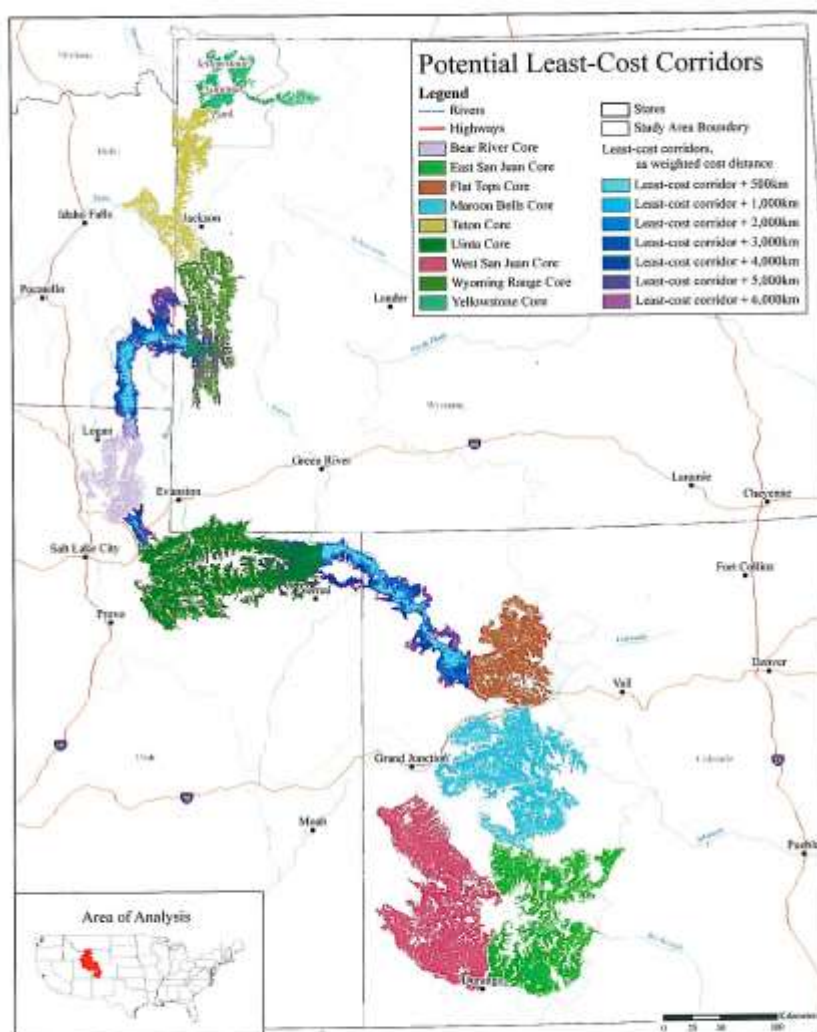


Figure 8. Potential least-cost corridors for lynx, as weighted cost distance.

17

The recent Forest Service documentation of wolverine in the Uintas also heightens awareness that habitat and prey base for this species needs to be delineated and its forage base protected. As a predator and scavenger, these animals along with lynx, bobcat, bears, and wolves are at risk from being shot or trapped when livestock are present. The Forest Service must address this risk to these carnivores in these allotments and the cumulative impacts from other grazing allotments in the Uinta Mountains which are part of the Project Area.

## NEPA Analysis

A fundamental aspect of NEPA is to take a “hard look” at current management, conditions, assumptions and implementation. A NEPA document that fails to analyze the following violates the purposes of NEPA:

- 1) Validity of assumptions from previous NEPA processes
- 2) Accuracy of predictions from previous NEPA processes
- 3) Adequacy of Forest Service implementation of previous decisions
- 4) Permittee compliance with permit terms and conditions, AMP's, AOIs and other requirements
- 5) effectiveness of actions taken in previous decisions

These above items are absolutely critical to be part of this NEPA process. Without this critical link the validity of the current assumptions are baseless. Without analyzing the accuracy and validity of the assumptions used in previous NEPA processes one has no way to judge the accuracy and effectiveness of the current analysis and proposals. The predictions made in previous NEPA processes also need to be disclosed and analyzed because if these were not accurate, and the agency is making similar decisions, then the process will lead to failure. A review of the adequacy of the FS's implementation of current AMP's and FP direction is essential to a valid NEPA process. For instance, if in previous processes the FS said they were going to do a certain monitoring plan or implement a certain type of management and these were never effectively implemented, it is important for the reader and the decision maker to know. If there have been problems with FS's implementation in the past, it is not logical to assume that implementation will now all of a sudden be appropriate. Another critical component is permittee compliance. If the permittee(s) have failed to properly comply with their permit terms and conditions and AMP requirements, including utilization requirements, rotation requirements and fence maintenance then it is absolutely critical to discuss this in the document and its effects on the proposed action.

The question is whether the Forest Service will value continuation of domestic sheep grazing in these wilderness watersheds above the value of watersheds, water storage, stream flows, fish and wildlife habitat, recreational and wilderness values, or will it finally place the public interest above that of a handful of permittees and cancel these permits and allow the wilderness to heal?

## Wilderness Impacts and Analysis (excerpted from supplemental comments dated July 16, 2014)

Domestic livestock grazing in Wilderness is a nonconforming use that is allowed to occur where it currently exists in Wilderness. Grazing is a nonconforming use, as are most of the others that

harm and damage Wilderness. This fact is well documented in various agency publications dealing with monitoring of wilderness. Monitoring Selected Conditions Related to Wilderness Character: A National Framework states:

*Section 4(d) of the Wilderness Act contains several special provisions allowing activities that would typically be prohibited in wilderness, such as mining and commercial livestock grazing, or landing of aircraft or use of motorboats, where these uses were already established before wilderness designation.*

In Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System it notes, “Livestock grazing may be allowed in wilderness, yet may contribute to soil disturbance and the spread of non-indigenous plants”<sup>22</sup>. The same document also notes, “Grazing by large non-indigenous herbivores such as domestic cattle, horses, and sheep may significantly degrade diminish the natural quality.”

Further Forest Service guidance hones in on the problems that grazing presents in Wilderness. The Technical Guide for Monitoring Selected Conditions Related to Wilderness Character clearly explains why monitoring livestock grazing in Wilderness is crucial:

*Grazing allotments introduce large nonindigenous herbivores such as domestic cattle, horses, and sheep in a wilderness. By their grazing and trampling activities, these nonindigenous herbivores may significantly diminish the natural quality of wilderness character by directly altering habitat for wildlife, reducing populations of rare or at-risk plants, introducing disease and other pathogens, increasing soil erosion, and altering hydrologic flow regimes (Belsky and Blumenthal 1997, Belsky and others 1999<sup>23</sup>, Fleischner 1994<sup>24</sup>). A decrease over time in the number of acres of grazing allotments with authorized use in a wilderness would indicate an increase in the natural quality. Conversely, an increase over time of the number of acres of grazing allotments with authorized use would indicate a decrease in the natural quality.*

There is no question that grazing damages wilderness and the NEPA document needs to address this issue. Aside from the documented damage that sheep grazing does to the vegetation and watershed of the High Uintas Wilderness described above and in our prior comments on this project, there are three issues that greatly affect the Wilderness. We address each of these briefly below.

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<sup>22</sup> Belsky, A.J. and Dana M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the interior West. *Conservation Biology* 11(2):315-327.

<sup>23</sup> Belsky AJ, Matzke A, Uselman S. 1999. Survey of livestock influences on stream and riparian ecosystems in the western US. *Journal of Soil and Water Conservation* 54:419-431.

<sup>24</sup> Fleischner TL. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8:629-644.



## Bighorn Sheep

Bighorn sheep are a native species and contribute to the wilderness values in the Wilderness. The Uintas were perhaps one of the best ranges for Rocky Mountain bighorn sheep prior to the arrival of domestic sheep. The scoping letter notes:

*The UWCNF and Ashley National Forest recognize that since the original decision was signed, Rocky Mountain bighorn sheep have been listed as an Intermountain Regional Forester's Sensitive Species and are known to spend time in the Henrys Fork and Uinta River Drainages. Parts of these drainages are included in the Gilbert Peak, Hessie Lake-Henrys Fork, and Painter Basin allotments. Understanding the risk of contact between bighorn and domestic sheep to mitigate potential disease transmission is believed to be an important issue that will need to be considered as the effects of domestic sheep grazing are analyzed.*

The problem with that is that we have known for forty years the impacts of domestic sheep on wild sheep. Mountains of research and evidence already exist to show bighorns and domestic sheep can't coexist, and that bighorns will travel dozens of miles across their range. Whether bighorns in the High Uintas Wilderness will continue to die because of domestic sheep diseases is a political question, not a biological one. The EIS should also look at impact from non-native mountain goats on bighorn sheep.

## Predators

The Forest Service Manual 2323.33c - Predator Control states, "*Predacious mammals and birds play a critical role in maintaining the integrity of natural ecosystems. Consider the benefits of a predator species in the ecosystem before approving control actions.*" The NEPA document needs to address this issue. The High Uintas Wilderness should be great habitat for wolves, wolverines, cougars, lynx and bears. However, largely because of the sheep grazing, these predators are either absent or exist in very low numbers.

## Driveways

The sheep driveways within and outside the Wilderness suffer from extreme damage. Anyone who has visited the East and West Fork Blacks Fork sees the damage. We find it hard to imagine grazing can continue to be approved with the kind of damage that takes place and meet forest plan or regional direction. This is true inside or outside the Wilderness.

The language in the Wilderness Act and the subsequent grazing guidelines do not mean it must occur at any cost, rather, decisions about livestock grazing won't rest solely on whether an area is designated as Wilderness. For example, a decision to close sheep allotments to protect bighorn sheep, as was done on the Payette National Forest, was made regardless of whether the allotments in question were Wilderness or not (most, if not all, were not). The same

situation exists in the High Uintas Wilderness. The current conditions, including the threat to bighorn sheep, calls for closing these allotments

We wish to (re)emphasize that negative impacts, and conflicts among alternative uses, relating to the following items must not just be within the scope of the EIS, but treated as significant and/or key alternative-driving in nature:

- Rocky Mountain bighorn sheep
- Wilderness
- Other Threatened/Endangered/Proposed/Candidate and U.S.F.S. Sensitive plant and animals, as well as their habitats
- Soils
- Bare ground from sheep grazing as well as bedding and trailing practices between watersheds
- Hydrology, including the role of the Uinta mountains and Wilderness Area as water storage sources for downstream water users and how activities such as grazing of domestic sheep and cattle in these sensitive watersheds affect water storage, flood forces and stream habitats (bank scouring), cover and substrate for spawning cutthroat trout.
- Native plant biodiversity compared to long-term livestock exclosures/ungrazed watersheds in the Uinta Wilderness
- Dominance of sites by a few increasers, native or exotic plants
- Native pollinators compared to long-term livestock exclosures/ungrazed watersheds in the Uinta Wilderness
- Global warming science re: cumulative effects on high elevation native vegetation conditions, bighorn sheep, and other high elevation wildlife of higher temperatures, earlier snowmelt, reduced snowpack
- Cumulative impacts on high elevation native vegetation conditions by climate change, domestic sheep, Mountain Goats superimposed on native grazers.
- The impact on populations of elk, deer, bighorn sheep, moose from forage competition with domestic sheep and Rocky Mountain Goats. Include not only numbers of individuals equivalent based on forage demand, but displacement from preferred foraging, breeding and rearing areas.
- The West Fork Black's Fork domestic sheep allotment must be included in the analysis due to it being in bighorn sheep habitat, being used for trailing of domestic sheep into/from East Fork Black's Fork, over Red Knob Pass and into the South Slope allotments, and its severely degraded conditions.

- Analysis of trail register comments for trail heads into these 11 allotments as part of the Recreation analysis.
- Analysis of the killing of predator/carnivores by permittees, herders, DWR, Wildlife Services, guard dogs for the 11 allotments, requiring predator-friendly management methods and a means of tracking mortality of these Sensitive, Management Indicator, or T&E Species populations as affected by conflicts with domestic sheep.
- Cumulative Impacts of other projects such as the series of timber sales/salvage on the North Slope (Smith's Fork, West Fork, Roughneck and other sales/salvage projects and their associated roads, road densities, noise and incursions into roadless areas) as well as oil and gas developments, and ohv impacts to the integrity of the overall Uinta Mountains and the Regionally Significant Wildlife Corridor of which they are an integral part.
- Cumulative Impacts of the trailing of Domestic Sheep on public lands/carnivores/predators (lynx, bear, wolf, coyote, wolverine) as they are trailed to and from the Uinta Wilderness allotments.
- Areas/routes traveled by Canada lynx based on radio collar data from the Colorado reintroductions in the late 1990's – mid 2000's.
- All past observations and records of bighorn sheep occurrences in the Uinta Wilderness and adjacent areas, their travel routes, wintering areas, summer feeding areas, breeding and calving areas and transitional areas.

Sincerely,



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March 11, 2016

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**Subject:** Comments on the High Uintas Wilderness Domestic Sheep Grazing Project

Dear Supervisor Whittekiend:

The Gallatin Wildlife Association (GWA) is a non-profit volunteer wildlife conservation organization representing hunters, anglers and other wildlife advocates in Southwest Montana and elsewhere. Our mission is to protect habitat and conserve fish and wildlife. GWA supports sustainable management of fish and wildlife populations through fair chase public hunting and fishing opportunities that will ensure these traditions are passed on for future generations to enjoy. We support the Montana constitution which states: “the opportunity to harvest wild game is a heritage that shall forever be preserved” and that “the legislature shall provide adequate remedies to prevent unreasonable depletion of natural resources.” We appreciate this opportunity to provide additional comment to the ill-advised proposal to continue domestic sheep use of the High Uintas Wilderness Area and bighorn sheep habitat, which will supplement the letter we sent you on Dec. 21, 2015.

**The Proposed Action:** Under the proposed action as outlined in the USFS (2016) scoping letter page 4, 6,650 ewes with a lamb(s) will be allowed to use the north slope of the Uintas Mountain Range within the Uinta-Wasatch-Cache National Forest. On the south slope of the High Uintas Wilderness Area the Ashley National Forest will authorize 6,200 ewes, each with a lamb(s). While ewes often have twin lambs we will assume here that each ewe has only one lamb. Thus we estimate the total number of domestic sheep utilizing this area to be 13,300 animals on the North Slope and 12,400 animals on the South Slope, which totals 25,700 domestic sheep. While the USFS will be providing for the viability of these domestic sheep during their approximate 2 month grazing season on National Forest public lands (generally July 11 – Sept. 10), the USFS cannot make the same claim for native bighorn sheep in the area or anywhere else on National Forest lands in Utah. A mere 136 adult bighorn sheep comprise the largest combined bighorn



sheep herd on National Forest lands throughout Utah (USFS Undated, Utah Division of Wildlife Resources 2013). This is a stunning revelation in particular when both the USFS and Utah DWR know the long term persistence of this very small population of bighorn sheep is threatened by the continued presence of over 25,000 domestic sheep authorized to use the 10 allotments outlined in the proposed action that lie primarily within the High Uintas Wilderness Area. We do not support the proposed action.

**General Bighorn Population History:** Presently, about 90% of Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) in the United States spend all or part of their lives on National Forest System lands (Schommer and Woolever 2001). Bighorn sheep were once abundant in Utah and across the west in large herds with connected habitat (Dubay et al. 2003, Singer et al. 2001, Singer et al. 2001(a), Smith et al. 1991, Toweill and Geist 1999, Utah DWR 2013). Historically, bighorn numbers were estimated to be between 1.5 to 2 million across the west (Toweill and Geist 1999). However, only about 35,000 Rocky Mountain bighorn sheep are found in North America now (Toweill and Geist 1999). This represents a loss of over 98% of the historic bighorn population with only 1.75% of historic numbers remaining across the West (Toweill and Geist 1999).

While we could not find historic bighorn estimates specifically for Utah, bighorns were considered abundant across the State (Toweill and Geist 1999, Utah DWR 2013). However, Rocky Mountain bighorn sheep declined dramatically in Utah and native populations were nearly extirpated following pioneer settlement (Toweill and Geist 1999, Utah DWR 2013). Currently there are only about 2,000 Rocky Mountain bighorn sheep in seven different populations and about the same number of Desert bighorn sheep left in Utah (Utah DWR 2013, page 15&16).

**Bighorn Sheep are a Sensitive Species in the Intermountain Region:** In 2009, because of declining bighorn sheep numbers, the Forest Service designated bighorn sheep a sensitive species in the Intermountain Region, which includes the Uinta-Wasatch-Cache and Ashley National Forests. Under a sensitive species designation, the objectives for bighorn sheep habitat conservation must shift to proactive management measures that protect and enhance habitat to prevent listing of bighorn sheep under the Endangered Species Act. These management changes must seek to avoid, minimize or reverse negative impacts to bighorn habitat and populations whose viability has been identified as a concern within the Region. The USFS has a primary responsibility to develop and implement management objectives that ensure sufficient habitat is available to provide for viable populations of bighorn sheep moving forward. We believe the continuation of domestic sheep use and trailing on or near bighorn sheep habitat in the High Uintas Wilderness Area and surrounding landscape are in direct conflict with these responsibilities.

**Bighorn Sheep Populations in the High Uintas Mountains/Wilderness Area:** As we understand it, bighorn sheep have been largely extirpated from the High Uintas Wilderness Area, or at best bighorn herds are very small and isolated (Utah DWR 2013, page 16, Table 1 and USFS Undated). The Uinta Mountains meta-population of Rocky Mountain bighorn sheep is the only population associated with National Forest Service

lands in Utah that currently exceeds the Utah DWR (2013) estimated “Minimum Viable Population” level for bighorn sheep ( $MVP \geq 125$  animals). However, the estimated combined adult population for the Uinta Mountains meta-population is only 136 animals and they are threatened by these domestic sheep allotments on the western boundary of their Core Herd Home Range (CHHR) (USFS Undated).

**Bighorn Sheep Habitat in the High Uintas:** The High Uintas Wilderness Area encompasses 456,705 acres and stretches nearly 60 miles east to west. The USFS proposal is to reauthorize 10 domestic sheep allotments lying north and south along the spine of the Uintas Mountain Range. The allotments cover a total of 160,410 acres within or adjacent to the High Uintas Wilderness Area, including 76,823 acres on the Ashley National Forest which runs along the south slope of the Uinta Range and 83,587 acres of the Uinta-Wasatch-Cache National Forest which runs along the north slope of the Uinta Range (U.S. Forest Service 2016). The Utah Division of Wildlife Resources (2013, page 14) maps a significant amount of this area as bighorn sheep habitat and/or currently occupied distribution. Furthermore, the North Slope - Summit, Three Corners and West Daggett bighorn herds are targeted for population augmentation and the South Slope – Diamond Mountain, Vernal and Yellowstone areas are targeted from bighorn sheep reintroductions (Utah DWR 2013, page 22). We are concerned the presence of domestic sheep (including trailing routes) in the High Uintas Wilderness Area and adjacent Forest Service national public lands in or near existing bighorn sheep herds or historic habitat pose a serious threat to the viability of existing herds as well as the suitability of historic bighorn sheep habitat in the area.

**Please Map Domestic Sheep Impacts, which Extend Beyond Allotment Boundaries:** To what degree do the USFS domestic sheep allotments and trailing routes (to and from the allotments) overlap existing distributions of bighorn sheep in the area? What about the overlap of bighorn sheep Core Herd Home Ranges with domestic sheep allotments as discussed in USFS (Undated)? How much historic bighorn sheep habitat in the area is encompassed by USFS livestock allotments? How much bighorn habitat is within 9 miles of the outer edge of the allotment boundaries and the trailing routes? This is important because bighorn/domestic sheep management guidelines suggest at least a 9 mile buffer zone of separation between the two species should be generally applied to assure bighorn viability over the long term (Montana Fish, Wildlife & Parks 2010, Schommer and Woolever 2001, Schommer and Woolever 2008, Suminski 1991, Western Association of Fish & Wildlife Agencies 2007, Wild Sheep Working Group 2012). The best available science instructs that the presence of the domestic sheep within these allotments will adversely impact the suitability of bighorn sheep habitat and/or the viability of existing populations across a vast landscape at least 9 miles broader than the outer perimeter of the combined allotment boundaries as well as the trailing routes to and from the allotments.

While the domestic sheep allotments themselves directly consume 160,410 acres of public lands, mostly within the High Uintas Wilderness Area, the proposed action will adversely impact a much larger landscape of bighorn sheep habitat, including surrounding public lands encompassing at least a 9 mile radius surrounding the outer

edge of the allotment boundaries. The Risk of Contact model discussed below may indicate an even broader area of risk to bighorn sheep. Regardless, if the proposed action is implemented a vast landscape of public lands will be unsuitable for bighorn sheep over the long term. How big an area would this be and how much of it is public lands? Please review and map these issues in the Environmental Impact Statement. From our quick review, it appears most if not all of the area impacted would be on USFS National public lands (USFS 2016) with a significant amount being important bighorn sheep habitat (Utah DWR 2013, page 14, USFS Undated). Does the size of the planning area encompass this entire landscape?

Regardless, please reveal the specific location of all livestock allotments and trailing routes in the area on a map in the EIS, in particular those overlapping or near bighorn sheep habitat, CHHR and existing populations. Please also include the type and amount of livestock (sheep and/or cattle) that are permitted to use these allotments along with their prescribed season of use. We suggest a map or maps that overlap the historic bighorn sheep habitat, the estimated current bighorn distribution, all the domestic livestock/sheep allotments and all the fences or other potential barriers to bighorn sheep movement in the area would be helpful to inform both the decision maker and the public.

**Have the Alternatives been Predetermined or Limited:** The scoping letter (USFS 2016, page 7) mentions within the Uinta-Wasatch-Cache National Forest the Desired Future Condition for the Bear River Area is: “From the Hayden Fork drainage to the east, if sheep permits for upper elevation allotments are voluntarily waived without a preference, permits will not be reissued and allotments will be closed to domestic livestock for purposes of future bighorn sheep habitat.” (p.4-190, p.4-201). Seven additional allotments are also mentioned, which are located along the North Slope of the Uinta Mountains totaling an additional 17,600 “capable” acres that conflict with bighorn sheep habitat. The Record of Decision for the Forest Plan identified these allotments for closure to expand bighorn sheep habitat, but only if the permits are voluntarily waived without preference back to the Forest Service (USFS 2016). In both cases, the U.S. Forest Service appears to be granting predetermined rights to continue domestic sheep use of these allotments at the discretion of the current permittee(s), even if such use is detrimental to bighorn sheep habitat and/or existing bighorn sheep populations. Doesn’t USFS policy clearly state that permitted livestock use is a discretionary privilege granted by the USFS rather than a right given to the permitted user? Aren’t USFS grazing leases subject to modification or closure by the USFS if necessary to protect the public interest and/or important natural features such as bighorn sheep habitat or population viability?

It appears the USFS has already predetermined the outcome here, or at best delegated any decision to close or retire any of the sheep allotments in question to the current permit holders. Our research indicates it is likely the USFS will need to make a significant change here if they intend on restoring bighorn sheep habitat and/or conserving bighorn sheep populations in the area. Is the decision of whether to continue or to retire the domestic sheep allotments up to the current permitted user(s), even if the USFS finds that retiring the allotments is necessary to benefit bighorn sheep habitat and existing populations? Please clarify the limits of your authority and whether or not the option of

retiring these allotments to benefit bighorn sheep habitat/populations can occur without permittee permission.

**Risk of Contact Model:** Please review and map the results from the USFS Risk of Contact model for Utah (USFS Undated), which helps determine the threat these domestic sheep allotments pose to existing bighorn herds in the area as well as across the state of Utah. It appears these domestic sheep allotments and others are interfering with your responsibility to provide habitat for viable populations of bighorn sheep across and beyond the High Uintas Wilderness area. The Uintas Mountains “meta-population” of bighorn sheep is the only population associated with National Forest Service lands in Utah that exceeds Utah DWR’s stated Minimum Viable Population of  $\geq 125$  animals (Utah DWR 2013, USFS Undated). However, we can find no current scientific evidence/information that supports such a low MVP as being sufficient to sustain a large mammal like bighorn sheep over the long term (see the MVP discussion below). Furthermore, this small population of bighorn sheep remains at high to moderate risk of contact with domestic sheep in 9 of the 10 allotments described in this proposed action and at least one other allotment in the area (West Fork Blacks Fork allotment) (See Table 2, USFS Undated). It is highly questionable the total bighorn sheep population in and near the High Uintas Wilderness can be considered viable over the long at only 136 adult animals, especially with this high to moderate risk of contact with domestic sheep and previous disease outbreaks (USFS Undated, Utah DWR 2013, Cassaigne et al. 2010, Singer et al. 2001(b)).

**Minimally Viable Populations:** While there is debate about what constitutes a bare Minimum Viable Population for any given species (Flather et al. 2011) and bighorns in particular (Cassaigne et al. 2010, Singer et al. 2001(b), Smith et al. 1991), there is growing consensus that multiple populations totaling thousands (not hundreds) of individuals will be needed to ensure long-term persistence of most mammals (Brook et al. 2006, Dratch and Gogan 2010, Flather et al. 2011, Reed et al. 2003, Traill et al. 2010).

Cassaigne et al (2010) suggests mortality rates for bighorn sheep are negatively related to population size in a logarithmic function. From a disease dynamics perspective, Cassaigne et al (2010) suggest a minimum population of 188 bighorn sheep would be required to insure long term persistence in the presence of epizootic disease. Singer et al. (2001) suggested  $292 \pm 82$  animals as the minimum population size that would be able to recover from an epizootic disease outbreak. Thus we suggest that Utah DWR’s (2013) MVP estimate for bighorn sheep of only 125 animals is substantially too low, especially when disease outbreaks have already occurred in some of their meta-populations.

The USFS notes that the best population on National Forest Service lands in Utah in terms of actual numbers is the Uintas Mountain herd, with a total estimated adult population of only 136 animals (USFS Undated). As best we can tell, the Utah DWR (2013) refers to these animals in 3-4 meta-populations called the North Slope Bare Top Mountain, Goslin Mountain, Sheep Creek and Carter Creek/Red Canyon herds. However, the Goslin population has been completely eliminated by Utah DWR (2013) due to a severe disease outbreak. Furthermore, reintroduced bighorn sheep that are limited to



small, isolated populations can lead to severe genetic bottlenecks (Ramey et al. 2001) and these habitat deficiencies hamper bighorn herd growth and persistence over time (Butler et al. 2013, Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Wehausen et al. 2011).

**Attempts to Restore Bighorn Sheep in Utah and the High Uintas:** Smith et al. (1991) specifically addresses some of the challenges/failings of Utah's early Rocky Mountain bighorn reintroduction effort. Prior to 1991 transplanted herds in Utah failed to increase and the statewide bighorn totals were approximately equal to the number of transplanted animals (Smith et al. 1991). The reasons for this included: (1) inadequate quantities of available range, (2) severe competition with other ungulates, (3) contact with domestic livestock, (4) improper juxtaposition of key habitat components, (5) inadequate quantities of one or more critical seasonal habitats, and (6) excessive human harassment (Smith et al. 1991). While the Utah DWR has documented much better reintroduction success for the Rocky Mountain bighorn sheep since 1996 (Utah DWR 2013, Graph, page 15) most of the populations dependent on USFS lands remain small, isolated and/or are exposed to continued risk of contact with domestic sheep (USFS Undated). Other threats to their long term viability remain (Utah DWR 2013).

It seems clear, large wild landscapes of interconnected domestic sheep-free habitat that provide for large bighorn sheep populations are necessary to ensure the long term viability of this species. The 10 domestic sheep allotments being reviewed in this EIS and perhaps other nearby allotments (West Fork Blacks Fork allotment for example) significantly limit the USFS's ability to provide enough interconnected habitat within the High Uintas Mountain Range and Wilderness Area to ensure long term bighorn sheep viability (USFS Undated). As well, how much forage do the domestic sheep remove each year? Forage loss/competition alone is also likely a significant adverse impact.

Indeed, no bighorn sheep populations currently exist on the South Slopes of the Uintas Mountain Range (Utah DWR 2013, USFS Undated) and none of the individual herds on the North Slopes have reached a MVP level of at least 125 animals (Utah DWR 2013). Furthermore, the North Slope-Goslin Mountain bighorn sheep populations was culled in 2009 by the Utah DWR due to disease issues and concerns about the disease spreading to nearby herds. Utah DWR (2013) would like to reestablish this population in the future. It also appears the North Slope West Daggett bighorn herd occupies habitat connected to the High Uintas Wilderness area east of the proposed domestic sheep allotments (Utah DWR 2013, pages 14 & 22). How far away are these bighorns from the closest domestic sheep allotments or trailing activities? What about the North Slope Summit and Three Corners populations? Important bighorn habitat and/or existing population distributions overlap at least 4 of the domestic sheep allotments in question (USFS Undated, Utah DWR 2013, page 14). The risk of interaction with domestic sheep and/or disease transmission to bighorn sheep appears quite high. Please review and reveal that risk to the best of your abilities in the final EIS.

In addition to the Utah DWR managed herds, populations of Rocky Mountain bighorn sheep populations are also found in Dinosaur National Monument and on Ute tribal lands

in northeastern Utah. Are these bighorn herds threatened by the presence of domestic sheep using USFS land? Are there other bighorn sheep herds in the area or other domestic livestock/sheep allotments in the area that may pose additional risks to bighorn sheep? If so, please reveal and discuss their status in the final EIS.

**USFS Goals, Standards, Guidelines and Sensitive Species Management Direction:**

To reauthorize domestic sheep use of these allotments given the sensitive nature of bighorn sheep in the Intermountain Region and the presence of bighorn sheep and/or bighorn sheep habitat in the area in or near the allotments, runs contrary to the USFS goals as outlined in the Feb, 16, 2016 Scoping Letter noted below:

- 3I. Maintain viability of species-at-risk (including endangered, threatened and sensitive species and unique communities);
- 3J. Manage Forest Service sensitive species to prevent them from being classified as threatened or endangered and where possible provide for delisting as sensitive (FSM 2670); and

Applicable standards and guidelines which include:

(G21) - For projects that may affect Forest Service Sensitive species, develop conservation measures and strategies to maintain, improve and/or minimize impacts to species and their habitats. Short-term deviations may be allowed as long as the action maintains or improves the habitat in the long term; and

Forest Plan Standards and guidelines specific to the wilderness which include:

- MA 01 012 - (S) Reintroduction of species is considered appropriate only if (the) species is indigenous and was extirpated by human induced events. Transplants are limited to indigenous species as determined by UDWR. (FSM 2323.33a) Indigenous species, which are classified as threatened, endangered or sensitive receive priority for transplant. And,

Forest Service Manual Direction

- 2670.22 - Sensitive Species: Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
- 2670.32 - Sensitive Species: Assist states in achieving their goals for conservation of endemic species.
- 2670.45 - Forest Supervisors: Coordinate forest programs with other federal agencies, states, and other groups and individuals concerned with the conservation of threatened, endangered, proposed, and sensitive species.
- 2670.46 - District Rangers: Coordinate district activities with interested state and federal agencies, groups, and individuals concerned with the conservation of threatened, endangered, proposed, and sensitive species.

**Other Cumulative Impacts to Bighorn Sheep:** According to Utah DWR (2013), factors contributing to the demise of bighorn sheep in Utah included habitat degradation and loss, competition with domestic livestock for forage and space, vulnerability to domestic livestock-borne diseases, and habitat conversions away from native grasslands towards shrub lands due to excessive grazing and fire suppression. Human disturbance in bighorn sheep habitat is also an increasing concern, such as off-road motorized use and mountain biking. Human disturbance is also a stress inducer, which may lead to increased disease problems (Utah DWR 2013). Wilderness areas can provide large areas of suitable habitat for bighorn sheep by minimizing or eliminating such human disturbances, in particular motorized vehicle impacts. However, the presence of domestic sheep in the High Uintas Wilderness area prevents these important public lands from being suitable habitat for bighorn sheep due to disease transmission issues and competition for food, space and water. Will the USFS consider these cumulative factors in its analysis of the domestic sheep allotments in the High Uintas Wilderness? As well, please determine whether the two Forests in question are providing sufficient habitat for viable populations of bighorn sheep across their historic range within the Forest Boundaries. It does not appear this is the case.

**General Bighorn Sheep/Domestic Sheep Science Review:** Domestic sheep compete with native bighorn sheep for food, space and water and are asymptomatic carriers of diseases that result in sick and dead bighorns if the two come into contact with one another (Beecham et al. 2007, Besser et al. 2014, Dubay et al. 2003, Foreyt and Jessup 1982, Goodson 1982, Jessup 1981, Jessup 1985, Lawrence et al. 2010, Monello et al. 2001, Schommer and Woolever 2001, Schommer and Woolever 2008, Suminski 1991, Toweill and Geist 1999, Wehausen et al. 2011). Once exposed, bighorn sheep themselves can become carriers of the deadly disease spreading it to other bighorn herds depressing populations indefinitely (Besser et al. 2012, Besser et al. 2013, Besser et al. 2014, Cassirer and Sinclair 2007, Dubay et al. 2003, Monello et al. 2001). In Montana alone, over 1,500 bighorn sheep died between 2008 and 2011 as a result of all-age pneumonia die-off events (Butler et al. 2013). Thus the mere presence of domestic sheep creates unique wildlife conservation challenges because of their potential to spread disease to bighorn sheep as well as their vulnerability to native predators (Brock et al. 2006).

Besser et al. (2012) and (2012(a)) provide evidence that *Mycoplasma ovipneumoniae* plays a primary role in the etiology (cause) of epizootic pneumonia of bighorn sheep in populations across the western United States and that it acts to induce secondary infection with other opportunistic pathogens. Furthermore, these studies found the likelihood of *M. ovipneumoniae* having a primary role in bighorn sheep pneumonia is consistent with the association between some epizootics of this disease and contact with domestic sheep because the latter carry *M. ovipneumoniae* at high prevalence. Additionally, Besser et al. (2014) found transmission of *M. ovipneumoniae* occurred from a single infected or challenged animal to bighorn sheep that were separated up to 12 meters, strongly suggesting that direct contact is not necessary for epizootic spread of pneumonia in bighorn sheep to occur. These introduced infectious diseases pose a tremendous threat to wildlife and in particular bighorn sheep (Wehausen et al. 2010). This threat increases as animal population sizes decrease, thereby reducing the gene pool of potentially resistant

individuals (Ramey et al. 2001), further increasing the likelihood of endangerment and extinction (Cassaigne et al. 2010, Wehausen et al. 2011).

The U.S. Ninth Circuit Court of Appeals (2016) recently ruled that the "precise mechanisms" of disease transmission are not needed to justify separation of domestic sheep from native bighorn sheep. "The conclusion was that the scientific consensus is that disease transmission from domestic sheep - by whatever mechanism and involving whatever confounding factors - poses a sufficient risk to bighorn sheep viability to merit separation of the bighorns from the domestic animals," wrote Circuit Judge Marsha Berzon in a 29-page opinion.

Furthermore, scientific research tells us that larger populations of bighorn sheep with connected habitat persist longer than smaller isolated populations (Berger 1990, Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Wehausen et al. 2011). The same is true for other species in general (Traill et al. 2010). As previously noted, while there is some debate about what constitutes a MVP for any given species (Flather et al. 2011) and for bighorns in particular (Cassaigne et al. 2010, Singer et al. 2001(b), Smith et al. 1991), there is growing consensus that multiple populations totaling thousands (not hundreds) of individuals will be needed to ensure long-term persistence of most mammals (Brook et al. 2006, Dratch and Gogan 2010, Flather et al. 2011, Reed et al. 2003, Traill et al. 2010). Furthermore, reintroduced bighorn sheep that are limited to small, isolated populations can lead to severe genetic bottlenecks (Ramey et al. 2001) and these habitat deficiencies hamper bighorn herd growth and persistence over time (Butler et al. 2013, Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Wehausen et al. 2011).

Cattle may also carry diseases detrimental to bighorn sheep (Jessup 1985, King and Workman 1984, Smith et al. 1991, Suminski 1991, Tillett and Chapman 1997, Wolfe et al. 2010). Cattle can also displace and/or compete for forage with bighorn sheep where their habitat use overlaps (Bissonnette and Steinkamp 1996, King and Workman 1984, Smith et al. 1991, Suminski 1991, Taylor et al. 1998, Taylor 2001, Thorne et al. 1979, Tillett and Chapman 1997, Toweill and Geist 1999). Climatic variation alone can significantly affect forage quality and quantity and recruitment rates of bighorn sheep and other ungulates (Butler et al. 2013). Thus disease, drought, competition with livestock and/or competition with other wildlife may be important limiting factors for bighorn sheep recruitment in any given year. The cumulative effects of these factors including cattle and elk competition for forage on bighorn sheep ranges can result in significant competition and social displacement to the point where historic ranges are no longer suitable for bighorn transplants (Smith et al. 1991).

Fences can also prove impassable to bighorn sheep, restricting their movements and resulting in mortality, particularly for rams whose horns may become entangled (Smith et al. 1991, Taylor et al. 1998, Whithorn 2001). Helvie (1971) presents a useful discussion of the types of fences that limit bighorn movements. Thus, providing large landscapes of historic bighorn sheep habitat that are free of livestock presence/impacts and the fences needed to manage them are preferable if bighorn restoration and conservation is the goal



(Jessup 1985, King and Workman 1984, Smith et al. 1991, Suminski 1991, Tillett and Chapman 1997, Wolfe et al. 2010).

The need for large wild landscape conservation of connected habitat for bighorn sheep is apparent. While the politics of removing domestic sheep from public lands bighorn habitat might be daunting, the scientific research is clear, the mere presence of domestic sheep results in the loss of bighorn sheep use of the area and the fragmentation and degradation of surrounding habitat and populations (Cassaigne et al. 2010, Singer et al. 2001, Singer et al. 2001(b), Smith et al. 1991, Suminski 1991, Toweill and Geist 1999, Wehausen et al. 2011).

**Summary:** In the book *Return of Royalty - Wild Sheep of North America* Toweill and Geist (1999) note:

*“Rocky Mountain bighorn populations can only be made secure in Utah through additional reintroduction, expansion of existing nucleus herds, and directed conservation efforts.”*

As well the Utah DWR (2013) eloquently quotes from the book *Mountain Sheep of North America* by Raul Valdez and Paul Krausman (1999):

*“Mountain sheep, like all other native fauna and flora, are part of the structure and heritage of North America. Despite all of the efforts exerted toward their conservation, wild sheep face a precarious future. They are an ecologically fragile species, adapted to limited habitats that are increasingly fragmented. Future conservation efforts will only be successful if land managers are able to minimize fragmentation. According mountain sheep their rightful share of North America and allowing them to inhabit the wilderness regions they require is a responsibility all Americans must shoulder. It is our moral and ethical obligation never to relent in the struggle to ensure their survival.”*

The best available science informs us all that native bighorns and domestic sheep cannot co-mingle in the same area because domestic sheep carry several diseases that are lethal to native bighorns. Since native bighorn sheep are a designated sensitive species in the Intermountain Region, bighorn habitat and/or small populations exists in or near the project area, and bighorn sheep restoration/conservation is both a USFS and Utah DWR shared goal, we conclude the 10 domestic sheep allotments in and near the High Uintas Wilderness area should be retired. Allotment retirement will allow for the establishment of viable interconnected native bighorn herds to this historic habitat within the High Uintas Wilderness area and other surrounding USFS lands. Retiring these domestic sheep allotments will also reduce potential conflicts with native predators that are attracted to domestic sheep flocks. Removal of the domestic sheep allotments will also enhance the wilderness values of the High Uintas Wilderness area. The National Wildlife Federation and the National Wild Sheep Foundation have programs/funding that can assist permittees with livestock allotment retirements/relocation that benefit bighorn sheep and other native wildlife. Please consider allotment retirement to be the best path forward.

Respectfully,

Glenn Hockett  
Volunteer President, Gallatin Wildlife Association

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# **A FORAGE CAPACITY AND STOCKING RATE DETERMINATION FOR THE HIGH UINTAS WILDERNESS DOMESTIC SHEEP ANALYSIS**

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**Analysis presented to the Ashley and Uinta Wasatch Cache National Forests**

**September, 2018**



## INTRODUCTION

In May 2014, the Uinta Wasatch Cache and Ashley NFs initiated scoping for the High Uintas Domestic Sheep Analysis.<sup>1</sup> The purpose of this project as described in the scoping notice is to reauthorize grazing of domestic sheep on five allotments in each of the NFs totaling 157,000 acres within the Uinta Wilderness, while continuing to permit up to 40,000 ewes and lambs to graze for two to three months, depending upon the allotment. Prior work in the Uinta Wilderness by Dr. John Carter identified issues of soil and stream bank erosion, severe use in uplands, and trailing damage across the passes leading from the UWCNF into the Ashley NF allotments and on steep slopes. These conditions were documented in a report by Dr. Carter that illustrated that non-capable lands were being severely grazed (Carter 2007).<sup>2</sup>

In the example of the adjacent West Fork Black's Fork allotment, which the Forest Service has excluded from this analysis, Carter's 2007 analysis demonstrated overstocking of the allotment, in which only 854 acres of the 14,786 acres were capable to support grazing. Of those 854 acres, 609 were wet meadows, areas not preferred by sheep. This indicated that only 5.7% of the allotment was capable (or 1.6% if wetlands were excluded from the capacity). Based on this observed drastic departure from the grazing capacity, our team conducted a comprehensive analysis to determine capable acres, forage capacity and stocking rates for the 10 allotments under current Forest Service analysis. This analysis constitutes the best available science.

The results of this effort were presented to the Forest Supervisors, District Rangers, Range Staff and Ecologist along with the Regional Range Lead in a meeting at the UWCNF Office in July, 2018 in Power Point format. (Attachment 1). Herein we detail the steps, methods and outcomes for three alternative scenarios that show the Forest Service must analyze a sustainable reduced stocking level and grazing system with rest for domestic sheep grazing that can be supported by the forage currently available on the capable and suitable acres. In addition, the West Fork Blacks Fork allotment should be included in the analysis by the Forest Service.

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<sup>1</sup> USDA. 2014. Scoping Letter High Uintas Domestic Sheep Analysis. Uinta Wasatch Cache NF (5/23/14)

<sup>2</sup>Carter, John. 2007. Watershed Conditions. Uinta Wilderness – West Fork Black's Fork, East Fork Black's Fork, Lake Fork, Middle Fork Beaver Creek, Burnt Fork. Environmental and Engineering Solutions, Mendon, Utah.  
<https://app.box.com/s/944957604b8618539585>



## **METHODS**

### **Datasets Used in the Grazing Capability Model**

Table 1 provides a summary of the datasets used in the Domestic Sheep Grazing Capability model.

**Table 1. GIS Datasets**

| <b>Dataset Name</b>                        | <b>Format Type</b> | <b>Version</b> | <b>Resolution</b>  | <b>Source</b>                                    |
|--------------------------------------------|--------------------|----------------|--------------------|--------------------------------------------------|
| NED Digital Elevation Model                | Raster             | 2013           | 10 meters          | US Geological Survey                             |
| Slope                                      | Raster             | 2018           | 10 meters          | Derived from NED Digital Elevation Model         |
| NAIP Digital Ortho Photo Images            | Raster             | 2016           | 1 meter            | USDA National Agriculture Imagery Program (NAIP) |
| Canopy Density Cover                       | Raster             | 2018           | 1 meter            | Wild Utah Project                                |
| National Wetlands Inventory                | Polygon            |                | Version 2.0 - 2016 | US Fish and Wildlife Service                     |
| Predicted Forage Production                | Raster             | 2018           | 10 meters          | Wild Utah Project                                |
| Forage Production Maps                     | Digitized PDFs     | 1960           | 1:17,000           | US Forest Service                                |
| Digitized Forage Production                | Polygon            | 1960           | 1:17000            | Digitized by Wild Utah Project                   |
| Grazing Allotments and Pastures Boundaries | Polygon            | 2016           | 1:24,000           | US Forest Service                                |
| NHD Water bodies                           | Polygon            | Version 1.07   | 1:24,000           | US Geological Survey                             |
| Grazing Capability (Forest Plan Revision)  | Polygon            | 2001           | 1:24,000           | US Forest Service                                |
| Forage Availability                        | Point              | 2016           | N/A                | Wild Utah Project                                |

### **Forage Availability Survey**

In order to get a representative sample of available forage in the project area, our team relied on lands in the East Fork Blacks Fork, Middle Fork Blacks Fork and Red Castle allotments which were not grazed prior to field sampling in August, 2016. With the help of a properly trained field team we conducted data collection in six soil types determined as the most common in the UWCNF portion of the project area.

Collectively, the six most common soil types are identified in the soils dataset as NS525,

NS531, NS501, NS223, NS222, and NS225 which cover almost 78% of the area across the five UWCNF allotments. In addition to these soil types, we included locations with the presence of wet meadows for data representation purposes. Soil types such as NS502 (Rubble and Rock Outcrop) that extends to a total of 17,219 acres or ~22% in the same 5 allotments were excluded from data collection since this soil type is largely barren and not expected to contain enough forage for grazing purposes. Our survey sites included both capable and non-capable areas according to the Grazing Capability Dataset from the Forest Service and at each site our field team inspected for signs of current sheep use such as droppings, tracks, bedding areas, and visible grazing use. This was done in order to exclude these from the forage capacity samples

Methods of determining forage production that rely on plot clippings are described in BLM (1996).<sup>3</sup> At each pre-determined location within each soil type, sample frames (24" x 24") were placed at 25', 50' 75' and 100' along a 100' transect. All herbaceous species in each sample plot were clipped to one inch above the ground, placed in Ziploc bags and brought back to camp, where they were kept open to air out until transported to the lab where they were air dried and weighed on an electronic balance. The amount of air dry forage per acre was then calculated for the plot size by multiplying air dry grams of the sample by 23.98. (Table 2). These results were then incorporated into the GIS analysis to determine the capable acres and stocking rates across all ten of the allotments in both Forests.

### **Calculating Current Forage Production**

The forage production dataset consists of a raster layer containing predicted values for forage production across the ten grazing allotments under study. This raster dataset is the result of an image classification model developed by Wild Utah Project. In the model, we used as the chief inputs a (1) set of digital ortho photo images from the National Agriculture Imagery Program captured in 2016, and (2) forage production survey points (Table 2) collected in the same year. These two datasets were correlated to each other by using the pixel values in the imagery and the forage production values determined at each survey location. This data correlation was then refined by using an NDVI (Normalized Difference Vegetation Index) raster to specifically target the different vegetation classes within the ortho photo images and confidently conduct a raster classification into different forage production classes based on the differential

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<sup>3</sup> Bureau of Land Management. 1996. Utilization studies and residual measurement, Interagency Technical Reference. Technical Reference 1734-03. BLM National Applied Resource Science Center, Denver, Colorado.

imagery signatures of those vegetation classes. Figures 1 – 5 provided below illustrate the general process of data correlation and image classification that was applied to derive a predicted forage production raster layer.

**Table 2. 2016 Forage Production**

| Site No | Site Average<br>grams | Forage<br>Production<br>lb/acre | Site No    | Site Average<br>grams | Forage<br>Production<br>lb/acre |
|---------|-----------------------|---------------------------------|------------|-----------------------|---------------------------------|
| RW025   | 0.0                   | 0.0                             | 19-01E     | 7.43                  | 178.1                           |
| 18-27A1 | 0.0                   | 0.0                             | 18-32D     | 7.60                  | 182.2                           |
| 18-25E  | 0.0                   | 0.0                             | 18-11      | 9.85                  | 236.2                           |
| JRR6    | 0.0                   | 0.0                             | 18-33C     | 10.15                 | 243.4                           |
| RW024   | 0.53                  | 12.6                            | 19-01G     | 10.18                 | 244.0                           |
| RW026   | 0.55                  | 13.2                            | NS1        | 12.53                 | 300.3                           |
| RW023   | 0.60                  | 14.4                            | 18-22A     | 13.63                 | 326.7                           |
| RW-017  | 1.00                  | 24.0                            | 18-26B     | 14.00                 | 335.7                           |
| MP1     | 1.73                  | 41.4                            | NS-02      | 16.00                 | 383.7                           |
| RW021   | 2.15                  | 51.6                            | 18-29B     | 18.38                 | 440.6                           |
| 18-19C  | 2.33                  | 55.8                            | 18-10F     | 18.63                 | 446.6                           |
| RW020   | 3.08                  | 73.7                            | 18-27A1CAP | 21.00                 | 503.6                           |
| MP3     | 3.40                  | 81.5                            | 18-25D     | 22.60                 | 541.9                           |
| RW019   | 4.50                  | 107.9                           | 18-31A2U   | 22.70                 | 544.3                           |
| 18-10H  | 4.63                  | 110.9                           | 18-21C     | 24.58                 | 589.3                           |
| MP2     | 4.73                  | 113.3                           | 18-17      | 26.73                 | 640.9                           |
| 18-33F  | 5.60                  | 134.3                           | 18-18D     | 31.18                 | 747.6                           |
| 18-16   | 5.83                  | 139.7                           | 18-18A2    | 36.88                 | 884.3                           |
| 1901C   | 6.33                  | 151.7                           | 18-18E     | 54.60                 | 1309.3                          |
| RW022   | 6.45                  | 154.7                           | RW015      | 59.68                 | 1431.0                          |



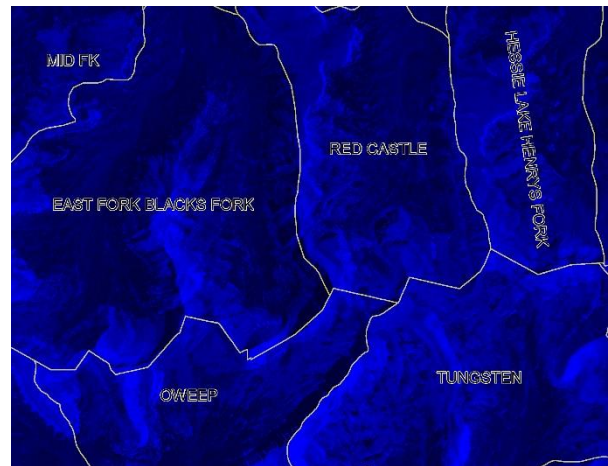
**Figure 1-a NAIP Ortho photo images - composite view**



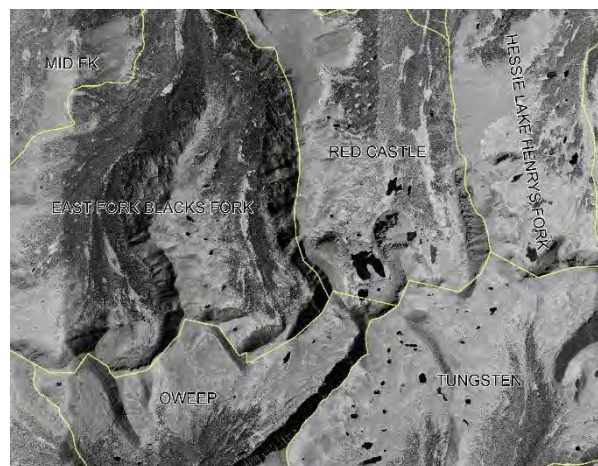
**Figure 1-b NAIP Ortho photo image - red band**



**Figure 1-c NAIP Ortho photo image - green band**



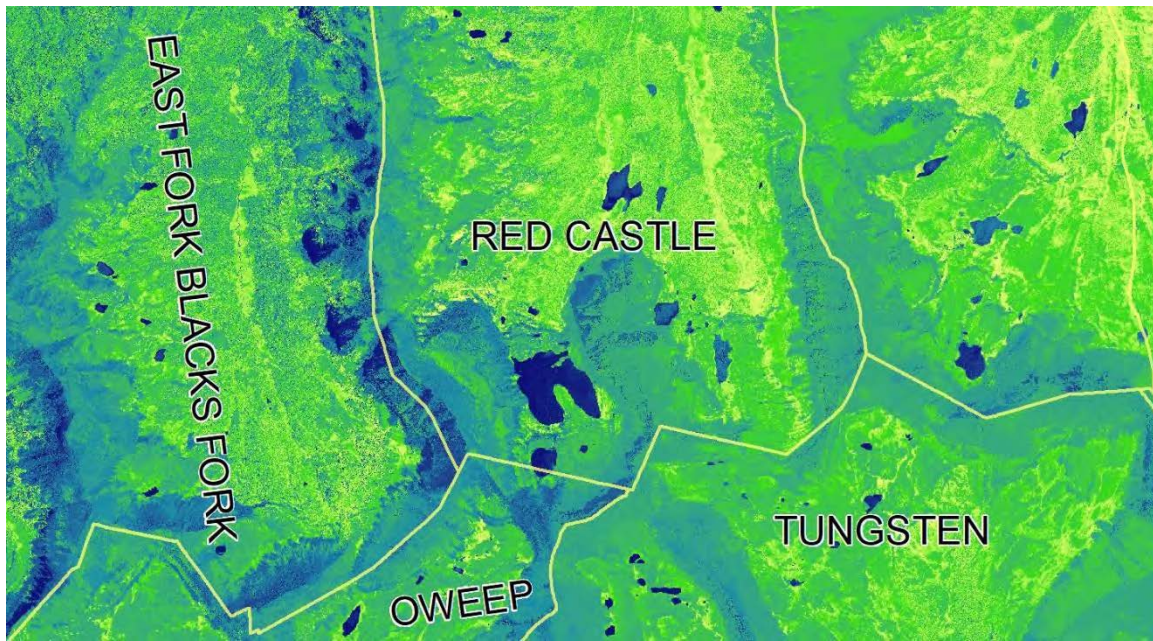
**Figure 1-d NAIP Ortho photo image - blue band**



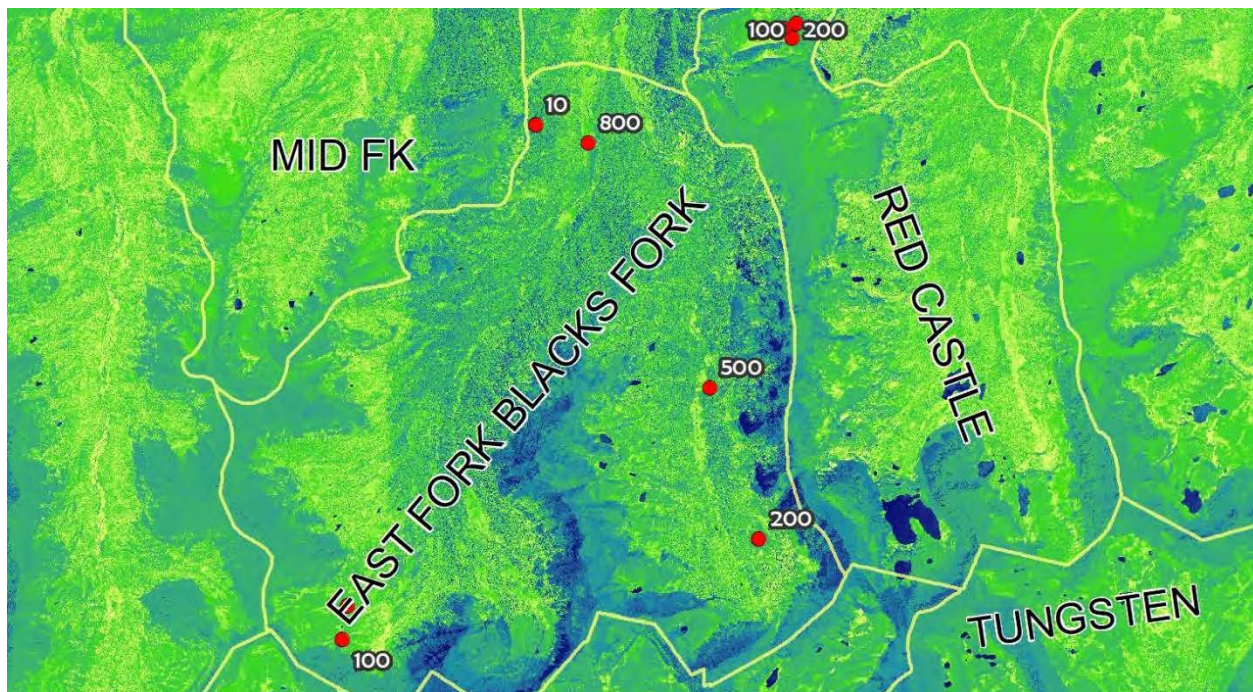
**Figure 1-e NAIP Ortho photo image - infrared band**

**Figure 1. Original ortho photo images from NAIP (2016) presented as composite view and individual optic bands**



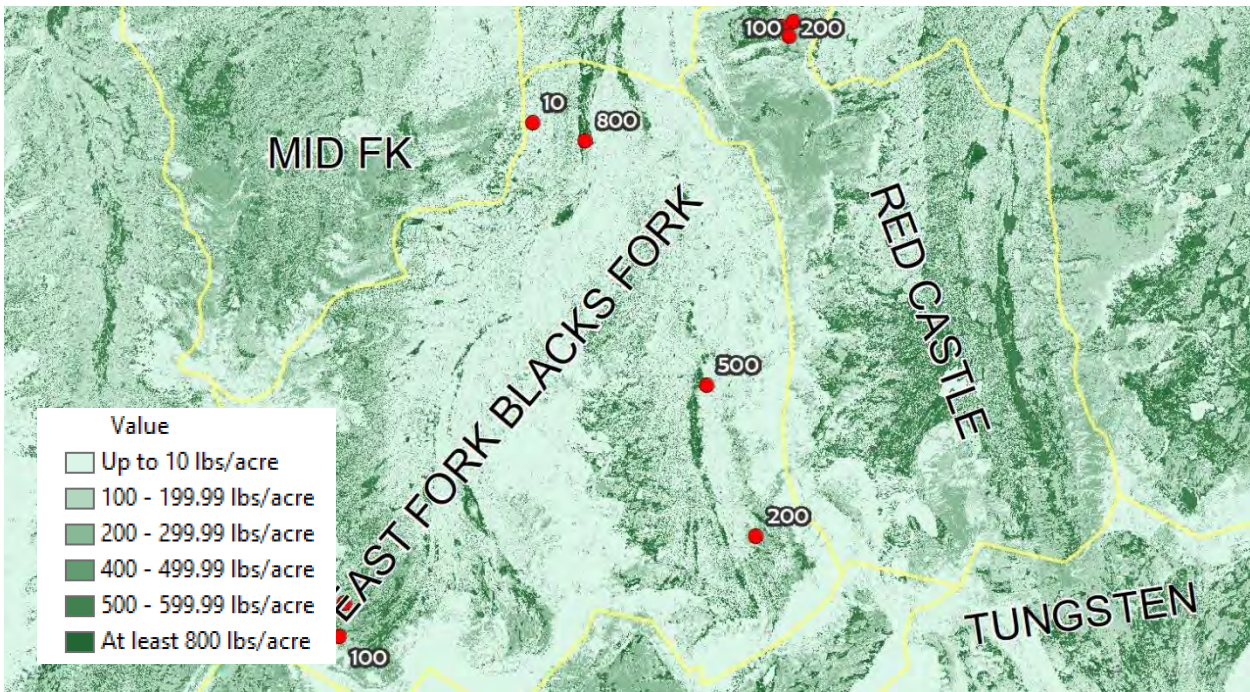


**Figure 2. NDVI raster obtained from image analysis operation by estimation of a ratio between the green and infrared bands in NAIP ortho photo images. (areas shown in blue represent water bodies and areas shown in various shades of green represent vegetation)**



**Figure 3. NDVI raster and forage production values estimated from survey conducted in 2016**





**Figure 4. Predicted forage production raster from image classification of forage production data.**

### **Incorporating USFS Forage Production (1960's data)**

Pre-existing forage production data were acquired from the US Forest Service as a series of digitized paper maps and aerial photos (PDF format) originally collected in the 1960's era. These data were part of a previous study to determine grazing capability in an area of the Uinta Mountains that included both the Uinta-Wasatch Cache and Ashley National Forest. (R4 Range Analysis Handbook).<sup>4</sup> After data acquisition, Wild Utah Project organized and prepared the digitized materials in order to geo-reference each of these materials by using the ArcGIS software. Next, we used the geo-referenced maps and aerial photos to place the geographic features in polygon format. After completion of this process, we used forage production information found in the associated reports to produce a forage production dataset with values expressed in pounds per acre. Figures 5 and 6 illustrate the state (before and after) of the data transformation process. Figure 7 shows the final forage production dataset.

<sup>4</sup> Region 4 U.S. Forest Service. 1964. R4 Range Analysis Handbook.



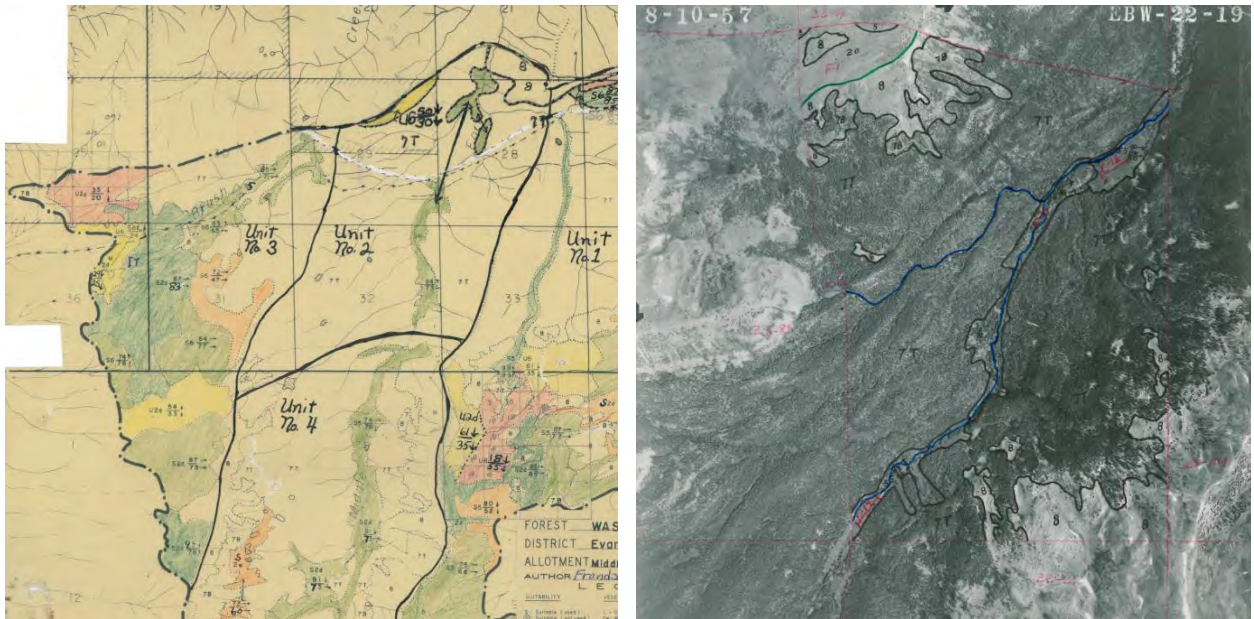


Figure 5. Original digitized paper maps and aerial photos acquired from US Forest Service.

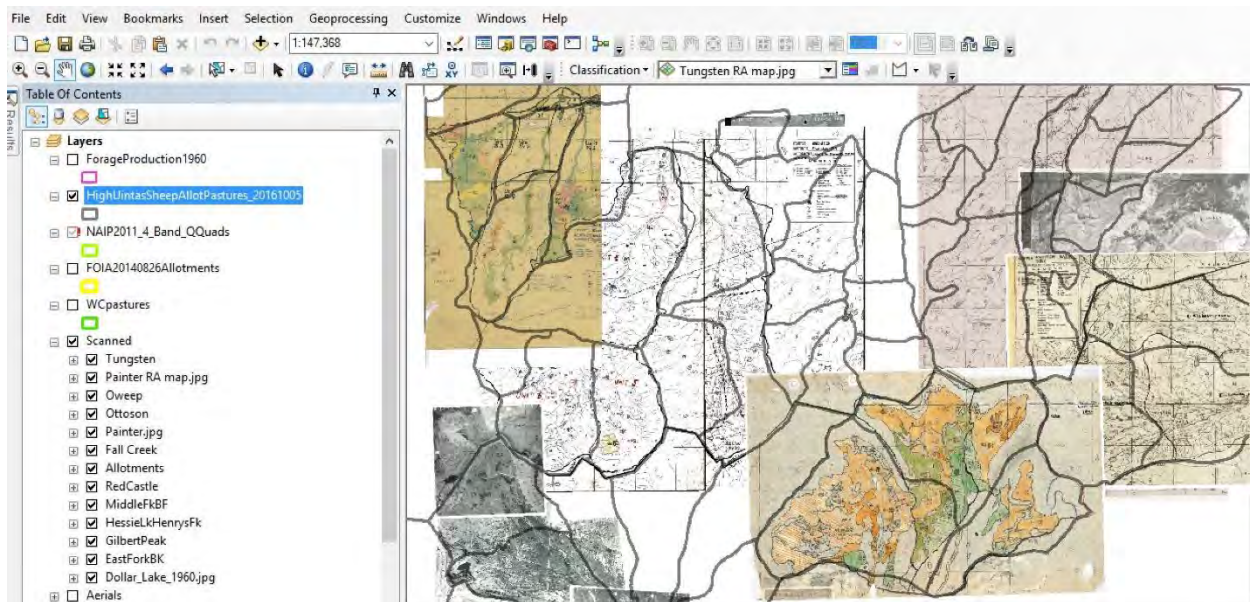
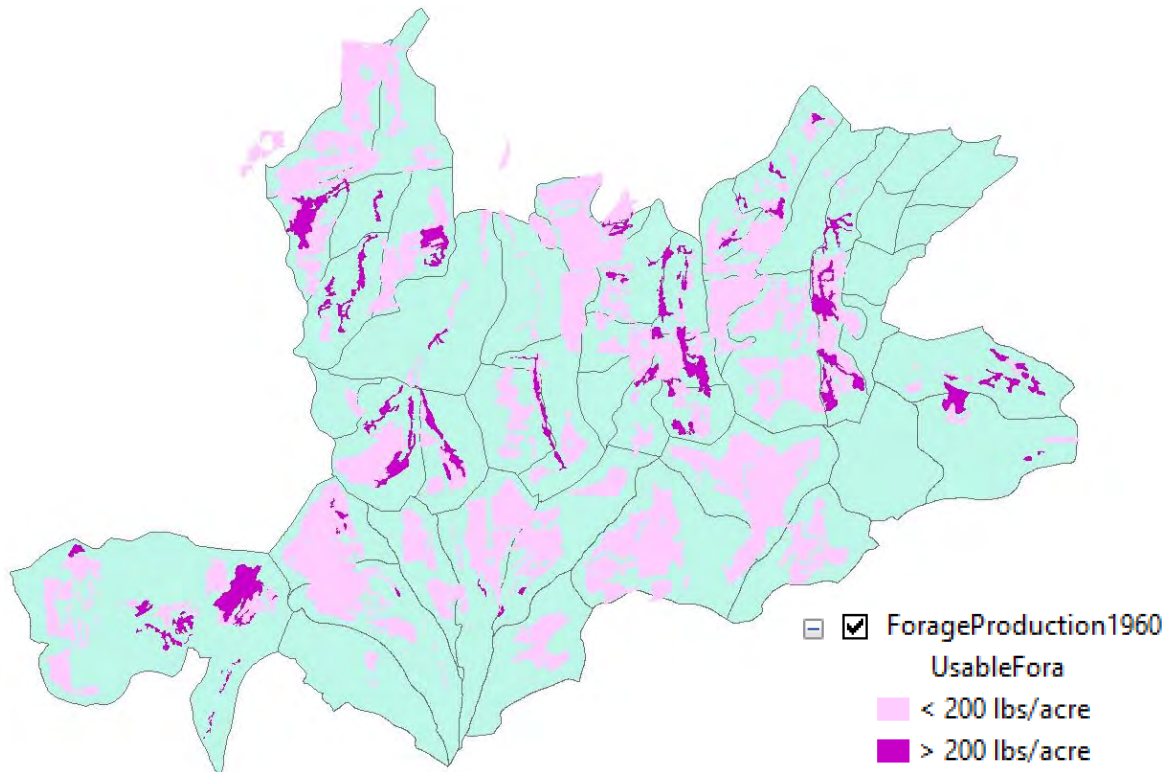


Figure 6. Organized and georeferenced paper maps and aerial photos in ArcGIS.

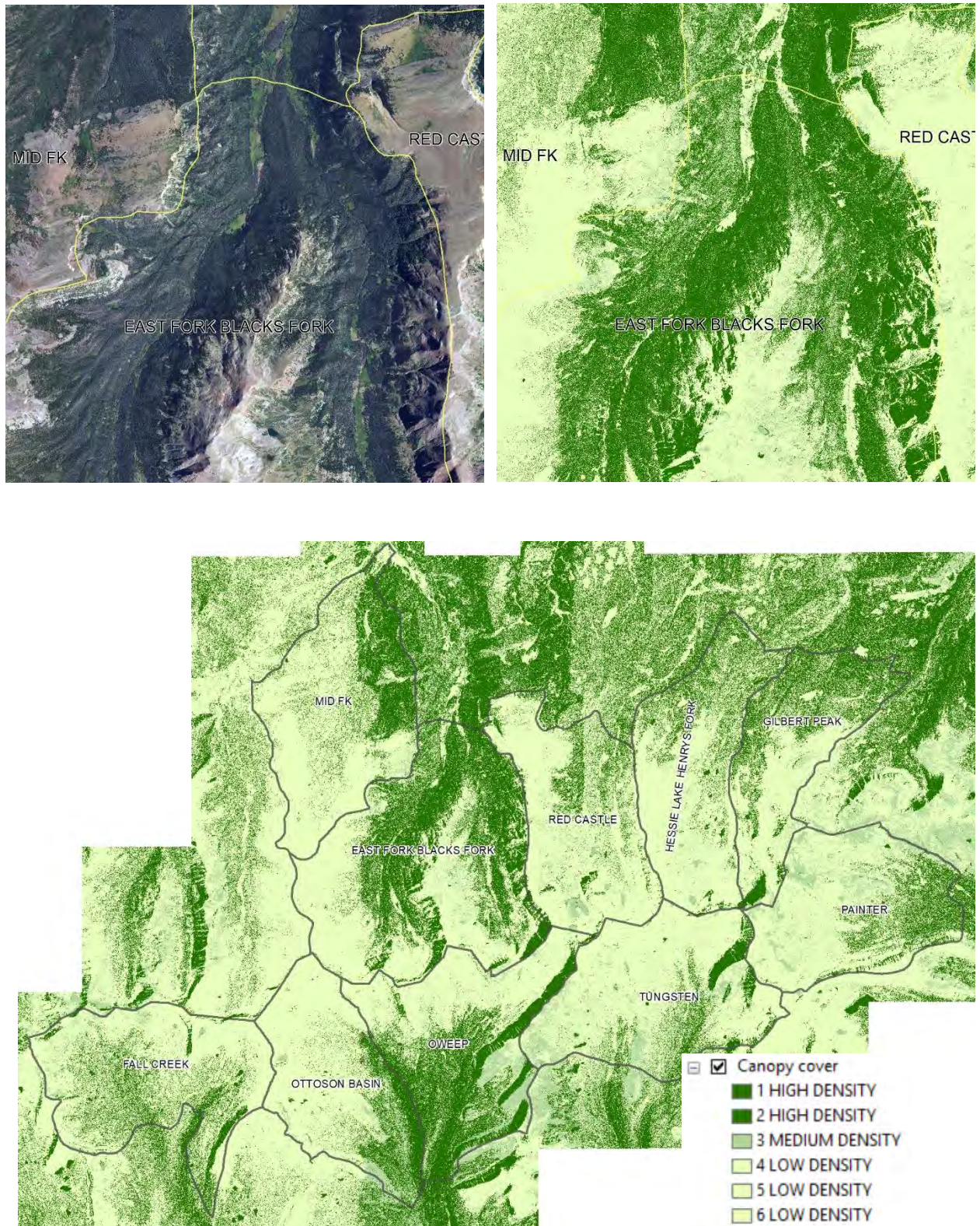


**Figure 7. Final forage production (1960's) dataset obtained from georeferenced paper maps and aerial photos and associated reports overlaid onto grazing allotments and pastures.**

### **Canopy Density Cover**

A canopy cover raster dataset was generated for the purpose of this study. The obtained dataset describes the study area in terms of canopy density levels (i.e. high to low). Canopy density levels were mapped using the values in the NDVI raster dataset and adjusting the raster classification process to target forest canopy density. Inclusion of this dataset in the grazing capability model was essential since areas with dense timber are considered as not capable in Regional Capability Criteria (see below). This was based on sheep generally avoiding grazing in areas of thick conifer cover. In the model, areas with high and medium canopy density are excluded from capable areas since those canopy density categories are associated with areas with dense timber, high number of fallen trees, and areas with restricted access to sheep. Figure 8 below illustrates the data transformation process to obtain the canopy density cover dataset.





**Figure 8. Canopy Density raster dataset using NDVI values from NAIP imagery.**  
(upper panel provides before and after images showing the transformation from NAIP ortho photo images to Canopy Density Raster dataset)



## **Grazing Capability Defined by the USFS**

The grazing capability dataset is comprised of polygon features that describe grazing capability for the grazing allotments in the study area. These data were created by the US Forest Service as required by the Forest Plan Revision process for the 2003 Revised Forest Plan.<sup>5</sup> According to the metadata embedded in the dataset, this data was published in October 2001 and was derived from a previous vegetation dataset by applying the Forest Service capability criteria as described below.

## **Grazing Capability Model**

To determine capable acres for domestic sheep grazing, we developed a model that responds to the criteria provided by US Forest Service Region 4, some of which were not included in the 2003 Forest Plan capability analysis described above:<sup>6</sup>

Regional Criteria for Range Capability:

- Areas with less than 45 percent slope for domestic sheep
- Areas producing more than or having the potential to produce an average of 200 lbs. of forage/acre on an air dry basis over the planning period
- Areas without dense timber, rock, or other physical barriers

Originally the criteria proposed by USFS Region 4 included a criterion for ground cover which states that capable lands have ground cover greater than 60 percent. However, we decided not to include this criterion since we did not have access to a reliable dataset for ground cover. The sheep grazing forage capability model used ArcGIS and the ArcGIS Spatial Analyst toolset as the modeling environment. As the main output, we obtained a dataset in polygon format that described the landscape according to the areas (acres) that are capable of supporting domestic sheep grazing. We generated two separate versions of the model, one removing water bodies (version 1), and one that removed both water bodies and wetlands (version 2). Figure 9 illustrates the steps implemented for the sheep grazing capability model. As part of this effort, we have created a step-by-step guide document that can be provided to USFS GIS staff for them to recreate and run this model.

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<sup>5</sup> USFS. Range Capability, Forest Plan Revision of 2003, Wasatch-Cache National Forest [Shapefile]. Salt Lake City, Utah. Data publish on October 2001.

<sup>6</sup> USDA. 1998. Rangeland Capability and Suitability Determinations for Forest Plan Revisions R-4 Revised 2/20/98.

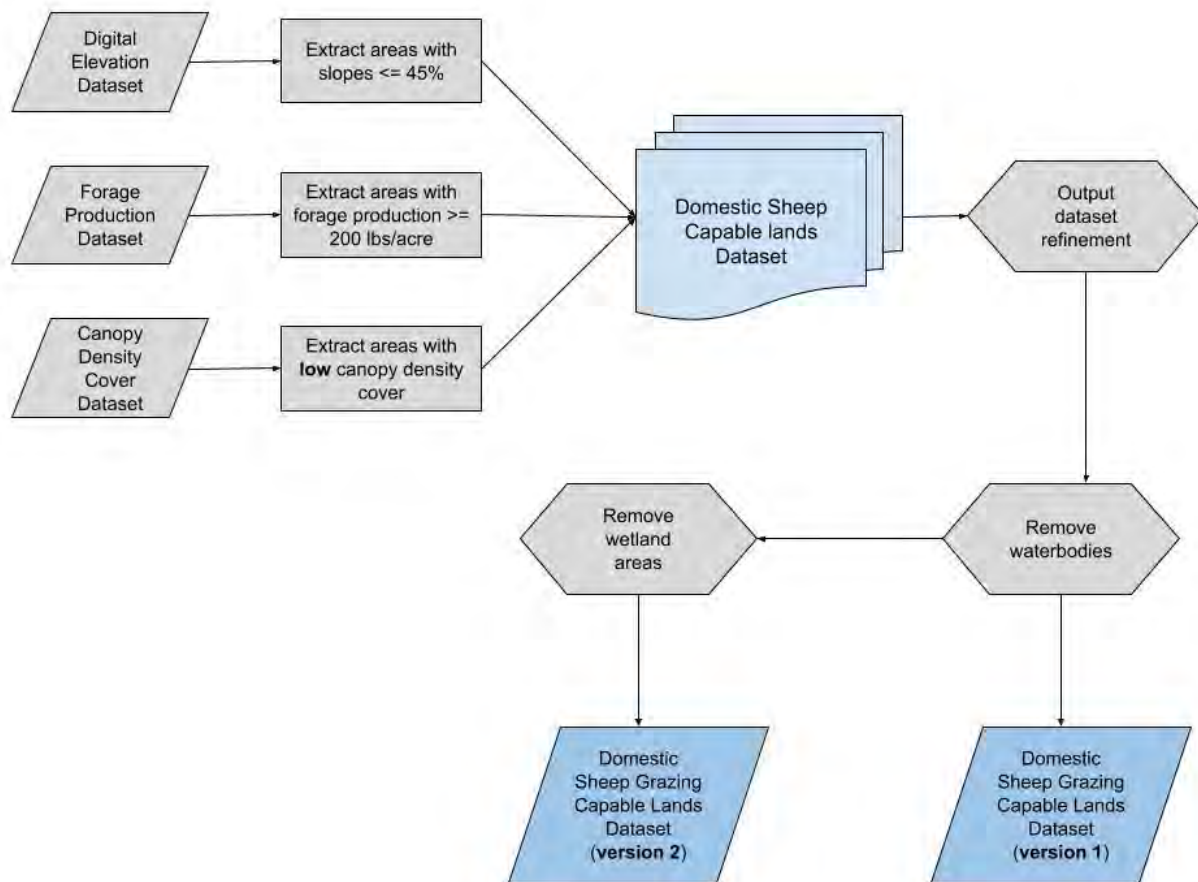


Figure 9 Flowchart of the Domestic Sheep Grazing Capability Model.

## **RESULTS AND DISCUSSION**

### **Current Forage Production and Comparison to 1960's Data**

A detailed presentation of these datasets is provided in Attachment 1 (which is the Power Point presentation presented to the Forest Service in the July 2018 meeting) along with maps for the outputs of capable lands for sheep grazing on the 10 Uintas allotments, under the 2 variations of the 3 alternatives. Attachment 2 is a comparison between the forage production data collected in 2016 and that collected in the 1960's. Briefly, the forage data collected in 2016 included all grasslike plants and forbs without excluding non-forage or undesirable species for sheep grazing. When Lewis (1970) determined forage production, he excluded non-forage species in his capacity estimates.<sup>7</sup> The R4 Range Analysis Handbook, in determining tentative grazing capacity, included Desirable and Intermediate species, and excluded undesirable, or non-forage species. It is unclear whether the 1960's data provided by the Forest Service included non-forage species, so the data were used as provided.

Table 3 summarizes key statistics from each data set.

**Table 3. Key Statistics for Forage Production (lb/acre)**

| <b>Time Period</b> | <b>Median</b> | <b>Mean</b> | <b>Maximum</b> |
|--------------------|---------------|-------------|----------------|
| <b>1960's</b>      | 206           | 240         | 615            |
| <b>2016</b>        | 166           | 294         | 1431           |

The median sample weight was less in 2016 than in the 1960's. Based on the sample medians it appears likely that production is either less today than in the 1960's, or at best has not improved.

### **Capability**

Three alternative scenarios were performed to determine capability. The details of these are presented in Attachment 1. They are as described below.

- Alternative A1 – includes areas with <45% slope, forage production >200 lb/acre (2016 data), and excludes areas of dense timber, rock or physical barriers and water bodies.
- Alternative A2 – is the same as B1 while also excluding wetlands.

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<sup>7</sup> Lewis, Mont E. 1970. Alpine Rangelands of the Uinta Mountains. Ashley and Wasatch National Forests Region 4.

- Alternative B1 – is the same as Alternative A1 except using the forage production data from the 1960's.
- Alternative B2 – is the same as B1 while also excluding wetlands.
- Alternative C1 – Corresponds to a test applied to the Forest Service Grazing Capability dataset against the same criteria used for the previous alternatives
- Alternative C2 – is the same as C1 while also excluding wetlands.

Table 4 summarizes the capable acres determined for the ten allotments.

**Table 4. Capable Acres by Allotment and Alternative Scenario**

| Allotment                                    | A1           | A2          | B1          | B2          | C1           | C2           |
|----------------------------------------------|--------------|-------------|-------------|-------------|--------------|--------------|
| EAST FORK BLACKS FORK                        | 1126         | 613         | 580         | 263         | 2009         | 1486         |
| FALL CREEK                                   | 514          | 319         | 870         | 734         | 4072         | 3652         |
| GILBERT PEAK                                 | 1324         | 846         | 577         | 355         | 3530         | 3057         |
| HESSIE LAKE HENRYS FORK                      | 1905         | 1103        | 180         | 56          | 2560         | 2033         |
| MID FK                                       | 1711         | 1197        | 1009        | 634         | 1826         | 1429         |
| OTTOSON BASIN                                | 1401         | 1099        | 24          | 14          | 4039         | 3580         |
| OWEEP                                        | 1887         | 1346        | 16          | 4           | 4483         | 3798         |
| PAINTER                                      | 1656         | 1186        | 385         | 317         | 4432         | 3875         |
| RED CASTLE                                   | 2167         | 1449        | 855         | 510         | 2546         | 2081         |
| TUNGSTEN                                     | 1031         | 527         | 0           | 0           | 7197         | 6394         |
| <b>Total</b>                                 | <b>14727</b> | <b>9685</b> | <b>4485</b> | <b>2889</b> | <b>36696</b> | <b>31385</b> |
| <b>Percent of Total Area (157,000 acres)</b> | <b>9.3</b>   | <b>6.2</b>  | <b>2.9</b>  | <b>1.8</b>  | <b>23.4</b>  | <b>20.0</b>  |

### Stocking Rate Determination

A forage consumption rate for sheep was provided in the R4 Range Analysis Handbook (Exhibit 71.2-C) showing forage consumption for a 125 lb ewe to be 4.1 lb/day air dry weight while an 80 – 90 lb lamb would consume 2.9 lb/day. These figures represent 3.3% of body weight consumed each day. Since permits allow two lambs per ewe, we used 9.9 lb/day (301 lb/month) as a forage consumption rate for the permitted numbers for each allotment.

According to government statistics, in 2017, the average live weight of sheep and lambs for slaughter was 132 pounds.<sup>8</sup> The average forage consumption rate is 3% of body weight on an air-dry basis.<sup>9</sup> Since three sheep (ewe/lamb pair) can be grazed under these permits, the forage consumption by each permitted pair would be 132 lb x 3 sheep x 3%, or 11.9 lb/day of air dry weight.<sup>10</sup>

<sup>8</sup> USDA. National Agricultural Statistics Service. Livestock Slaughter ISSN: 0499-0544

<sup>9</sup> USDA. 2009. Estimating Initial Stocking Rates. TN Range No. 3. Natural Resources Conservation Service, Boise, Id.

<sup>10</sup> A quick check online for sheep weights found these values: Suffolk (180 – 350 lb) [https://en.wikipedia.org/wiki/Suffolk\\_sheep](https://en.wikipedia.org/wiki/Suffolk_sheep) ; Merino (121 - 176 lb) <https://www.roysfarm.com/merino-sheep/>;



In determining stocking rate, we used the 9.9 lb/day value for forage consumption as it represents the data used by the Forest Service in the 1960's and apparently has not been updated. The additional information is to frame that number with the possibly much higher weights and forage consumption by today's sheep. Thus, our forage consumption rate likely underestimates the actual amount used.

In our comments from April 2016, we relied on Holechek et al (2004) recommended utilization rates.<sup>11</sup> They recommended 20% for alpine ranges grazed during the growing season or in poor condition, while for ranges in good condition and grazed during the dormant season 30% was recommended. In our 2014 comments to the US Forest Service, where we conducted a "back of the envelope" type of forage analysis for the Uintas study area, we chose the mid-point of 25%. In the report, "Alpine Rangelands of the Uinta Mountains", Mont Lewis recommended 30% utilization for all areas except wetlands. He recommended 40% in wetlands, while acknowledging these are not preferred and not suitable and that the drier uplands nearby will be preferred. For this analysis we have used 30% even though our past work has shown these alpine areas to be in poor condition with uplands depleted in ground cover, gully erosion, bank scouring and heavy grazing in non-capable areas such as steep slopes, and clearly in poor condition. (Carter 2007).

We have used the mean production rate determined by our data (294 lb/acre) to determine a stocking rate. This is conservative considering the wetland samples that were included in these samples. We then applied this and the forage consumption rate (301 lb/month) for a ewe and two lambs to the capable acres for each of the six alternative scenarios to arrive at the length of time the capable acres and current forage can support the permitted numbers. The results are presented in Tables 5 – 7 and the Figures in attachment 1.

Currently sheep are permitted to graze for approximately 2 months with the exception of the Fall Creek allotment which, according to the 2014 scoping notice is three months. In Alternative scenario A, using the 2016 forage production data, the months current forage can support the permitted numbers would be 0.08 -0.49 months depending upon the allotment. In Alternative scenario B, using the 1960's forage production data, the forage would support the permitted numbers for 0 – 0.25 months, depending upon the allotment. In Alternative scenario C, using the Forest Service capability map without accounting for current forage production (2016 data), the permitted numbers would be supported for 0.32 – 1.76 months depending upon the allotment. The Forest Service

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Rambouillet (200 lb) [https://en.wikipedia.org/wiki/Rambouillet\\_sheep](https://en.wikipedia.org/wiki/Rambouillet_sheep) Note that rams can be 50% larger such as in the Rambouillet where they can weigh 300 lbs. According to the same Wikipedia citation, 50% of the sheep on western ranges are Rambouillet.

<sup>11</sup> JL Holechek, RD Pieper, CH Herbel. 2004. Range Management Principles and Practices, Table 8.8.

capability dataset did not include forage production data, therefore we conclude the outcome with forage production data would be similar to Alternative scenario A. While the Forest Service will argue the land must only have the “potential” to produce 200 lb/acre to be capable, clearly based on our analysis large areas of these allotments which are grazed and trailed have not produced this minimal criterion since the 1960’s and do not have the potential to produce this amount in the presence of domestic sheep grazing.

## **CONCLUSION AND RECOMMENDATIONS**

The analysis we have conducted for the Uinta Wasatch Cache and Ashley National Forests’ High Uintas Domestic Sheep Analysis indicates that only a small fraction of these allotments are capable for domestic sheep grazing. Even under the most optimistic scenario only about a quarter of the lands of these High Uintas Wilderness allotments are capable of supporting domestic sheep grazing. This is with a conservative forage capability model and stocking rate analysis that included forage samples collected in wetland areas along with predicted weights of sheep that are likely lighter than most sheep today. Our analysis was further conservative in the utilization rate used in all alternatives of the model.

The capable acres identified in our forage capability model for this mountain range are scattered, small areas disconnected from each other to a large extent and require sheep to be trailed between them. Historically, nearly every acre sheep can access has been grazed across the Uinta mountains, regardless of slope, ground cover and vegetation condition, which has caused great damage. Previous monitoring we have conducted (Carter 2007) has identified large-scale erosion is occurring in the Uintas due to this practice of trailing and grazing in non-capable areas. Based on our analysis presented above, we conclude that 80 - 98 % of the land under consideration for re-authorization is not capable and hence not able to sustain the proposed 40,000 ewes and lambs for the proposed time.

We therefore recommend that in the Draft Environmental Impact Statement for domestic sheep permit reauthorization in the high Uintas, the Forest Service includes an alternative that analyzes the reduction of stocking rates, and either conducts their own forage capability analysis, or refers to the one provided to them herein, in this analysis.

**Table 5. Stocking Rate Determination for Alternative A**

| <b>Allotment</b>        | <b>Capable Acres</b> | <b>Avg Forage Production 2016 lb/acre</b> | <b>Total Forage Production lb/acre</b> | <b>Available Forage at 30% Use</b> | <b>Forage Consumption Ewe + 2 lambs as Permitted lb/month</b> | <b>Permitted Ewe/Lamb pairs</b> | <b>Months in Allotment for Permitted Numbers</b> |
|-------------------------|----------------------|-------------------------------------------|----------------------------------------|------------------------------------|---------------------------------------------------------------|---------------------------------|--------------------------------------------------|
| <b>Alternative A1</b>   |                      |                                           |                                        |                                    |                                                               |                                 |                                                  |
| Grand Total             | 14727                |                                           |                                        |                                    |                                                               |                                 |                                                  |
| EAST FORK BLACKS FORK   | 1126                 | 294                                       | 331044                                 | 99313                              | 301                                                           | 1350                            | 0.24                                             |
| FALL CREEK              | 514                  | 294                                       | 151116                                 | 45335                              | 301                                                           | 1100                            | 0.14                                             |
| GILBERT PEAK            | 1324                 | 294                                       | 389256                                 | 116777                             | 301                                                           | 1400                            | 0.28                                             |
| HESSIE LAKE HENRYS FORK | 1905                 | 294                                       | 560070                                 | 168021                             | 301                                                           | 1400                            | 0.40                                             |
| MID FK                  | 1711                 | 294                                       | 503034                                 | 150910                             | 301                                                           | 1200                            | 0.42                                             |
| OTTOSON BASIN           | 1401                 | 294                                       | 411894                                 | 123568                             | 301                                                           | 1300                            | 0.32                                             |
| OWEEP                   | 1887                 | 294                                       | 554778                                 | 166433                             | 301                                                           | 1400                            | 0.39                                             |
| PAINTER                 | 1656                 | 294                                       | 486864                                 | 146059                             | 301                                                           | 1200                            | 0.40                                             |
| RED CASTLE              | 2167                 | 294                                       | 637098                                 | 191129                             | 301                                                           | 1300                            | 0.49                                             |
| TUNGSTEN                | 1031                 | 294                                       | 303114                                 | 90934                              | 301                                                           | 1200                            | 0.25                                             |
| <b>Alternative A2</b>   |                      |                                           |                                        |                                    |                                                               |                                 |                                                  |
| Grand Total             | 9685                 |                                           |                                        |                                    |                                                               |                                 |                                                  |
| EAST FORK BLACKS FORK   | 613                  | 294                                       | 180222                                 | 54066.6                            | 301                                                           | 1350                            | 0.13                                             |
| FALL CREEK              | 319                  | 294                                       | 93786                                  | 28135.8                            | 301                                                           | 1100                            | 0.08                                             |
| GILBERT PEAK            | 846                  | 294                                       | 248724                                 | 74617.2                            | 301                                                           | 1400                            | 0.18                                             |
| HESSIE LAKE HENRYS FORK | 1103                 | 294                                       | 324282                                 | 97284.6                            | 301                                                           | 1400                            | 0.23                                             |
| MID FK                  | 1197                 | 294                                       | 351918                                 | 105575.4                           | 301                                                           | 1200                            | 0.29                                             |
| OTTOSON BASIN           | 1099                 | 294                                       | 323106                                 | 96931.8                            | 301                                                           | 1300                            | 0.25                                             |
| OWEEP                   | 1346                 | 294                                       | 395724                                 | 118717.2                           | 301                                                           | 1400                            | 0.28                                             |
| PAINTER                 | 1186                 | 294                                       | 348684                                 | 104605.2                           | 301                                                           | 1200                            | 0.29                                             |
| RED CASTLE              | 1449                 | 294                                       | 426006                                 | 127801.8                           | 301                                                           | 1300                            | 0.33                                             |
| TUNGSTEN                | 527                  | 294                                       | 154938                                 | 46481.4                            | 301                                                           | 1200                            | 0.13                                             |

Table 6. Stocking Rate Determination for Alternative B

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative B1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 4485          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 580           | 294                                | 170520                          | 51156                       | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 870           | 294                                | 255780                          | 76734                       | 301                                                    | 1100                     | 0.23                                      |
| GILBERT PEAK            | 577           | 294                                | 169638                          | 50891.4                     | 301                                                    | 1400                     | 0.12                                      |
| HESSIE LAKE HENRYS FORK | 180           | 294                                | 52920                           | 15876                       | 301                                                    | 1400                     | 0.04                                      |
| MID FK                  | 1009          | 294                                | 296646                          | 88993.8                     | 301                                                    | 1200                     | 0.25                                      |
| OTTOSON BASIN           | 24            | 294                                | 7056                            | 2116.8                      | 301                                                    | 1300                     | 0.01                                      |
| OWEEP                   | 16            | 294                                | 4704                            | 1411.2                      | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 385           | 294                                | 113190                          | 33957                       | 301                                                    | 1200                     | 0.09                                      |
| RED CASTLE              | 855           | 294                                | 251370                          | 75411                       | 301                                                    | 1300                     | 0.19                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |
| Alternative B2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 2889          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 263           | 294                                | 77322                           | 23196.6                     | 301                                                    | 1350                     | 0.06                                      |
| FALL CREEK              | 734           | 294                                | 215796                          | 64738.8                     | 301                                                    | 1100                     | 0.20                                      |
| GILBERT PEAK            | 355           | 294                                | 104370                          | 31311                       | 301                                                    | 1400                     | 0.07                                      |
| HESSIE LAKE HENRYS FORK | 56            | 294                                | 16464                           | 4939.2                      | 301                                                    | 1400                     | 0.01                                      |
| MID FK                  | 634           | 294                                | 186396                          | 55918.8                     | 301                                                    | 1200                     | 0.15                                      |
| OTTOSON BASIN           | 14            | 294                                | 4116                            | 1234.8                      | 301                                                    | 1300                     | 0.00                                      |
| OWEEP                   | 4             | 294                                | 1176                            | 352.8                       | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 317           | 294                                | 93198                           | 27959.4                     | 301                                                    | 1200                     | 0.08                                      |
| RED CASTLE              | 510           | 294                                | 149940                          | 44982                       | 301                                                    | 1300                     | 0.11                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |



Table 7. Stocking Rate Determination for Alternative C

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative C1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 36696         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 2009          | 294                                | 590646                          | 177193.8                    | 301                                                    | 1350                     | 0.44                                      |
| FALL CREEK              | 4072          | 294                                | 1197168                         | 359150.4                    | 301                                                    | 1100                     | 1.08                                      |
| GILBERT PEAK            | 3530          | 294                                | 1037820                         | 311346                      | 301                                                    | 1400                     | 0.74                                      |
| HESSIE LAKE HENRYS FORK | 2560          | 294                                | 752640                          | 225792                      | 301                                                    | 1400                     | 0.54                                      |
| MID FK                  | 1826          | 294                                | 536844                          | 161053.2                    | 301                                                    | 1200                     | 0.45                                      |
| OTTOSON BASIN           | 4039          | 294                                | 1187466                         | 356239.8                    | 301                                                    | 1300                     | 0.91                                      |
| OWEEP                   | 4483          | 294                                | 1318002                         | 395400.6                    | 301                                                    | 1400                     | 0.94                                      |
| PAINTER                 | 4432          | 294                                | 1303008                         | 390902.4                    | 301                                                    | 1200                     | 1.08                                      |
| RED CASTLE              | 2546          | 294                                | 748524                          | 224557.2                    | 301                                                    | 1300                     | 0.57                                      |
| TUNGSTEN                | 7197          | 294                                | 2115918                         | 634775.4                    | 301                                                    | 1200                     | 1.76                                      |
|                         |               |                                    |                                 |                             |                                                        |                          |                                           |
| Alternative C2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 31385         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1486          | 294                                | 436888                          | 131066                      | 301                                                    | 1350                     | 0.32                                      |
| FALL CREEK              | 3652          | 294                                | 1073699                         | 322110                      | 301                                                    | 1100                     | 0.97                                      |
| GILBERT PEAK            | 3057          | 294                                | 898662                          | 269599                      | 301                                                    | 1400                     | 0.64                                      |
| HESSIE LAKE HENRYS FORK | 2033          | 294                                | 597785                          | 179336                      | 301                                                    | 1400                     | 0.43                                      |
| MID FK                  | 1429          | 294                                | 420139                          | 126042                      | 301                                                    | 1200                     | 0.35                                      |
| OTTOSON BASIN           | 3580          | 294                                | 1052570                         | 315771                      | 301                                                    | 1300                     | 0.81                                      |
| OWEEP                   | 3798          | 294                                | 1116567                         | 334970                      | 301                                                    | 1400                     | 0.79                                      |
| PAINTER                 | 3875          | 294                                | 1139263                         | 341779                      | 301                                                    | 1200                     | 0.95                                      |
| RED CASTLE              | 2081          | 294                                | 611671                          | 183501                      | 301                                                    | 1300                     | 0.47                                      |
| TUNGSTEN                | 6394          | 294                                | 1879799                         | 563940                      | 301                                                    | 1200                     | 1.56                                      |

## **ATTACHMENT 1**

# Uinta Sheep Capability and Stocking Rates

**Emanuel Vasquez, Wild Utah Project**

**John Carter, Yellowstone to Uintas Connection**

**July 2018**

## Some Examples of Conditions





**Alpine Ground Cover (Red Knob Pass) at 12,300'**





**Looking into East Fork Black's  
Fork from Red Knob – Sheep  
Graze These Slopes up to  
12,000' and more**



**Upper Lake Fork Grazed by Sheep Trailed thru WFBF/EFBF? across Red Knob Pass**





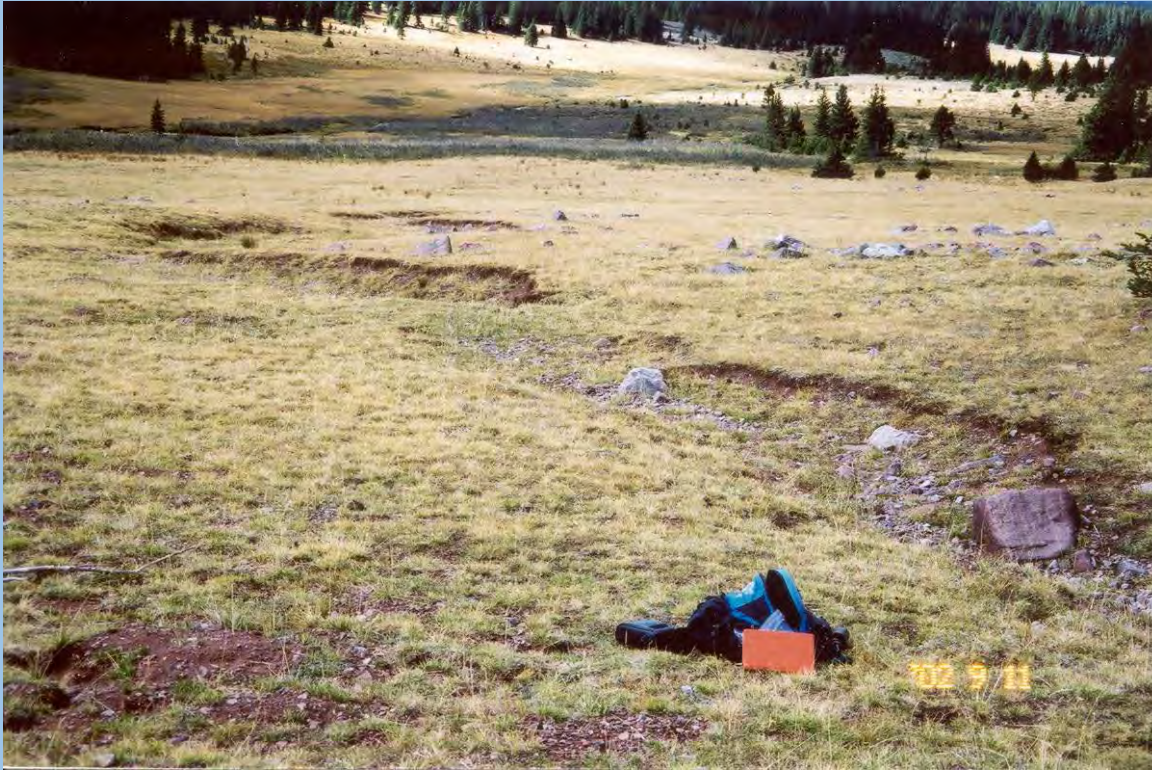
**East Fork Black's Fork – Steep Slopes Grazed**





**EFBF Upper Basin – note barren uplands, braided stream channel**





**East Fork Black's Fork - Active Headcuts**





**Middle Fork Beaver Creek Ungrazed - Healing Headcuts**





**Scouring, sediment in East Fork Black's Fork**





**EFBF Upper Basin – note barren upland slopes, stream bank damage**





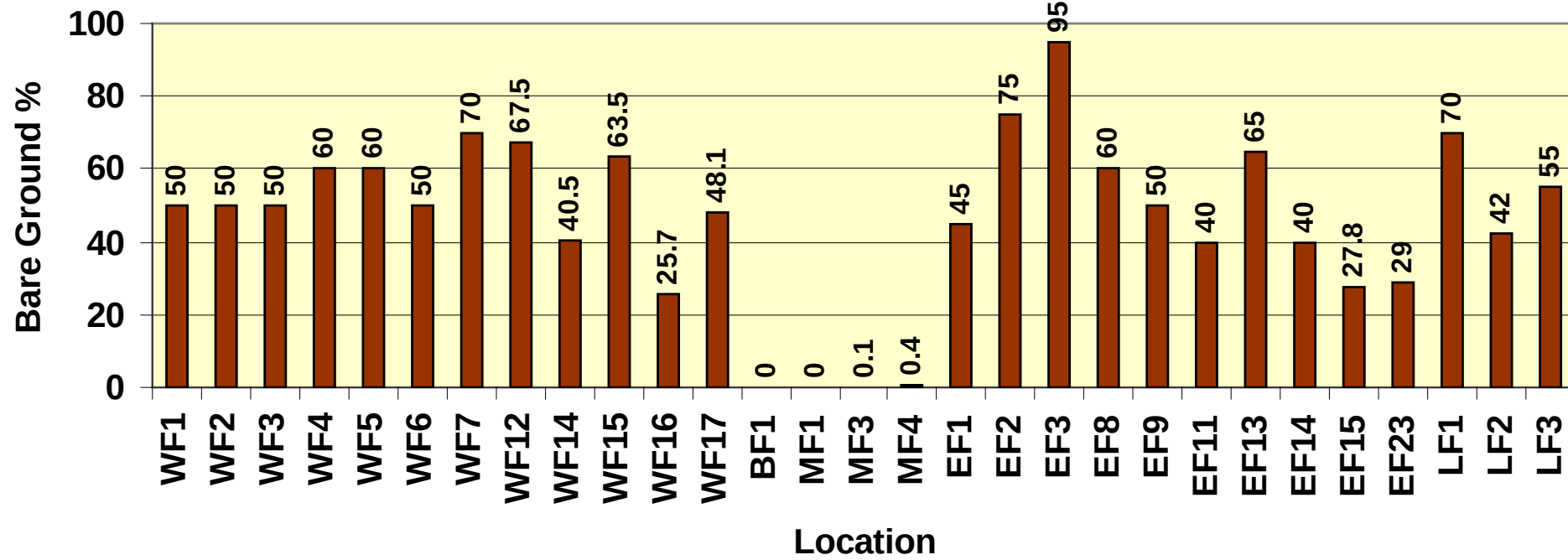
**WFBF – Lake EJOD rapidly filling with sediment from eroding uplands.. Note deltas of sediment coming off grazed uplands..Mont Lewis described this effect in 1970 report.**





**Small Stream in WFBF on left, similar stream on right in closed watershed...**

## Bare Ground % at Transects and Ocular Photopoints Uinta Wilderness



# Mont Lewis 1970

- **Graze on slopes <20%**
- **Utilization 30%**
- **Bare ground <30%**
- **Wetlands not preferred**
- **Scattered suitable areas a problem**



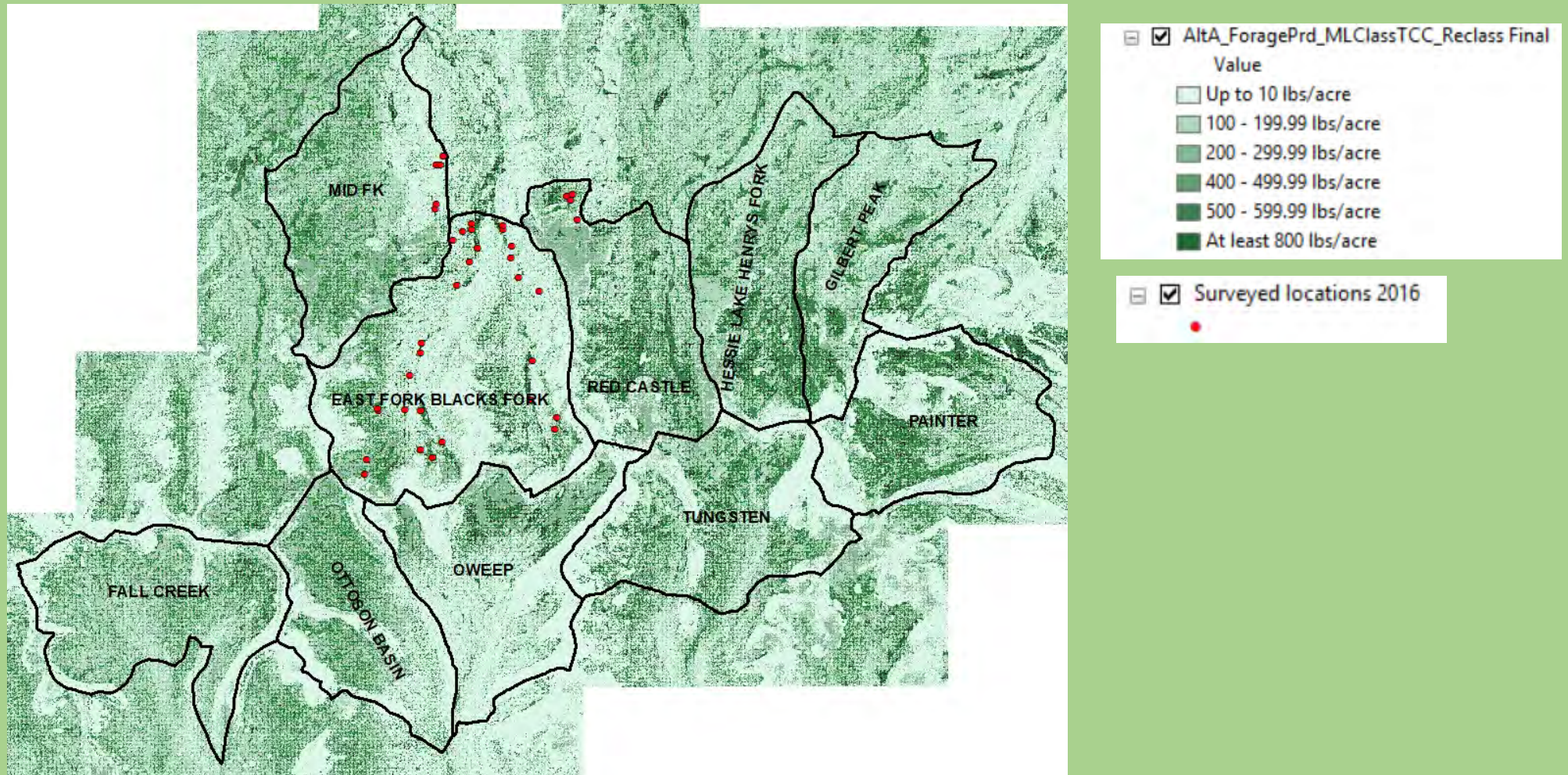
# Stocking Rate Factors

- Ewe/lambs forage consumption 9.9 lb/day or 301 lb/month (based on 125 lb ewe, 80 – 90 lb lambs 1964 R4 Range Analysis Hbk). Note Rambouillet ewes 200 lbs, rams 300. Current USDA weights 132 at slaughter.
- Utilization Rate 30% (Holechek et al recommend 20% during growing season or poor condition, while Lewis recommended 30%).
- Average forage production 294 lb/capable acre (included wetland samples. Would be 211 lb without. 1960's data average 240 lb/acre.

# Alternative A

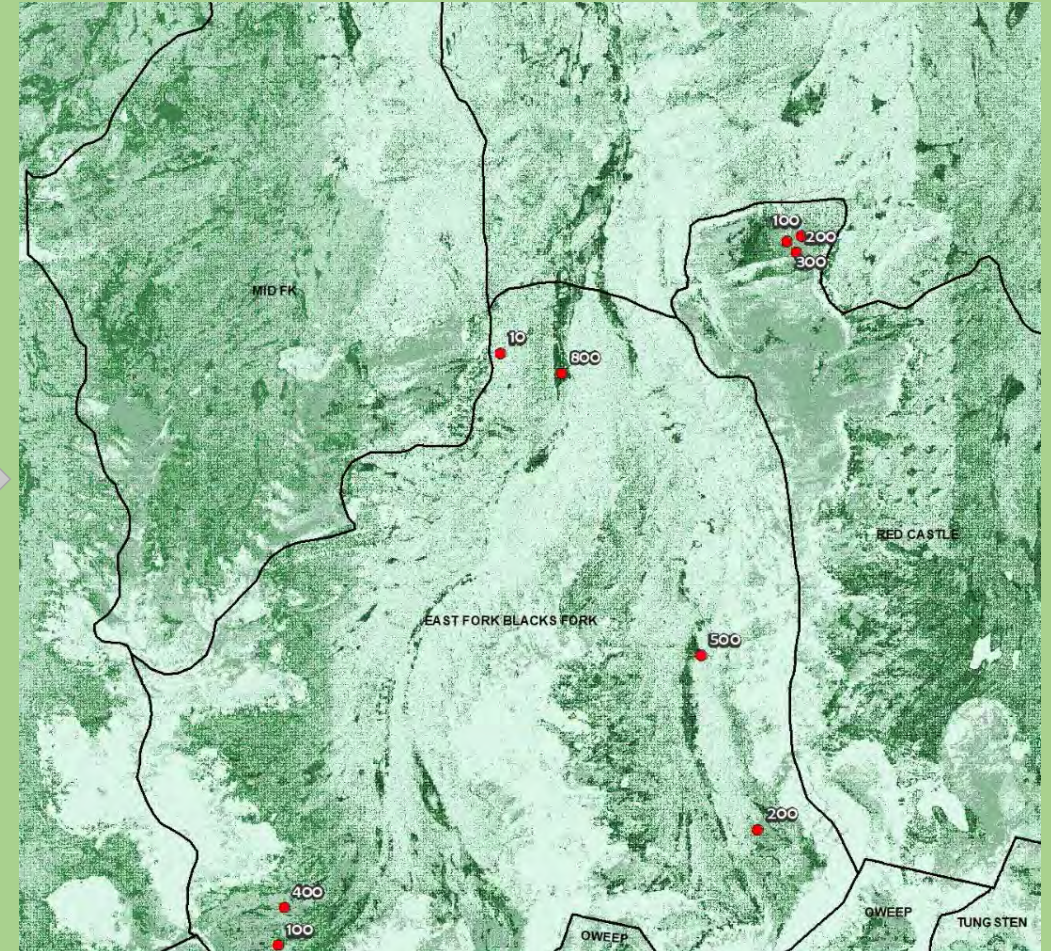
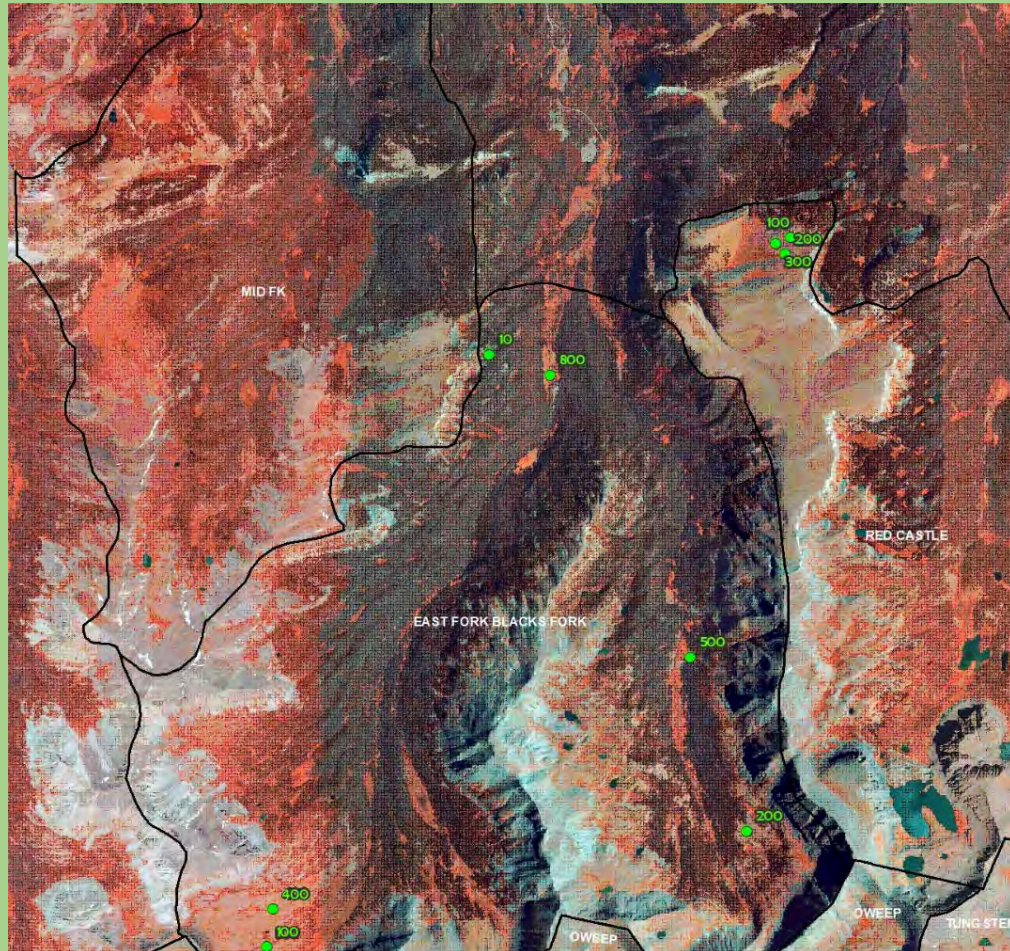
- **Alternative A:** In this alternative, grazing capability is estimated by using a forage production model developed by Wild Utah Project that integrates data collected in 2016 with NAIP-based aerial imagery and an evaluation of USFS grazing capability criteria.
- **Grazing Capability Criteria:**
  - Areas capable of grazing are:
    - < 45 % slope
    - Have a minimum forage production of 200 lbs/acre
    - Areas without dense timber, rock, or other physical barriers
    - Ground cover greater than 60%

# Extent and distribution of forage production model developed by Wild Utah Project



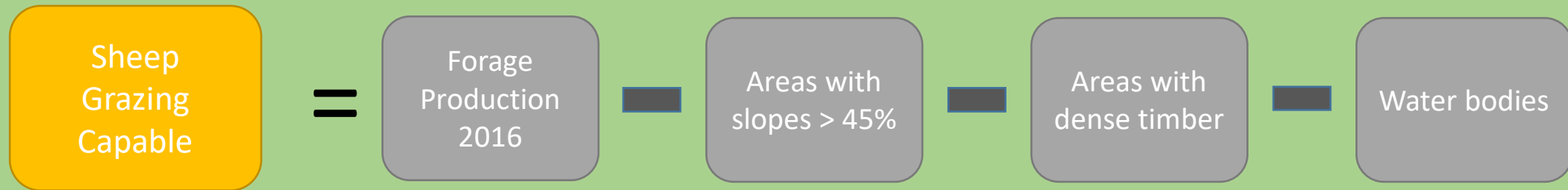


# Forage production derived from aerial imagery and collected data in the field

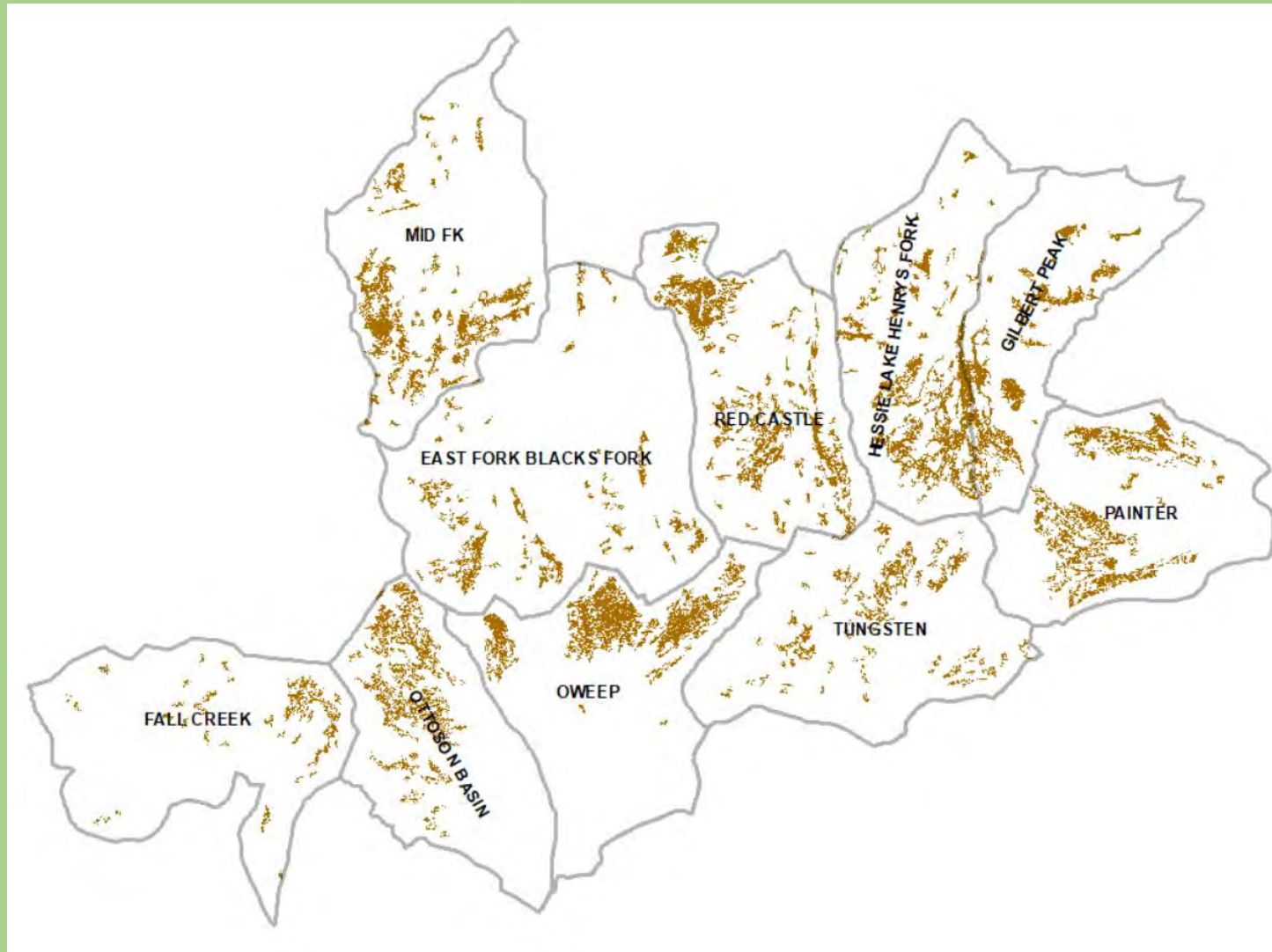




# Alternative A.1: Grazing capability GIS model

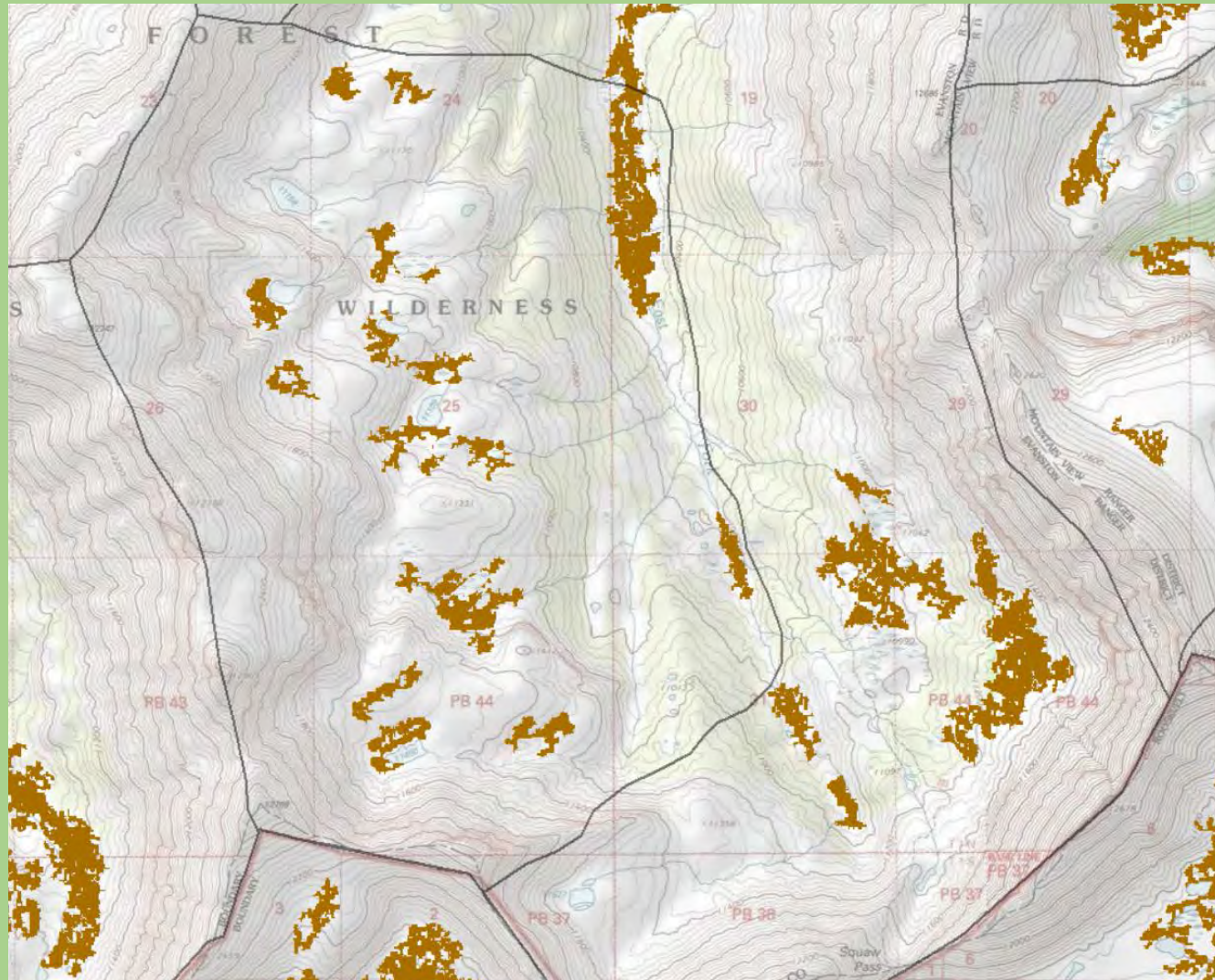


# GIS Results: Alternative A.1



Total acres in Alternative  
A.1 = **14,727**

# GIS Results: Alternative A.1 (close-up)





# GIS Results: Alternative A.1

## Grazing capable acres

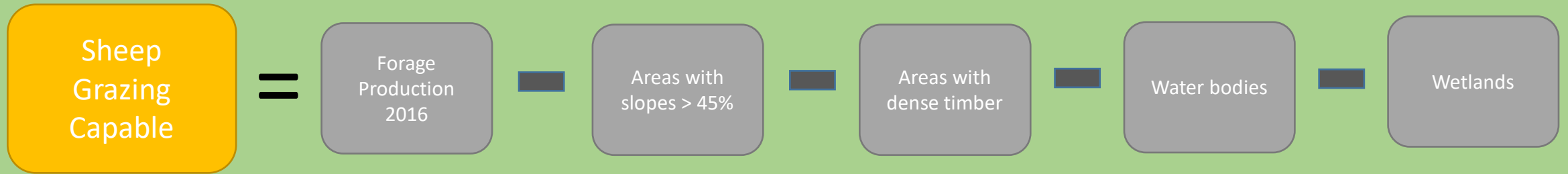
| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 1126.77          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 1324.44          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1905.74          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1711.09          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2167.79          |
| FALL CREEK              | Ashley National Forest              | 513.97           |
| OTTOSON BASIN           | Ashley National Forest              | 1401.96          |
| OWEEP                   | Ashley National Forest              | 1887.58          |
| PAINTER                 | Ashley National Forest              | 1656.45          |
| TUNGSTEN                | Ashley National Forest              | 1031.32          |
|                         | <b>TOTAL ACRES</b>                  | <b>14,727.13</b> |

# GIS Results: Alternative A.1

## Grazing stocking rates

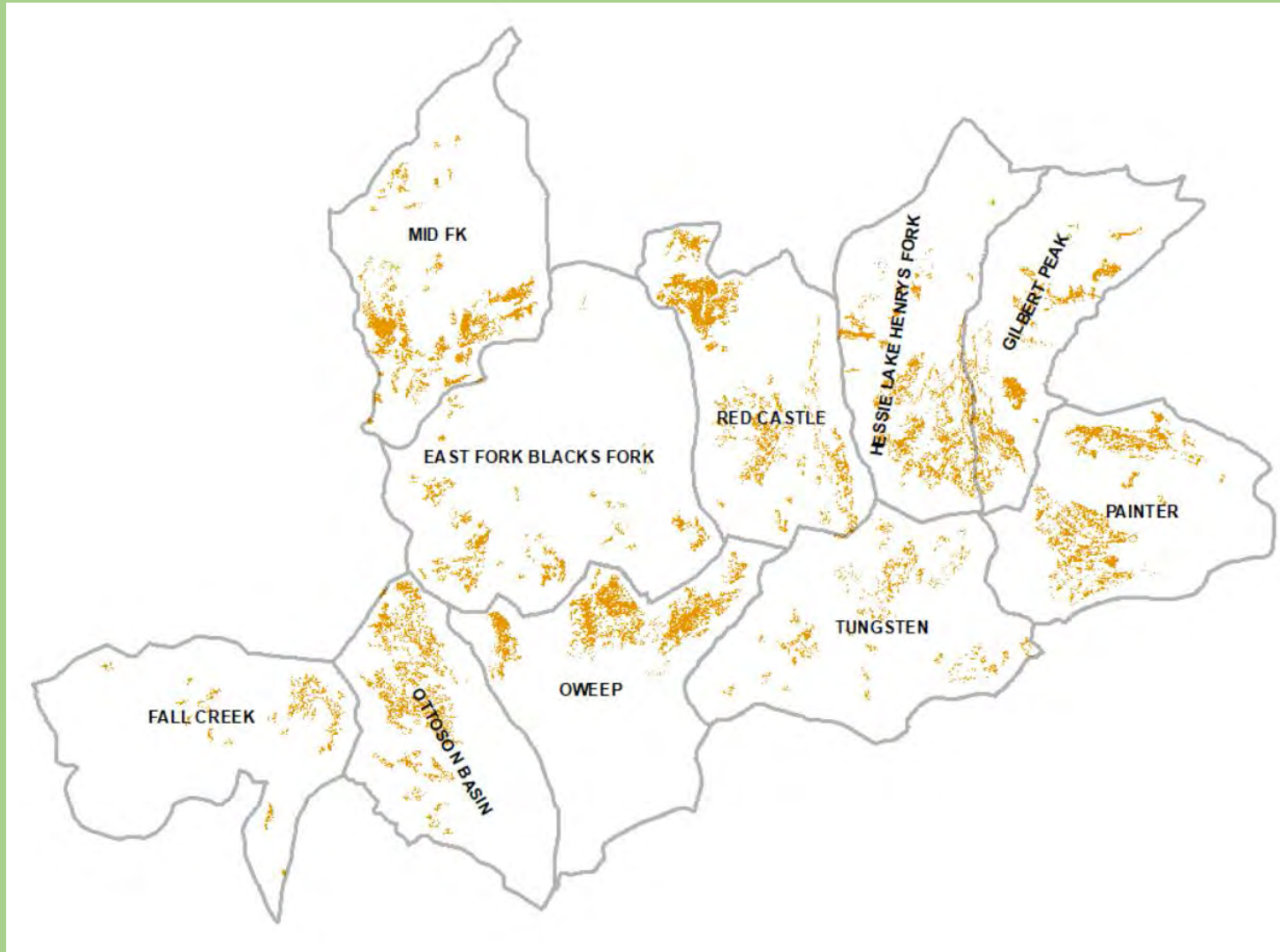
| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 14727         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1126          | 294                                | 331044                          | 99313                       | 301                                                    | 1350                     | 0.24                                      |
| FALL CREEK              | 514           | 294                                | 151116                          | 45335                       | 301                                                    | 1100                     | 0.14                                      |
| GILBERT PEAK            | 1324          | 294                                | 389256                          | 116777                      | 301                                                    | 1400                     | 0.28                                      |
| HESSIE LAKE HENRYS FORK | 1905          | 294                                | 560070                          | 168021                      | 301                                                    | 1400                     | 0.40                                      |
| MID FK                  | 1711          | 294                                | 503034                          | 150910                      | 301                                                    | 1200                     | 0.42                                      |
| OTTOSON BASIN           | 1401          | 294                                | 411894                          | 123568                      | 301                                                    | 1300                     | 0.32                                      |
| OWEED                   | 1887          | 294                                | 554778                          | 166433                      | 301                                                    | 1400                     | 0.39                                      |
| PAINTER                 | 1656          | 294                                | 486864                          | 146059                      | 301                                                    | 1200                     | 0.40                                      |
| RED CASTLE              | 2167          | 294                                | 637098                          | 191129                      | 301                                                    | 1300                     | 0.49                                      |
| TUNGSTEN                | 1031          | 294                                | 303114                          | 90934                       | 301                                                    | 1200                     | 0.25                                      |

# Alternative A.2: GIS model



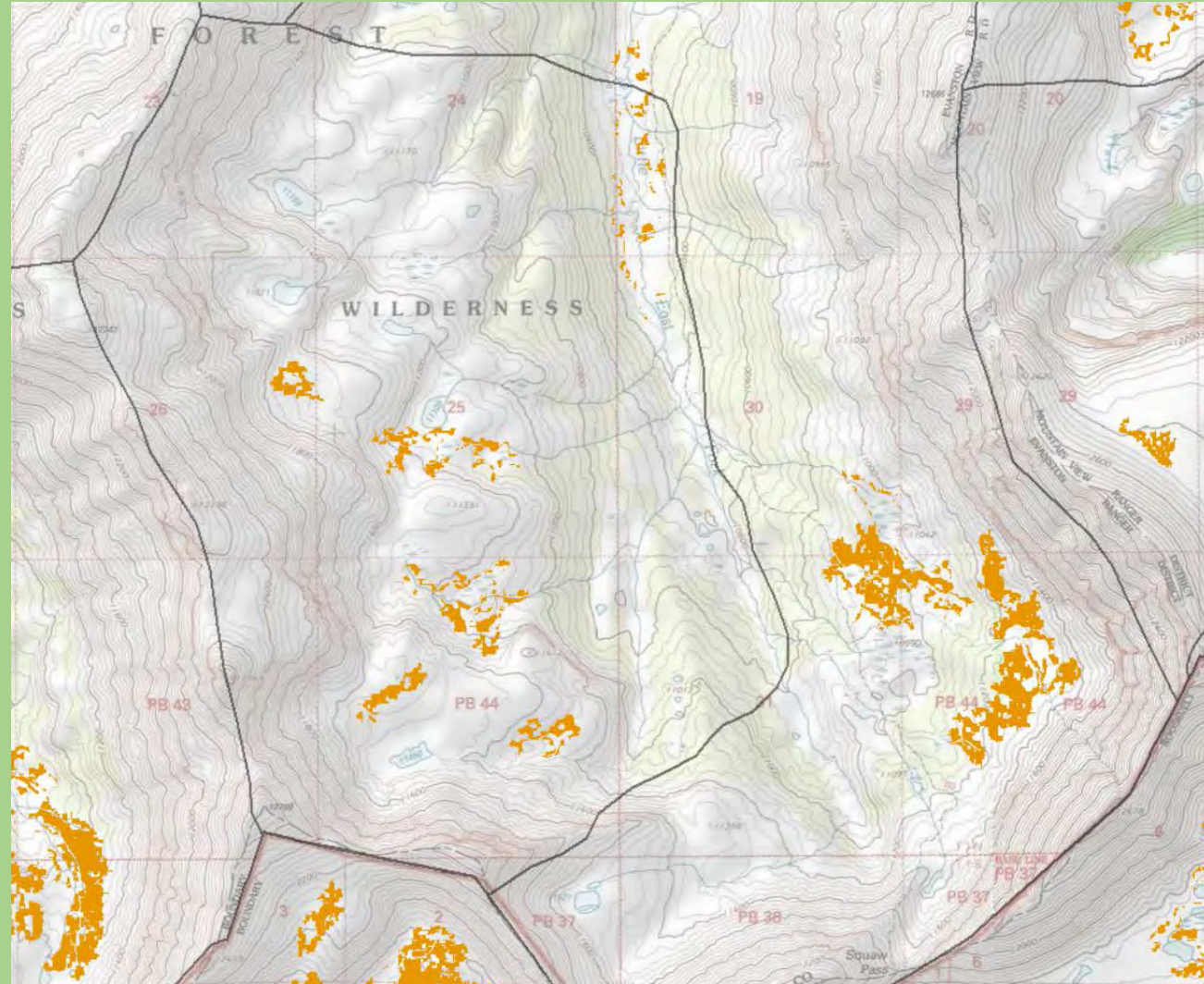


# GIS Results: Alternative A.2



Total acres in Alternative  
A.2 = **9,684**

# GIS Results: Alternative A.2 (close-up)



# GIS Results: Alternative A.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 612.96           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 846.03           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1102.71          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1196.75          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 1449.20          |
| FALL CREEK              | Ashley National Forest              | 319.32           |
| OTTOSON BASIN           | Ashley National Forest              | 1098.64          |
| OWEEP                   | Ashley National Forest              | 1345.76          |
| PAINTER                 | Ashley National Forest              | 1186.43          |
| TUNGSTEN                | Ashley National Forest              | 526.71           |
|                         | <b>TOTAL ACRES</b>                  | <b>9,684.50</b>  |

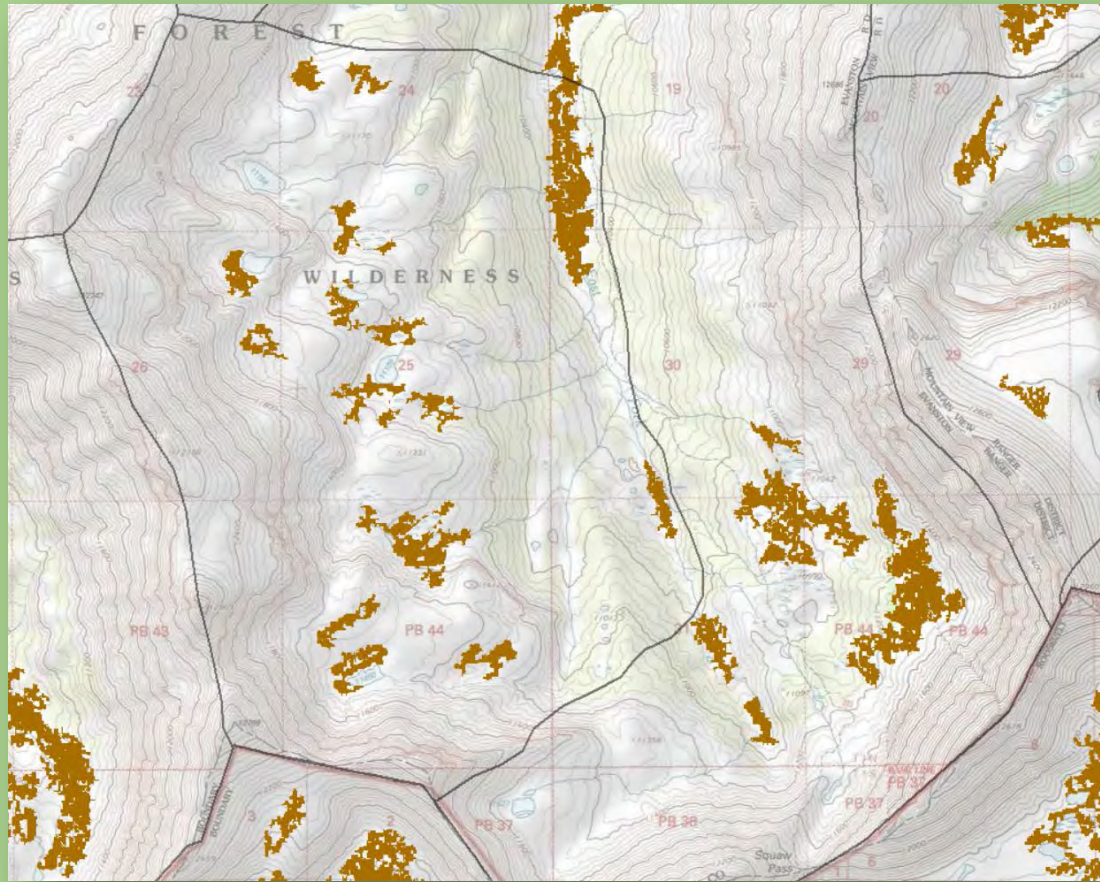


# GIS Results: Alternative A.2

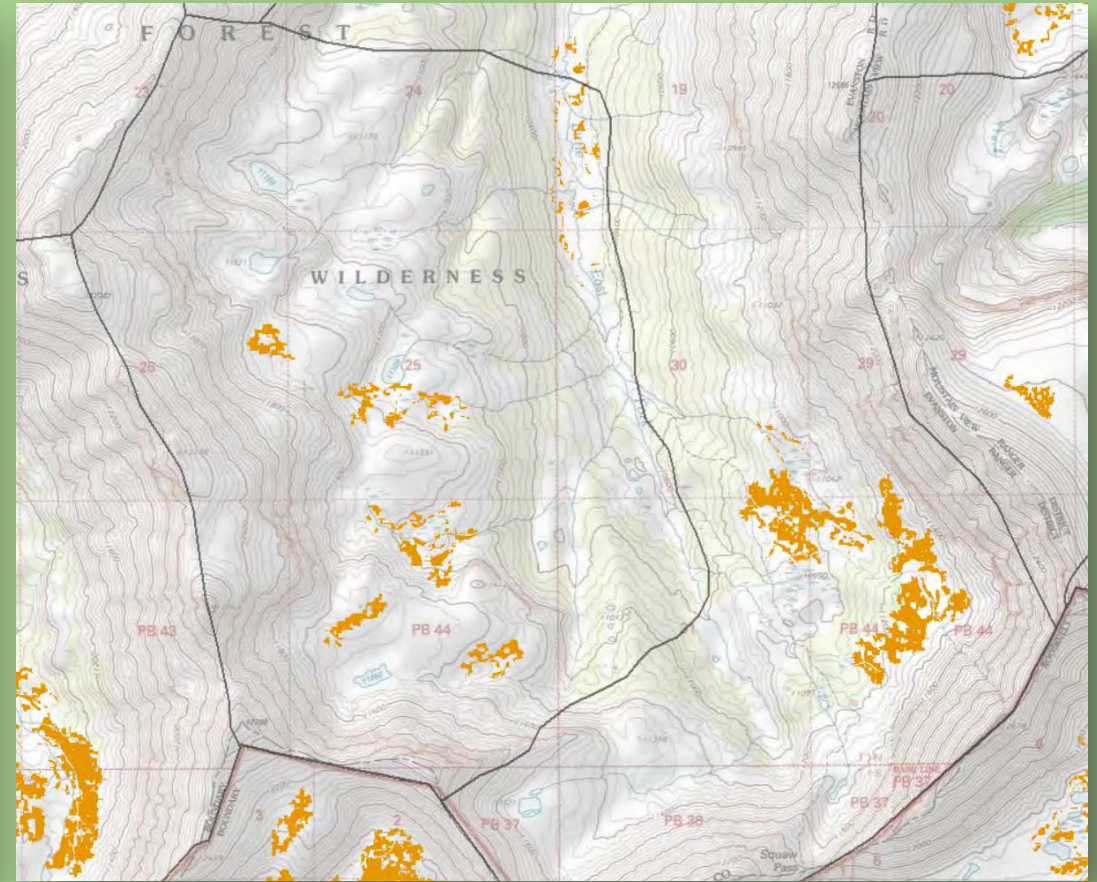
## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 9685          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 613           | 294                                | 180222                          | 54066.6                     | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 319           | 294                                | 93786                           | 28135.8                     | 301                                                    | 1100                     | 0.08                                      |
| GILBERT PEAK            | 846           | 294                                | 248724                          | 74617.2                     | 301                                                    | 1400                     | 0.18                                      |
| HESSIE LAKE HENRYS FORK | 1103          | 294                                | 324282                          | 97284.6                     | 301                                                    | 1400                     | 0.23                                      |
| MID FK                  | 1197          | 294                                | 351918                          | 105575.4                    | 301                                                    | 1200                     | 0.29                                      |
| OTTOSON BASIN           | 1099          | 294                                | 323106                          | 96931.8                     | 301                                                    | 1300                     | 0.25                                      |
| OWEEP                   | 1346          | 294                                | 395724                          | 118717.2                    | 301                                                    | 1400                     | 0.28                                      |
| PAINTER                 | 1186          | 294                                | 348684                          | 104605.2                    | 301                                                    | 1200                     | 0.29                                      |
| RED CASTLE              | 1449          | 294                                | 426006                          | 127801.8                    | 301                                                    | 1300                     | 0.33                                      |
| TUNGSTEN                | 527           | 294                                | 154938                          | 46481.4                     | 301                                                    | 1200                     | 0.13                                      |

# GIS Results: Comparison between A.1 and A.2 (close-up)



A.1



A.2



# GIS Results: Comparison between A.1 and A.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 14727         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1126          | 294                                | 331044                          | 99313                       | 301                                                    | 1350                     | 0.24                                      |
| FALL CREEK              | 514           | 294                                | 151116                          | 45335                       | 301                                                    | 1100                     | 0.14                                      |
| GILBERT PEAK            | 1324          | 294                                | 389256                          | 116777                      | 301                                                    | 1400                     | 0.28                                      |
| HESSIE LAKE HENRYS FORK | 1905          | 294                                | 560070                          | 168021                      | 301                                                    | 1400                     | 0.40                                      |
| MID FK                  | 1711          | 294                                | 503034                          | 150910                      | 301                                                    | 1200                     | 0.42                                      |
| OTTOSON BASIN           | 1401          | 294                                | 411894                          | 123568                      | 301                                                    | 1300                     | 0.32                                      |
| OWEEP                   | 1887          | 294                                | 554778                          | 166433                      | 301                                                    | 1400                     | 0.39                                      |
| PAINTER                 | 1656          | 294                                | 486864                          | 146059                      | 301                                                    | 1200                     | 0.40                                      |
| RED CASTLE              | 2167          | 294                                | 637098                          | 191129                      | 301                                                    | 1300                     | 0.49                                      |
| TUNGSTEN                | 1031          | 294                                | 303114                          | 90934                       | 301                                                    | 1200                     | 0.25                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 9685          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 613           | 294                                | 180222                          | 54066.6                     | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 319           | 294                                | 93786                           | 28135.8                     | 301                                                    | 1100                     | 0.08                                      |
| GILBERT PEAK            | 846           | 294                                | 248724                          | 74617.2                     | 301                                                    | 1400                     | 0.18                                      |
| HESSIE LAKE HENRYS FORK | 1103          | 294                                | 324282                          | 97284.6                     | 301                                                    | 1400                     | 0.23                                      |
| MID FK                  | 1197          | 294                                | 351918                          | 105575.4                    | 301                                                    | 1200                     | 0.29                                      |
| OTTOSON BASIN           | 1099          | 294                                | 323106                          | 96931.8                     | 301                                                    | 1300                     | 0.25                                      |
| OWEEP                   | 1346          | 294                                | 395724                          | 118717.2                    | 301                                                    | 1400                     | 0.28                                      |
| PAINTER                 | 1186          | 294                                | 348684                          | 104605.2                    | 301                                                    | 1200                     | 0.29                                      |
| RED CASTLE              | 1449          | 294                                | 426006                          | 127801.8                    | 301                                                    | 1300                     | 0.33                                      |
| TUNGSTEN                | 527           | 294                                | 154938                          | 46481.4                     | 301                                                    | 1200                     | 0.13                                      |



# Alternative B

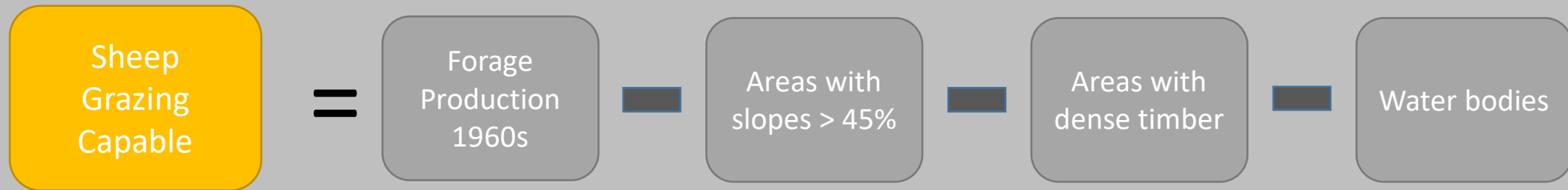
- Alternative B: grazing capability is derived from the forage production (digitized) data that was collected back in the 1960s and implementation of the USFS grazing capability criteria.
- Grazing Capability Criteria:
  - Areas capable of grazing are:
    - < 45 % slope
    - Have a minimum forage production of 200 lbs/acre
    - Areas without dense timber, rock, or other physical barriers
    - Ground cover greater than 60%

# Original extent and distribution of forage production data from 1960



Total acres evaluated in  
1960 = **30,460**

# Alternative B.1: GIS model





# GIS Results: Alternative B.1



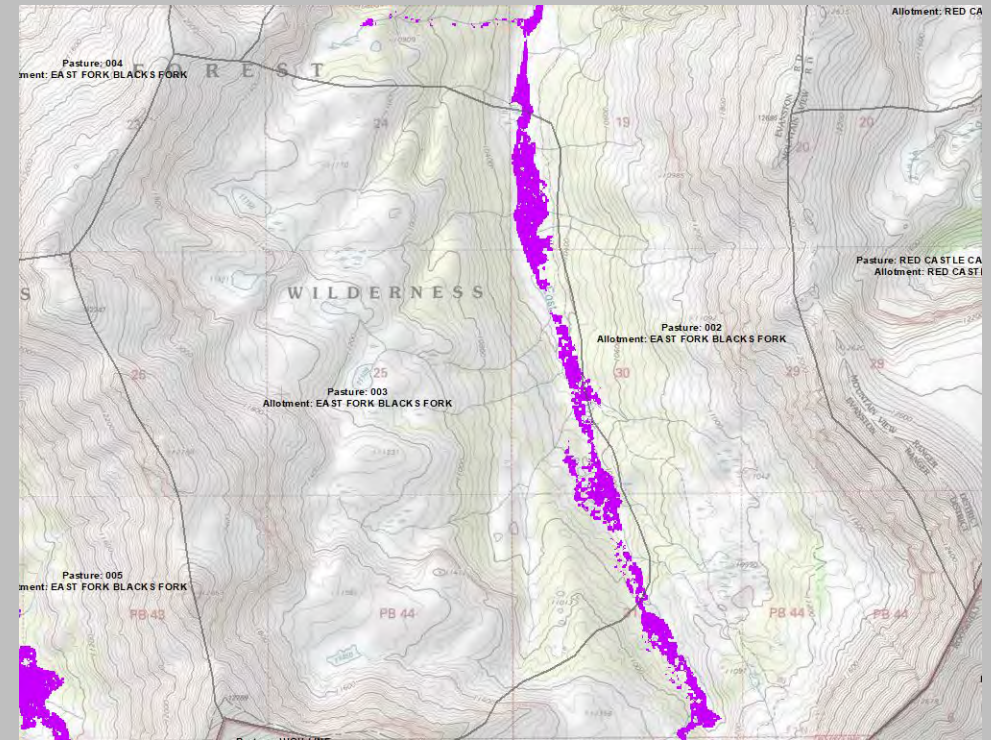
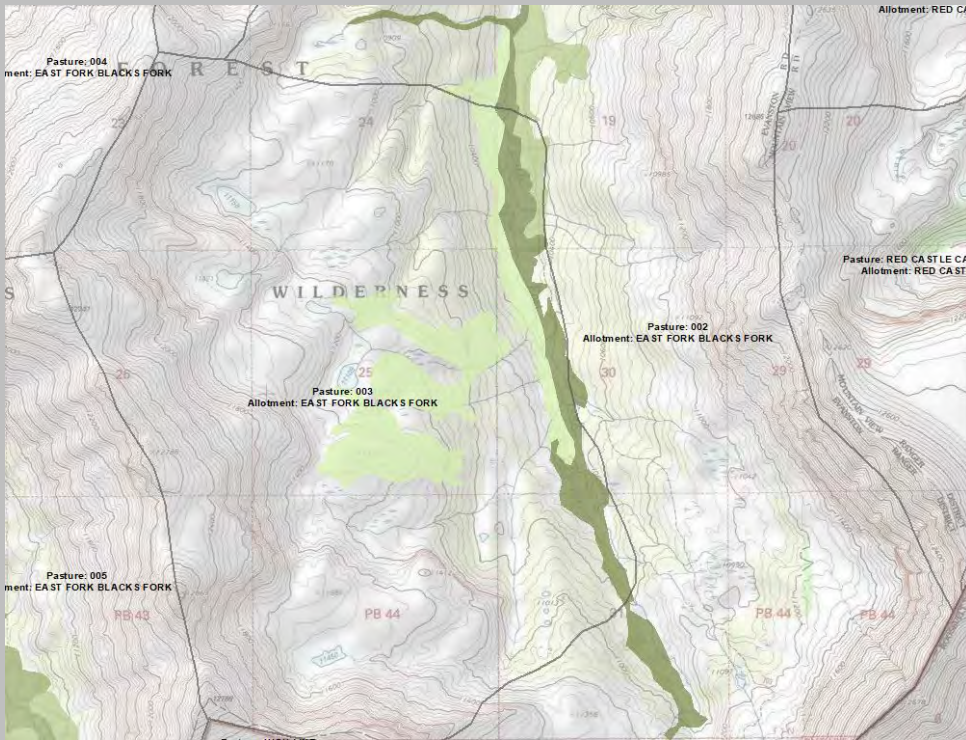
Total acres in Alternative  
B.1 = **4,485**

# GIS Results: Alternative B.1

BEFORE

Forage production -> capable

AFTER



# GIS Results: Alternative B.1

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 580.01           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 577.14           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 180.17           |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1009.25          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 843.75           |
| FALL CREEK              | Ashley National Forest              | 869.93           |
| OTTOSON BASIN           | Ashley National Forest              | 24.42            |
| OWEEP                   | Ashley National Forest              | 15.57            |
| PAINTER                 | Ashley National Forest              | 384.82           |
| TUNGSTEN                | Ashley National Forest              | 0                |
|                         | <b>TOTAL ACRES</b>                  | <b>4,485.06</b>  |

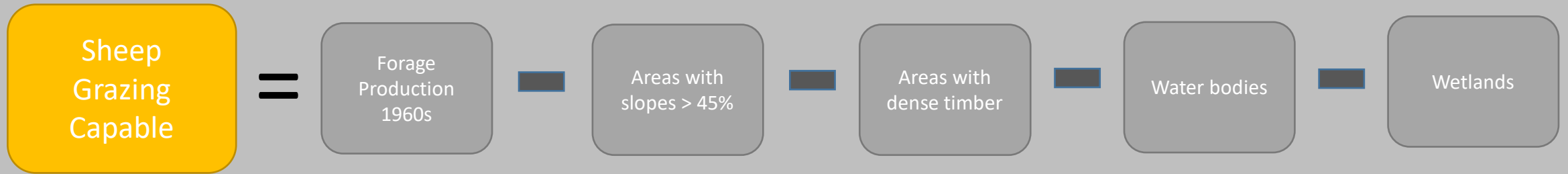
# GIS Results: Alternative B.1

## Grazing stocking rates

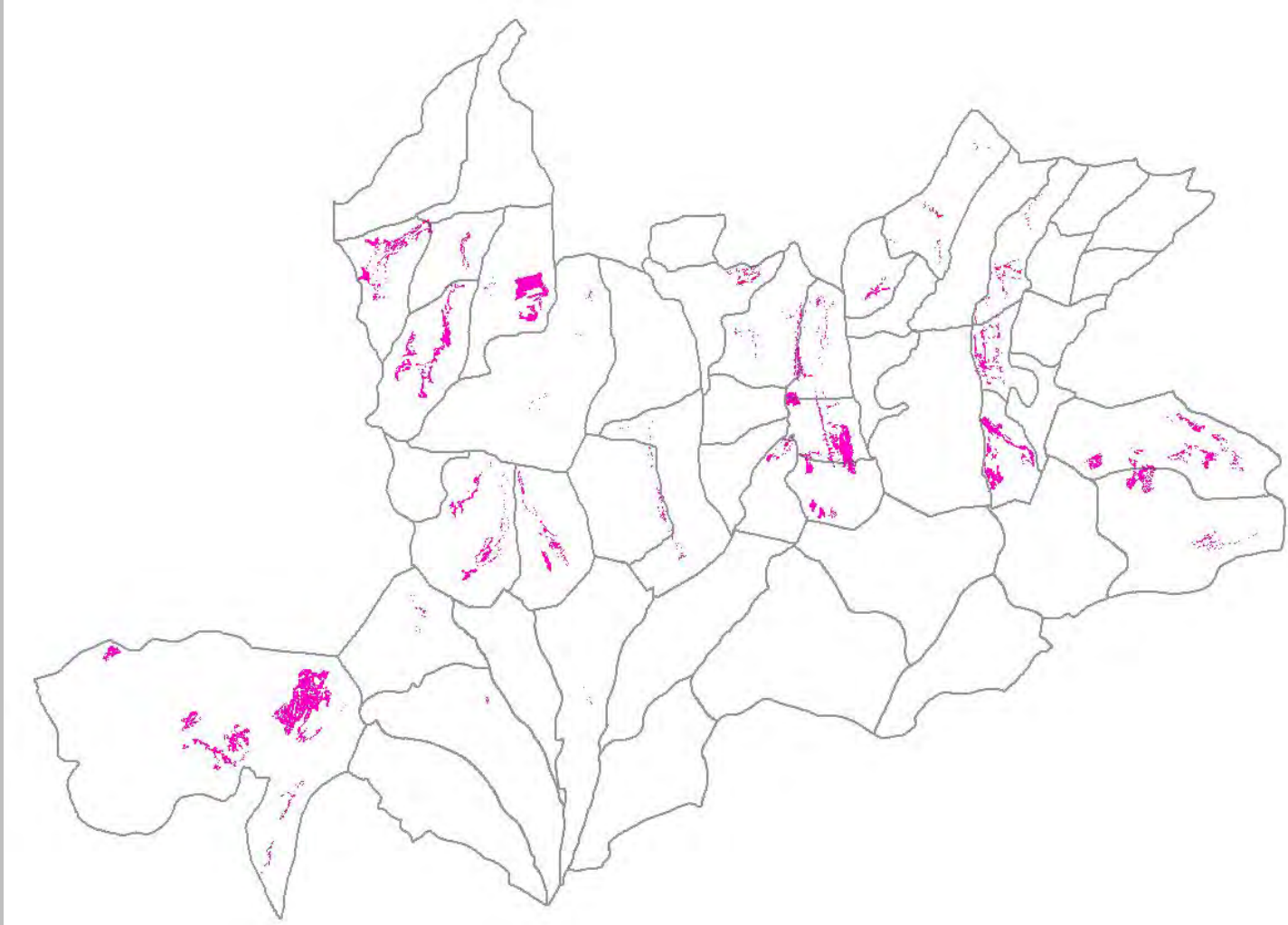
| Allotment                      | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B1</b>          |               |                                    |                                 |                             |                                                        |                          |                                           |
| <b>Grand Total</b>             | <b>4485</b>   |                                    |                                 |                             |                                                        |                          |                                           |
| <b>EAST FORK BLACKS FORK</b>   | <b>580</b>    | <b>294</b>                         | <b>170520</b>                   | <b>51156</b>                | <b>301</b>                                             | <b>1350</b>              | <b>0.13</b>                               |
| <b>FALL CREEK</b>              | <b>870</b>    | <b>294</b>                         | <b>255780</b>                   | <b>76734</b>                | <b>301</b>                                             | <b>1100</b>              | <b>0.23</b>                               |
| <b>GILBERT PEAK</b>            | <b>577</b>    | <b>294</b>                         | <b>169638</b>                   | <b>50891.4</b>              | <b>301</b>                                             | <b>1400</b>              | <b>0.12</b>                               |
| <b>HESSIE LAKE HENRYS FORK</b> | <b>180</b>    | <b>294</b>                         | <b>52920</b>                    | <b>15876</b>                | <b>301</b>                                             | <b>1400</b>              | <b>0.04</b>                               |
| <b>MID FK</b>                  | <b>1009</b>   | <b>294</b>                         | <b>296646</b>                   | <b>88993.8</b>              | <b>301</b>                                             | <b>1200</b>              | <b>0.25</b>                               |
| <b>OTTOSON BASIN</b>           | <b>24</b>     | <b>294</b>                         | <b>7056</b>                     | <b>2116.8</b>               | <b>301</b>                                             | <b>1300</b>              | <b>0.01</b>                               |
| <b>OWEEP</b>                   | <b>16</b>     | <b>294</b>                         | <b>4704</b>                     | <b>1411.2</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.00</b>                               |
| <b>PAINTER</b>                 | <b>385</b>    | <b>294</b>                         | <b>113190</b>                   | <b>33957</b>                | <b>301</b>                                             | <b>1200</b>              | <b>0.09</b>                               |
| <b>RED CASTLE</b>              | <b>855</b>    | <b>294</b>                         | <b>251370</b>                   | <b>75411</b>                | <b>301</b>                                             | <b>1300</b>              | <b>0.19</b>                               |
| <b>TUNGSTEN</b>                | <b>0</b>      | <b>294</b>                         | <b>0</b>                        | <b>0</b>                    | <b>301</b>                                             | <b>1200</b>              | <b>0.00</b>                               |



# Alternative B.2: GIS model



# GIS Results: Alternative B.2



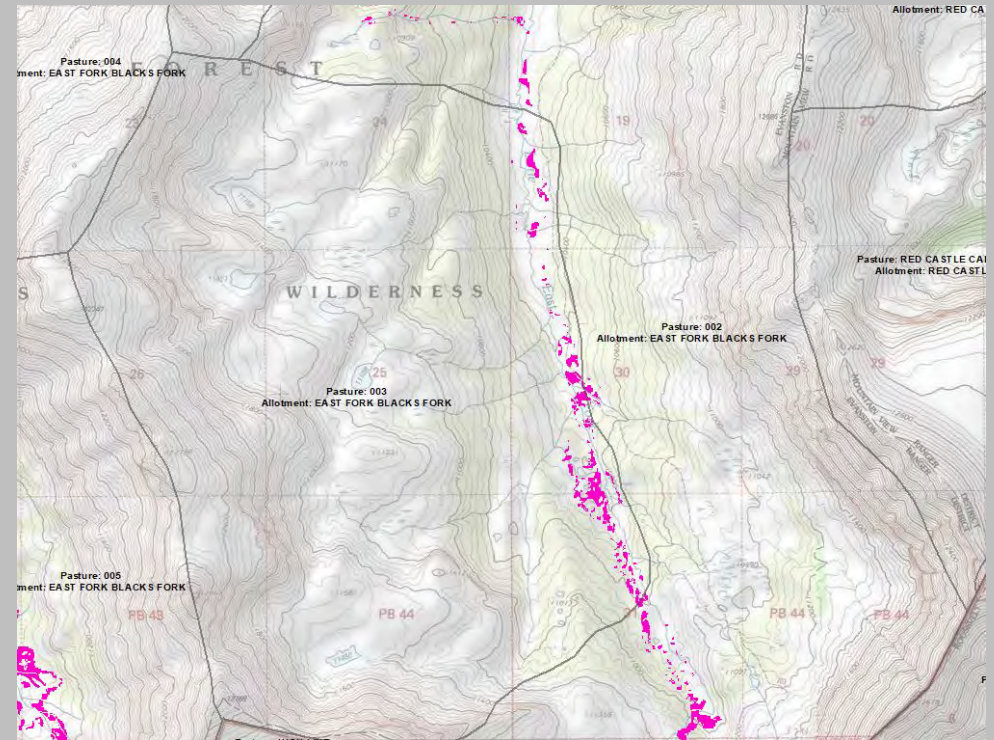
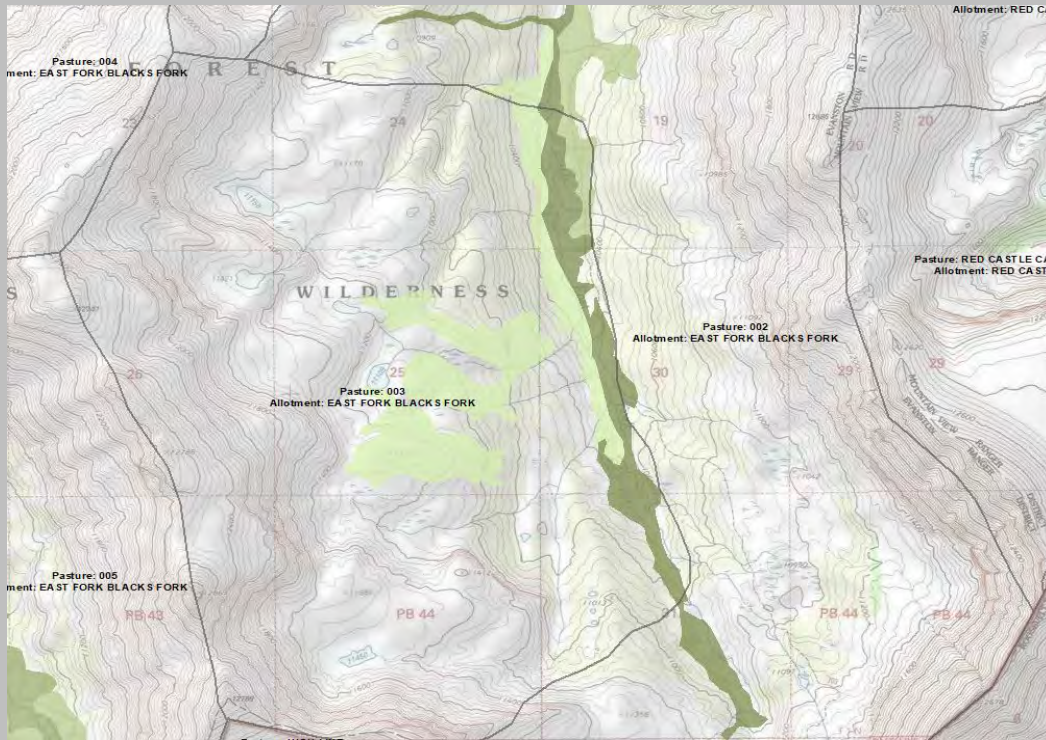
Total acres in Alternative  
B.2 = **2,888**

# GIS Results: Alternative B.2

BEFORE

Forage production -> capable

AFTER



# GIS Results: Alternative B.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 262.92           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 354.74           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 55.80            |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 634.63           |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 510.21           |
| FALL CREEK              | Ashley National Forest              | 734.38           |
| OTTOSON BASIN           | Ashley National Forest              | 13.81            |
| OWEEP                   | Ashley National Forest              | 4.26             |
| PAINTER                 | Ashley National Forest              | 317.96           |
| TUNGSTEN                | Ashley National Forest              | 0                |
|                         | <b>TOTAL ACRES</b>                  | <b>2,888.69</b>  |



# GIS Results: Alternative B.2

## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative B2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 2889          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 263           | 294                                | 77322                           | 23196.6                     | 301                                                    | 1350                     | 0.06                                      |
| FALL CREEK              | 734           | 294                                | 215796                          | 64738.8                     | 301                                                    | 1100                     | 0.20                                      |
| GILBERT PEAK            | 355           | 294                                | 104370                          | 31311                       | 301                                                    | 1400                     | 0.07                                      |
| HESSIE LAKE HENRYS FORK | 56            | 294                                | 16464                           | 4939.2                      | 301                                                    | 1400                     | 0.01                                      |
| MID FK                  | 634           | 294                                | 186396                          | 55918.8                     | 301                                                    | 1200                     | 0.15                                      |
| OTTOSON BASIN           | 14            | 294                                | 4116                            | 1234.8                      | 301                                                    | 1300                     | 0.00                                      |
| OWEEP                   | 4             | 294                                | 1176                            | 352.8                       | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 317           | 294                                | 93198                           | 27959.4                     | 301                                                    | 1200                     | 0.08                                      |
| RED CASTLE              | 510           | 294                                | 149940                          | 44982                       | 301                                                    | 1300                     | 0.11                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |

# GIS Results: Comparison between B.1 and B.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B1</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 4485          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 580           | 294                                | 170520                          | 51156                       | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 870           | 294                                | 255780                          | 76734                       | 301                                                    | 1100                     | 0.23                                      |
| GILBERT PEAK            | 577           | 294                                | 169638                          | 50891.4                     | 301                                                    | 1400                     | 0.12                                      |
| HESSIE LAKE HENRYS FORK | 180           | 294                                | 52920                           | 15876                       | 301                                                    | 1400                     | 0.04                                      |
| MID FK                  | 1009          | 294                                | 296646                          | 88993.8                     | 301                                                    | 1200                     | 0.25                                      |
| OTTOSON BASIN           | 24            | 294                                | 7056                            | 2116.8                      | 301                                                    | 1300                     | 0.01                                      |
| OWEED                   | 16            | 294                                | 4704                            | 1411.2                      | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 385           | 294                                | 113190                          | 33957                       | 301                                                    | 1200                     | 0.09                                      |
| RED CASTLE              | 855           | 294                                | 251370                          | 75411                       | 301                                                    | 1300                     | 0.19                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B2</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 2889          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 263           | 294                                | 77322                           | 23196.6                     | 301                                                    | 1350                     | 0.06                                      |
| FALL CREEK              | 734           | 294                                | 215796                          | 64738.8                     | 301                                                    | 1100                     | 0.20                                      |
| GILBERT PEAK            | 355           | 294                                | 104370                          | 31311                       | 301                                                    | 1400                     | 0.07                                      |
| HESSIE LAKE HENRYS FORK | 56            | 294                                | 16464                           | 4939.2                      | 301                                                    | 1400                     | 0.01                                      |
| MID FK                  | 634           | 294                                | 186396                          | 55918.8                     | 301                                                    | 1200                     | 0.15                                      |
| OTTOSON BASIN           | 14            | 294                                | 4116                            | 1234.8                      | 301                                                    | 1300                     | 0.00                                      |
| OWEED                   | 4             | 294                                | 1176                            | 352.8                       | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 317           | 294                                | 93198                           | 27959.4                     | 301                                                    | 1200                     | 0.08                                      |
| RED CASTLE              | 510           | 294                                | 149940                          | 44982                       | 301                                                    | 1300                     | 0.11                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |

# Alternative C

- **Alternative C correspond to an evaluation of the grazing capability layer by USFS against the criteria for capability also proposed by USFS**
- **Grazing Capability Criteria:**
  - **Areas capable of grazing are:**
    - **< 45 % slope**
    - **Have a minimum forage production of 200 lbs/acre**
    - **Areas without dense timber, rock, or other physical barriers**
    - **Ground cover greater than 60%**

# Assumption about the USFS Capability Dataset

Given that the provided dataset does not provide specific values for forage production and ground cover we made the following assumptions:

- Forage production in polygons classified as capable is at least 200 lbs/acre
- Ground cover is at least 60%



# Original extent and distribution of capable lands according to USFS

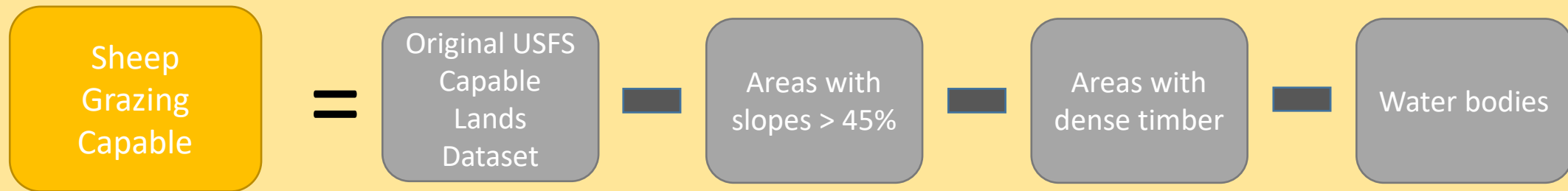


Total acres of USFS capable areas = **57,399**

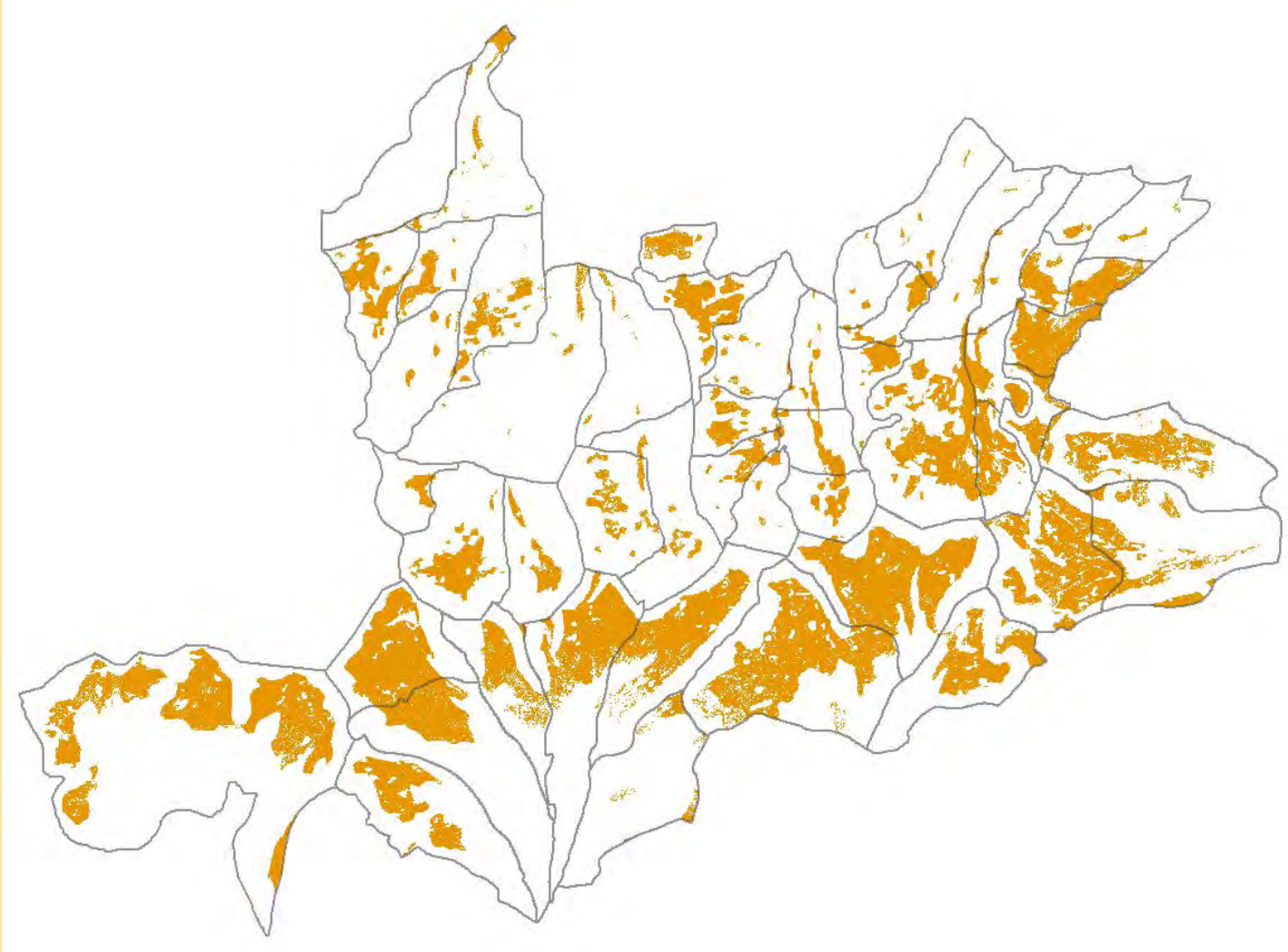
# Estimated capable acres by allotment

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 2496.03          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3954.12          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2838.68          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 2090.37          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2873.79          |
| FALL CREEK              | Ashley National Forest              | 5604.55          |
| OTTOSON BASIN           | Ashley National Forest              | 6103.67          |
| OWEEP                   | Ashley National Forest              | 8582.39          |
| PAINTER                 | Ashley National Forest              | 7657.22          |
| TUNGSTEN                | Ashley National Forest              | 15198.88         |
|                         | <b>TOTAL ACRES</b>                  | <b>57,399.72</b> |

# Alternative C.1: GIS model



# GIS Results: Alternative C.1

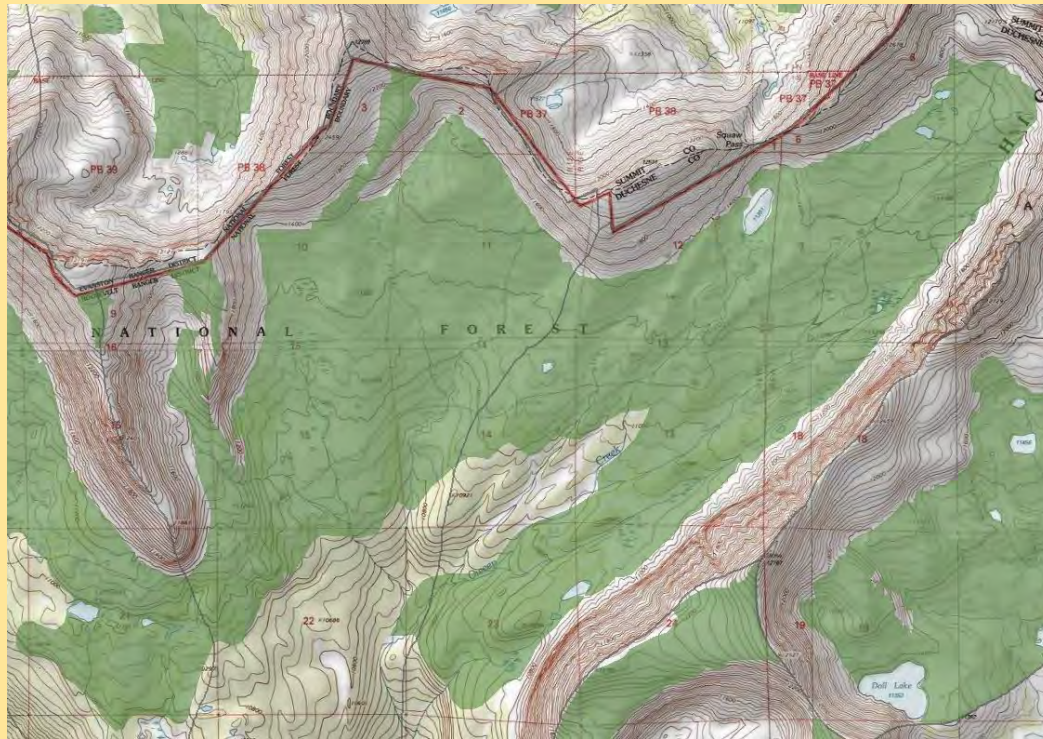


Total acres in Alternative  
C.1 = **36,965**

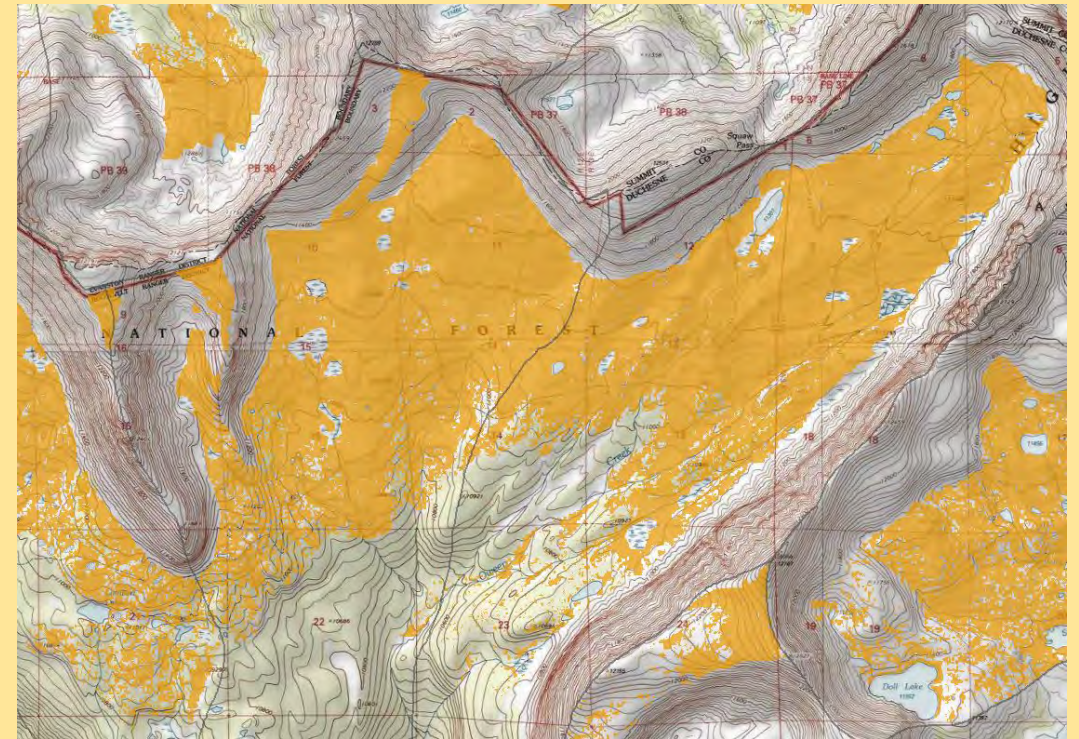


# GIS Results: Alternative C.1

BEFORE



AFTER



# GIS Results: Alternative C.1

## Grazing capable acres

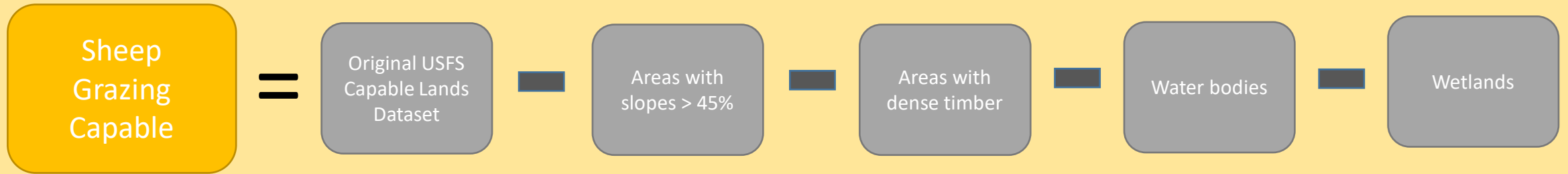
| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 2008.97          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3529.52          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2560.48          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1826.14          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2546.87          |
| FALL CREEK              | Ashley National Forest              | 4072.34          |
| OTTOSON BASIN           | Ashley National Forest              | 4039.04          |
| OWEEP                   | Ashley National Forest              | 4483.14          |
| PAINTER                 | Ashley National Forest              | 4431.90          |
| TUNGSTEN                | Ashley National Forest              | 7197.16          |
|                         | <b>TOTAL ACRES</b>                  | <b>36,695.57</b> |

# GIS Results: Alternative C.1

## Grazing stocking rates

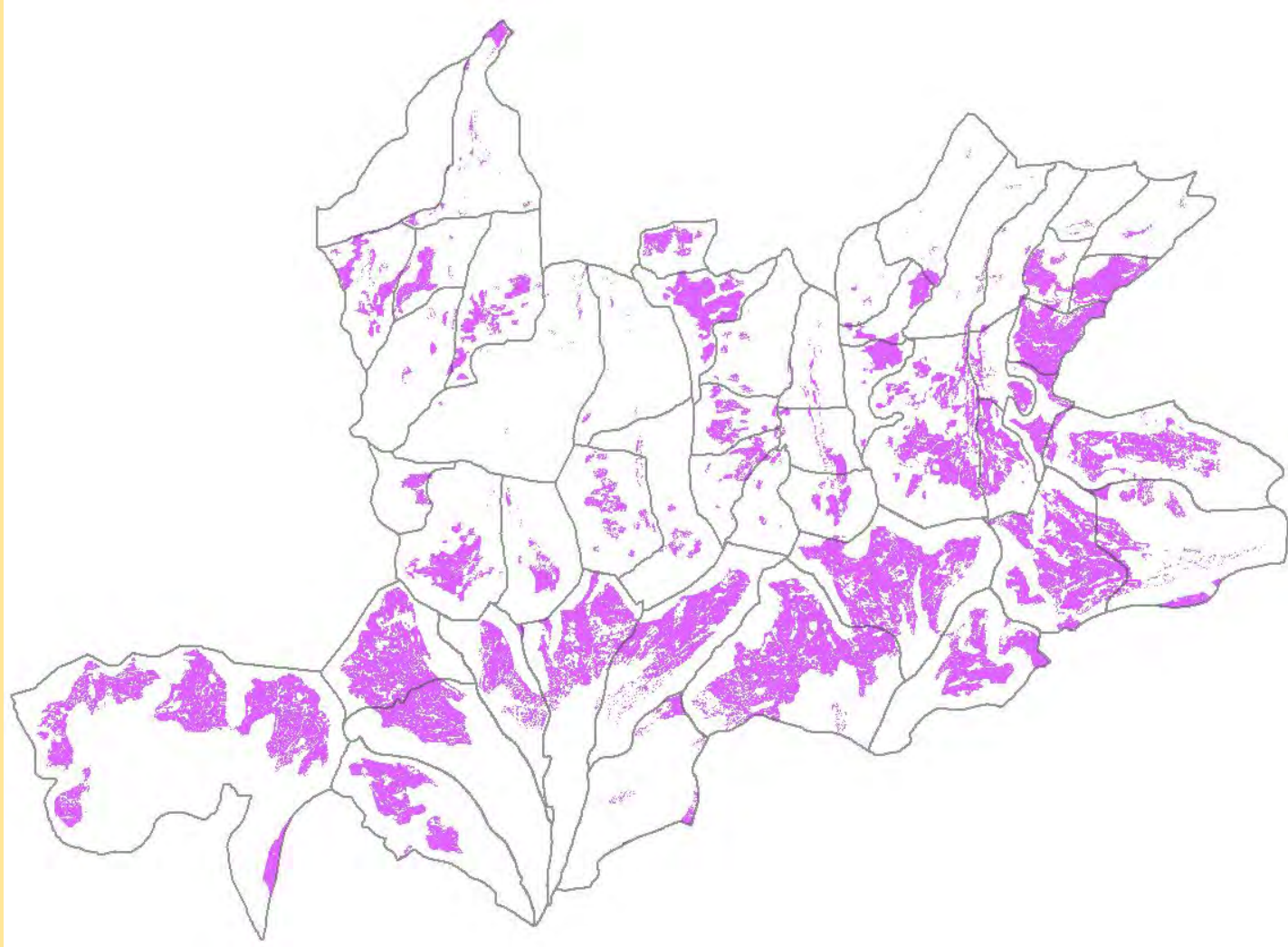
| Allotment                      | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C1</b>          |               |                                    |                                 |                             |                                                        |                          |                                           |
| <b>Grand Total</b>             | <b>36696</b>  |                                    |                                 |                             |                                                        |                          |                                           |
| <b>EAST FORK BLACKS FORK</b>   | <b>2009</b>   | <b>294</b>                         | <b>590646</b>                   | <b>177193.8</b>             | <b>301</b>                                             | <b>1350</b>              | <b>0.44</b>                               |
| <b>FALL CREEK</b>              | <b>4072</b>   | <b>294</b>                         | <b>1197168</b>                  | <b>359150.4</b>             | <b>301</b>                                             | <b>1100</b>              | <b>1.08</b>                               |
| <b>GILBERT PEAK</b>            | <b>3530</b>   | <b>294</b>                         | <b>1037820</b>                  | <b>311346</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.74</b>                               |
| <b>HESSIE LAKE HENRYS FORK</b> | <b>2560</b>   | <b>294</b>                         | <b>752640</b>                   | <b>225792</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.54</b>                               |
| <b>MID FK</b>                  | <b>1826</b>   | <b>294</b>                         | <b>536844</b>                   | <b>161053.2</b>             | <b>301</b>                                             | <b>1200</b>              | <b>0.45</b>                               |
| <b>OTTOSON BASIN</b>           | <b>4039</b>   | <b>294</b>                         | <b>1187466</b>                  | <b>356239.8</b>             | <b>301</b>                                             | <b>1300</b>              | <b>0.91</b>                               |
| <b>OWEEP</b>                   | <b>4483</b>   | <b>294</b>                         | <b>1318002</b>                  | <b>395400.6</b>             | <b>301</b>                                             | <b>1400</b>              | <b>0.94</b>                               |
| <b>PAINTER</b>                 | <b>4432</b>   | <b>294</b>                         | <b>1303008</b>                  | <b>390902.4</b>             | <b>301</b>                                             | <b>1200</b>              | <b>1.08</b>                               |
| <b>RED CASTLE</b>              | <b>2546</b>   | <b>294</b>                         | <b>748524</b>                   | <b>224557.2</b>             | <b>301</b>                                             | <b>1300</b>              | <b>0.57</b>                               |
| <b>TUNGSTEN</b>                | <b>7197</b>   | <b>294</b>                         | <b>2115918</b>                  | <b>634775.4</b>             | <b>301</b>                                             | <b>1200</b>              | <b>1.76</b>                               |

# Alternative C.2: GIS model





# GIS Results: Alternative C.2

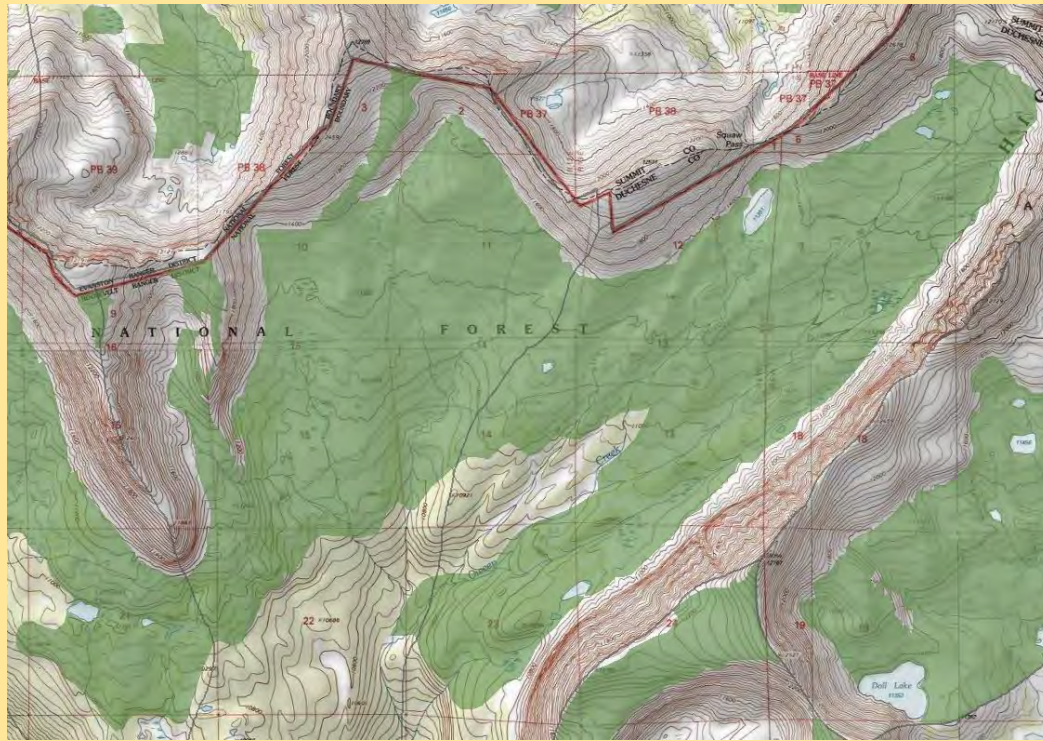


Total acres in Alternative  
C.2 = **31,384**

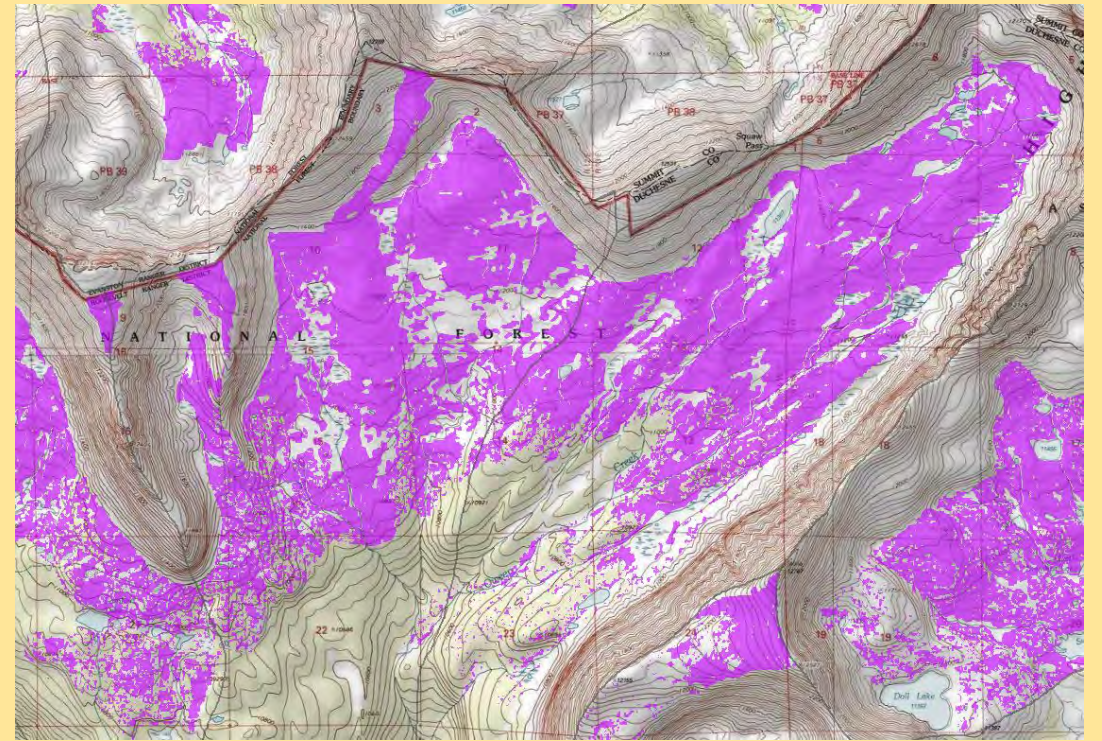


# GIS Results: Alternative C.2

BEFORE



AFTER



# GIS Results: Alternative C.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 1486.01          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3056.67          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2033.28          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1429.04          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2080.51          |
| FALL CREEK              | Ashley National Forest              | 3652.04          |
| OTTOSON BASIN           | Ashley National Forest              | 3580.17          |
| OWEEP                   | Ashley National Forest              | 3797.85          |
| PAINTER                 | Ashley National Forest              | 3875.04          |
| TUNGSTEN                | Ashley National Forest              | 6393.87          |
|                         | <b>TOTAL ACRES</b>                  | <b>31,384.50</b> |

# GIS Results: Alternative C.2

## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative C2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             |               |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1486          | 294                                | 436888                          | 131066                      | 301                                                    | 1350                     | 0.32                                      |
| FALL CREEK              | 3652          | 294                                | 1073699                         | 322110                      | 301                                                    | 1100                     | 0.97                                      |
| GILBERT PEAK            | 3057          | 294                                | 898662                          | 269599                      | 301                                                    | 1400                     | 0.64                                      |
| HESSIE LAKE HENRYS FORK | 2033          | 294                                | 597785                          | 179336                      | 301                                                    | 1400                     | 0.43                                      |
| MID FK                  | 1429          | 294                                | 420139                          | 126042                      | 301                                                    | 1200                     | 0.35                                      |
| OTTOSON BASIN           | 3580          | 294                                | 1052570                         | 315771                      | 301                                                    | 1300                     | 0.81                                      |
| OWEEP                   | 3798          | 294                                | 1116567                         | 334970                      | 301                                                    | 1400                     | 0.79                                      |
| PAINTER                 | 3875          | 294                                | 1139263                         | 341779                      | 301                                                    | 1200                     | 0.95                                      |
| RED CASTLE              | 2081          | 294                                | 611671                          | 183501                      | 301                                                    | 1300                     | 0.47                                      |
| TUNGSTEN                | 6394          | 294                                | 1879799                         | 563940                      | 301                                                    | 1200                     | 1.56                                      |



# GIS Results: Comparison between C.1 and C.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C1</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 36696         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 2009          | 294                                | 590646                          | 177193.8                    | 301                                                    | 1350                     | 0.44                                      |
| FALL CREEK              | 4072          | 294                                | 1197168                         | 359150.4                    | 301                                                    | 1100                     | 1.08                                      |
| GILBERT PEAK            | 3530          | 294                                | 1037820                         | 311346                      | 301                                                    | 1400                     | 0.74                                      |
| HESSIE LAKE HENRYS FORK | 2560          | 294                                | 752640                          | 225792                      | 301                                                    | 1400                     | 0.54                                      |
| MID FK                  | 1826          | 294                                | 536844                          | 161053.2                    | 301                                                    | 1200                     | 0.45                                      |
| OTTOSON BASIN           | 4039          | 294                                | 1187466                         | 356239.8                    | 301                                                    | 1300                     | 0.91                                      |
| OWEED                   | 4483          | 294                                | 1318002                         | 395400.6                    | 301                                                    | 1400                     | 0.94                                      |
| PAINTER                 | 4432          | 294                                | 1303008                         | 390902.4                    | 301                                                    | 1200                     | 1.08                                      |
| RED CASTLE              | 2546          | 294                                | 748524                          | 224557.2                    | 301                                                    | 1300                     | 0.57                                      |
| TUNGSTEN                | 7197          | 294                                | 2115918                         | 634775.4                    | 301                                                    | 1200                     | 1.76                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C2</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             |               |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1486          | 294                                | 436888                          | 131066                      | 301                                                    | 1350                     | 0.32                                      |
| FALL CREEK              | 3652          | 294                                | 1073699                         | 322110                      | 301                                                    | 1100                     | 0.97                                      |
| GILBERT PEAK            | 3057          | 294                                | 898662                          | 269599                      | 301                                                    | 1400                     | 0.64                                      |
| HESSIE LAKE HENRYS FORK | 2033          | 294                                | 597785                          | 179336                      | 301                                                    | 1400                     | 0.43                                      |
| MID FK                  | 1429          | 294                                | 420139                          | 126042                      | 301                                                    | 1200                     | 0.35                                      |
| OTTOSON BASIN           | 3580          | 294                                | 1052570                         | 315771                      | 301                                                    | 1300                     | 0.81                                      |
| OWEED                   | 3798          | 294                                | 1116567                         | 334970                      | 301                                                    | 1400                     | 0.79                                      |
| PAINTER                 | 3875          | 294                                | 1139263                         | 341779                      | 301                                                    | 1200                     | 0.95                                      |
| RED CASTLE              | 2081          | 294                                | 611671                          | 183501                      | 301                                                    | 1300                     | 0.47                                      |
| TUNGSTEN                | 6394          | 294                                | 1879799                         | 563940                      | 301                                                    | 1200                     | 1.56                                      |

## **ATTACHMENT 2**

# Forage Production

1960s vs. 2016

# Datasets Description

## 2016

Forage Production Lbs/Acre – Summary

| Min. | 1st Qu. | Median | Mean   | 3rd Qu. | Max.    |
|------|---------|--------|--------|---------|---------|
| 0.00 | 49.01   | 166.40 | 294.10 | 442.10  | 1431.00 |

sd(ppa)– standard deviation for forage production lbs/acre  
[1] 338.7322

Sampled sites per soil type

summary(fprodsites\$MUSYM)

|     |       |       |       |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 202 | NS104 | NS222 | NS223 | NS225 | NS482 | NS501 | NS503 | NS525 | NS531 |
| 1   | 6     | 7     | 2     | 8     | 2     | 4     | 1     | 3     | 6     |

Randomly selected vs. USFS sites

summary(fprodsites\$SiteType)

|        |      |
|--------|------|
| Random | USFS |
| 17     | 23   |

## 1960s

> summary(ppa2)

| Min. | 1st Qu. | Median | Mean  | 3rd Qu. | Max.  |
|------|---------|--------|-------|---------|-------|
| 32.0 | 127.0   | 206.0  | 240.1 | 346.0   | 615.0 |

> sd(ppa2)

[1] 136.788  
|

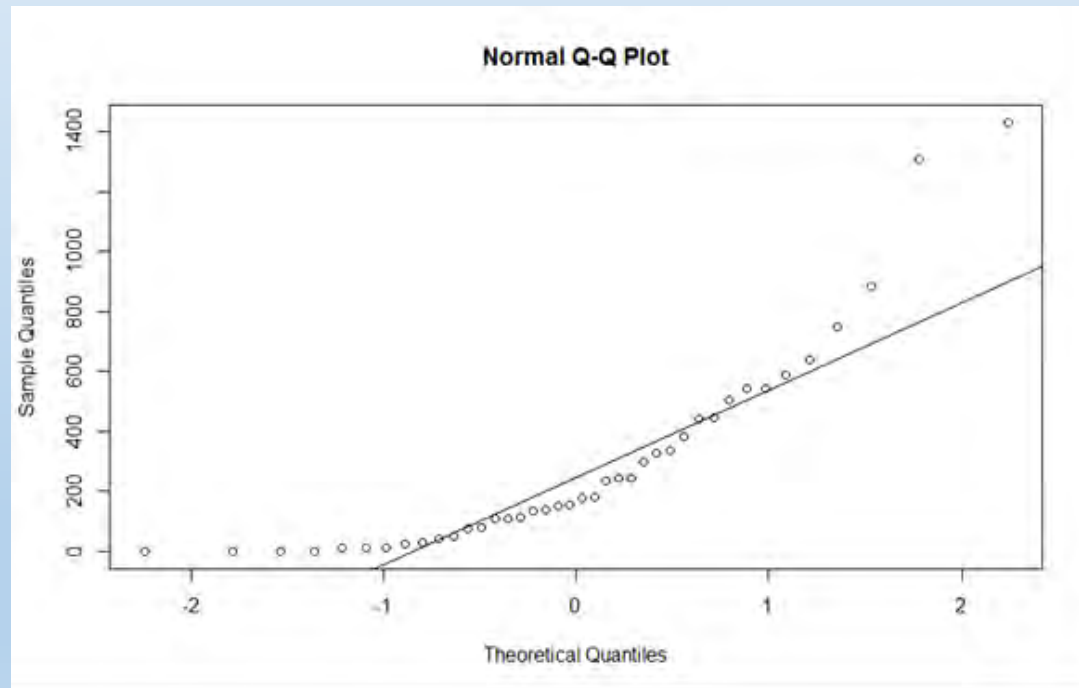
> summary(fprodsites2\$MUSYM)

|       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 202   | 351   | NS102 | NS104 | NS205 | NS222 | NS223 | NS225 | NS310 | NS312 | NS350 | NS482 | NS483 |
| NS484 | NS501 | NS502 | NS503 | NS520 | NS525 | NS531 |       |       |       |       |       |       |
| 6     | 6     | 1     | 31    | 14    | 35    | 24    | 9     | 2     | 1     | 6     | 1     | 1     |
| 1     | 27    | 44    | 3     | 4     | 36    | 4     |       |       |       |       |       |       |

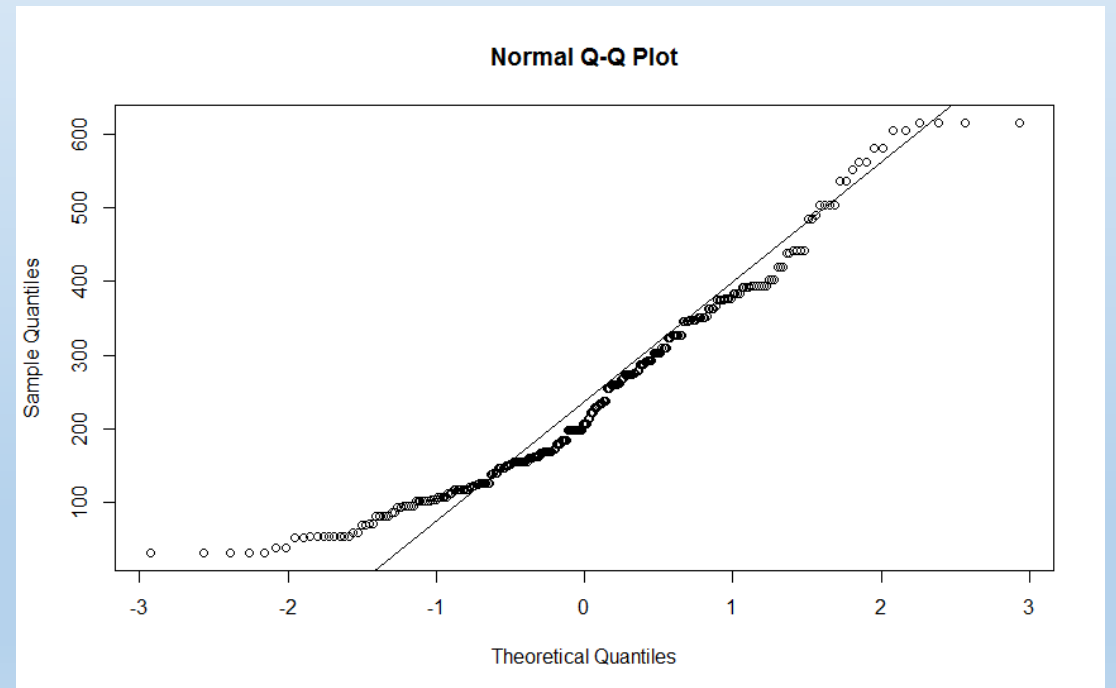


# QQ Plots

2016

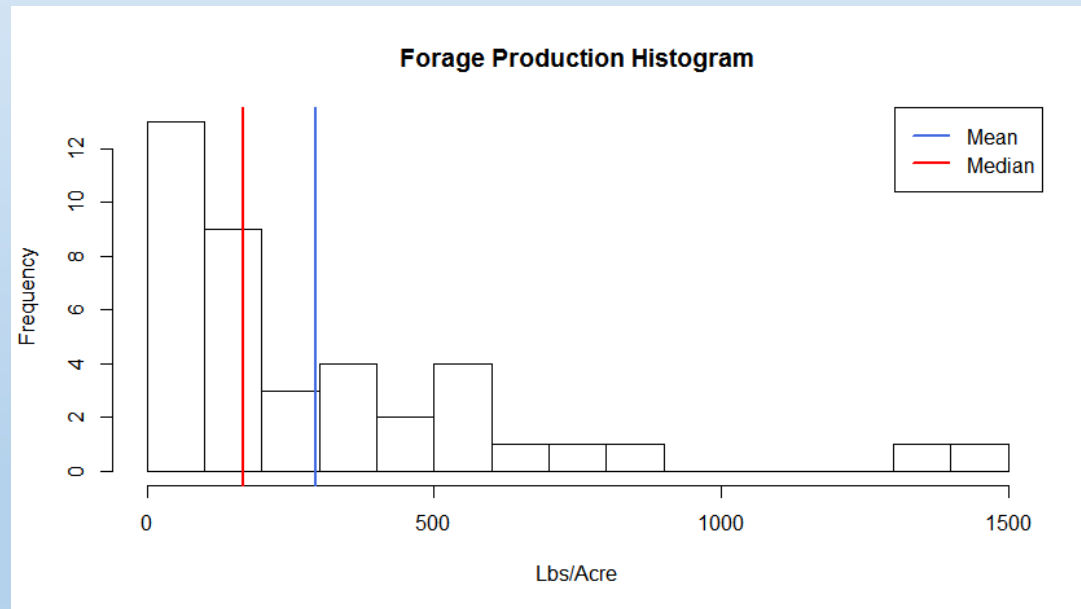


1960s

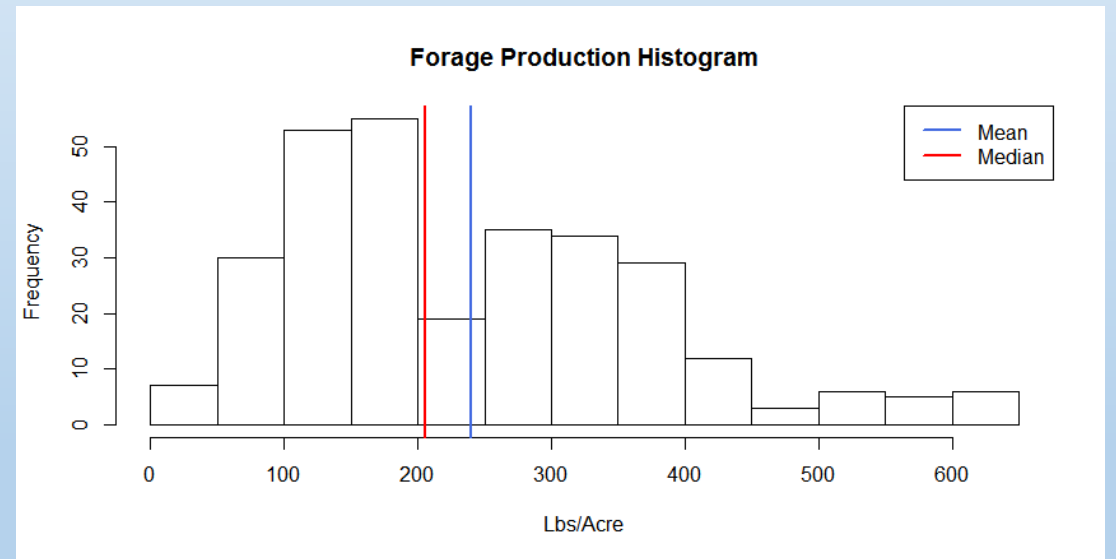


# Histograms

2016

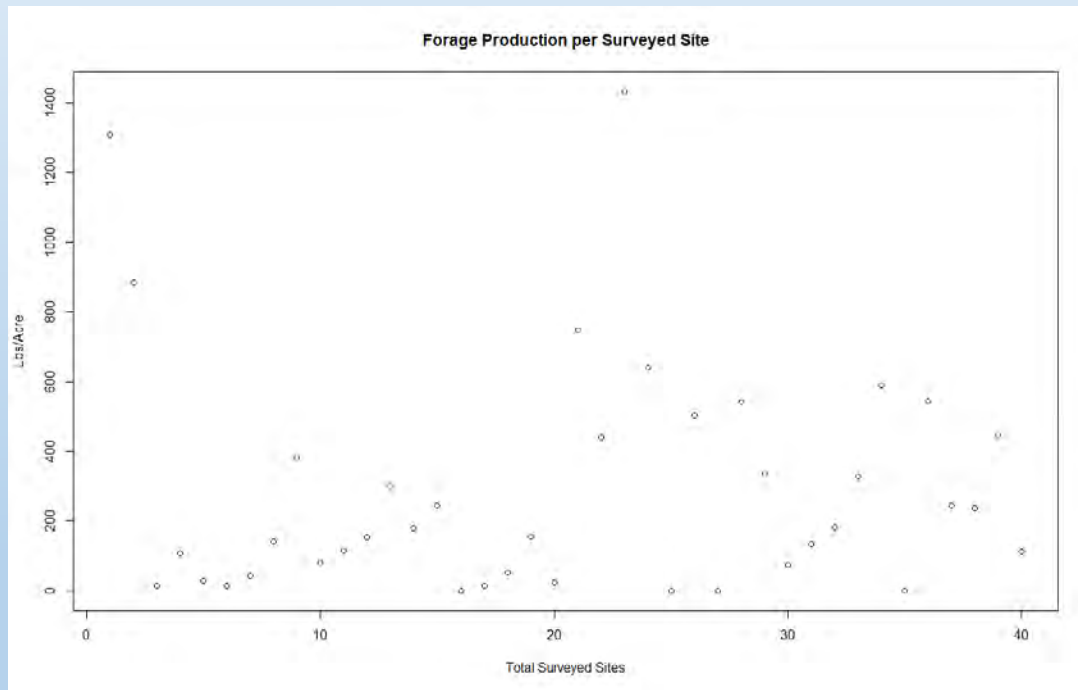


1960s

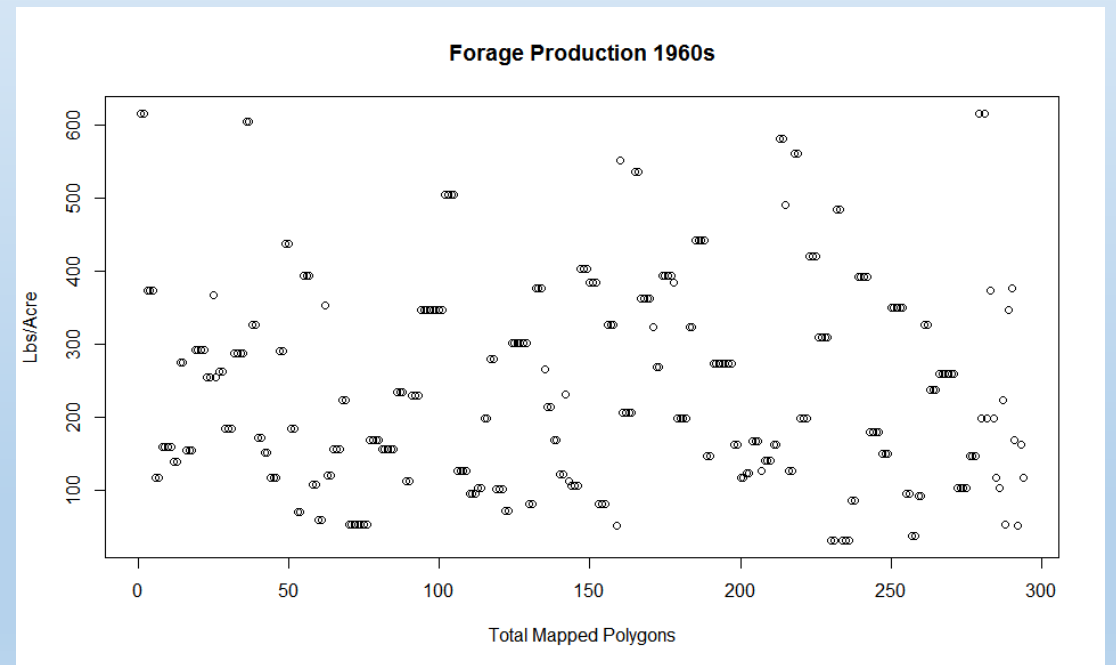


# Plots

2016

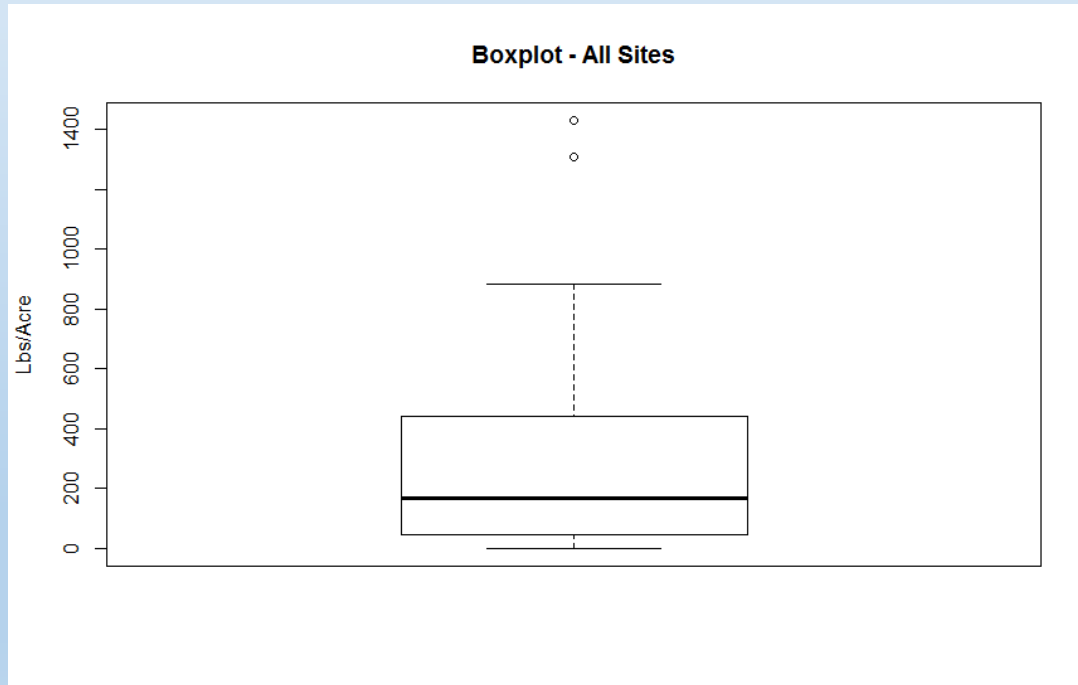


1960s

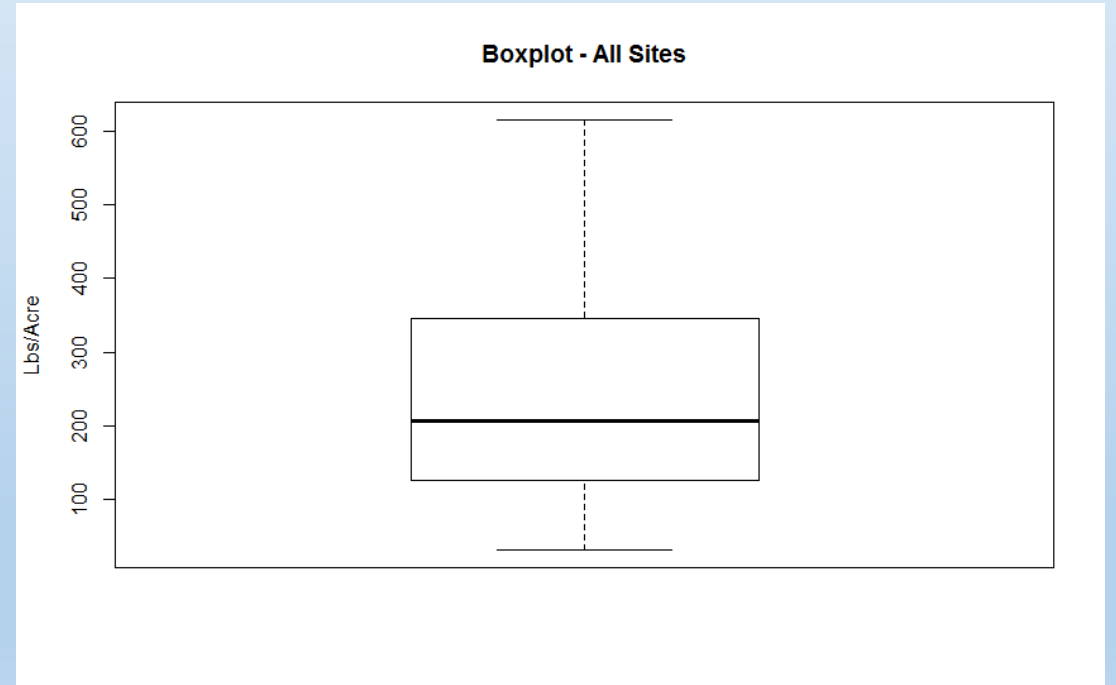


# Box plots – all sites

**2016**



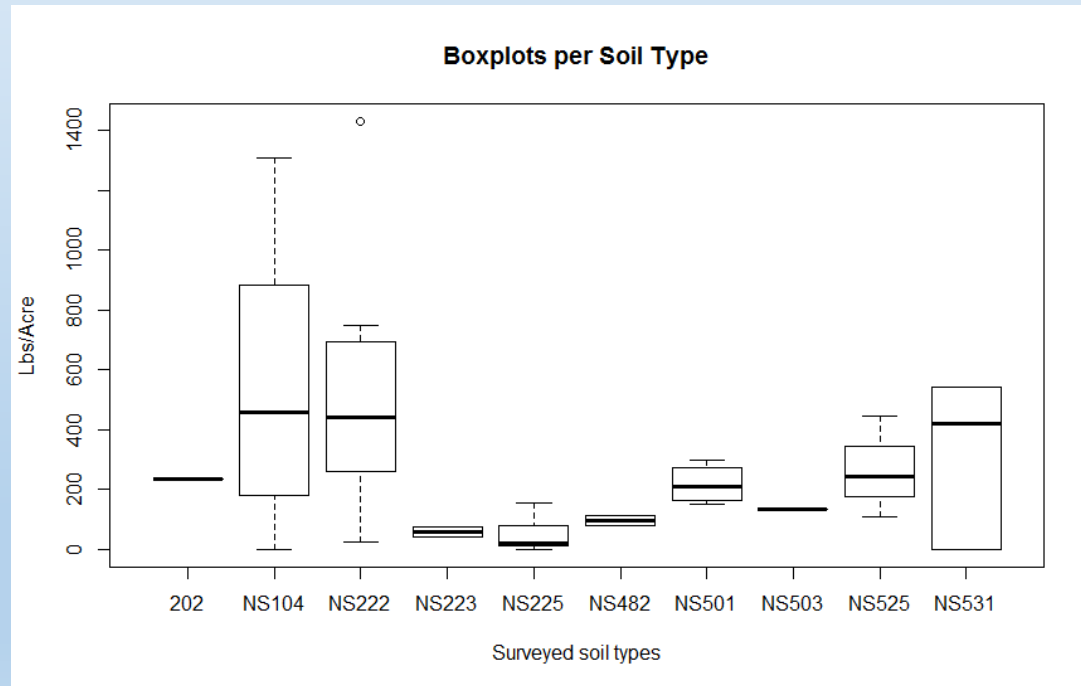
**1960s**



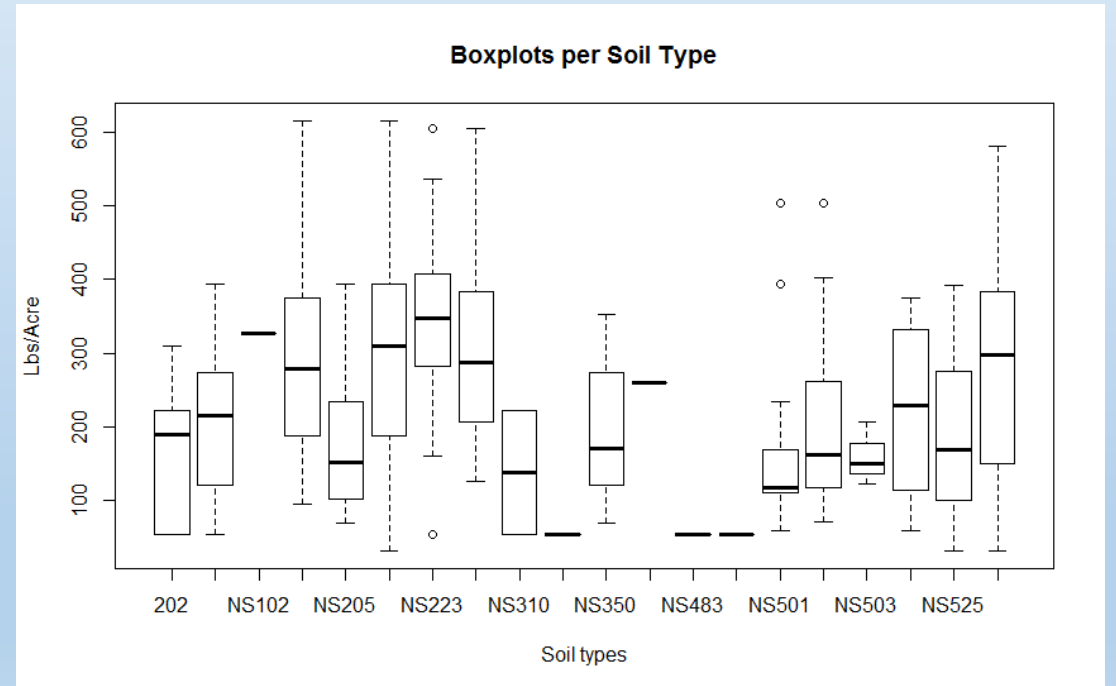


# Box plots per soil type

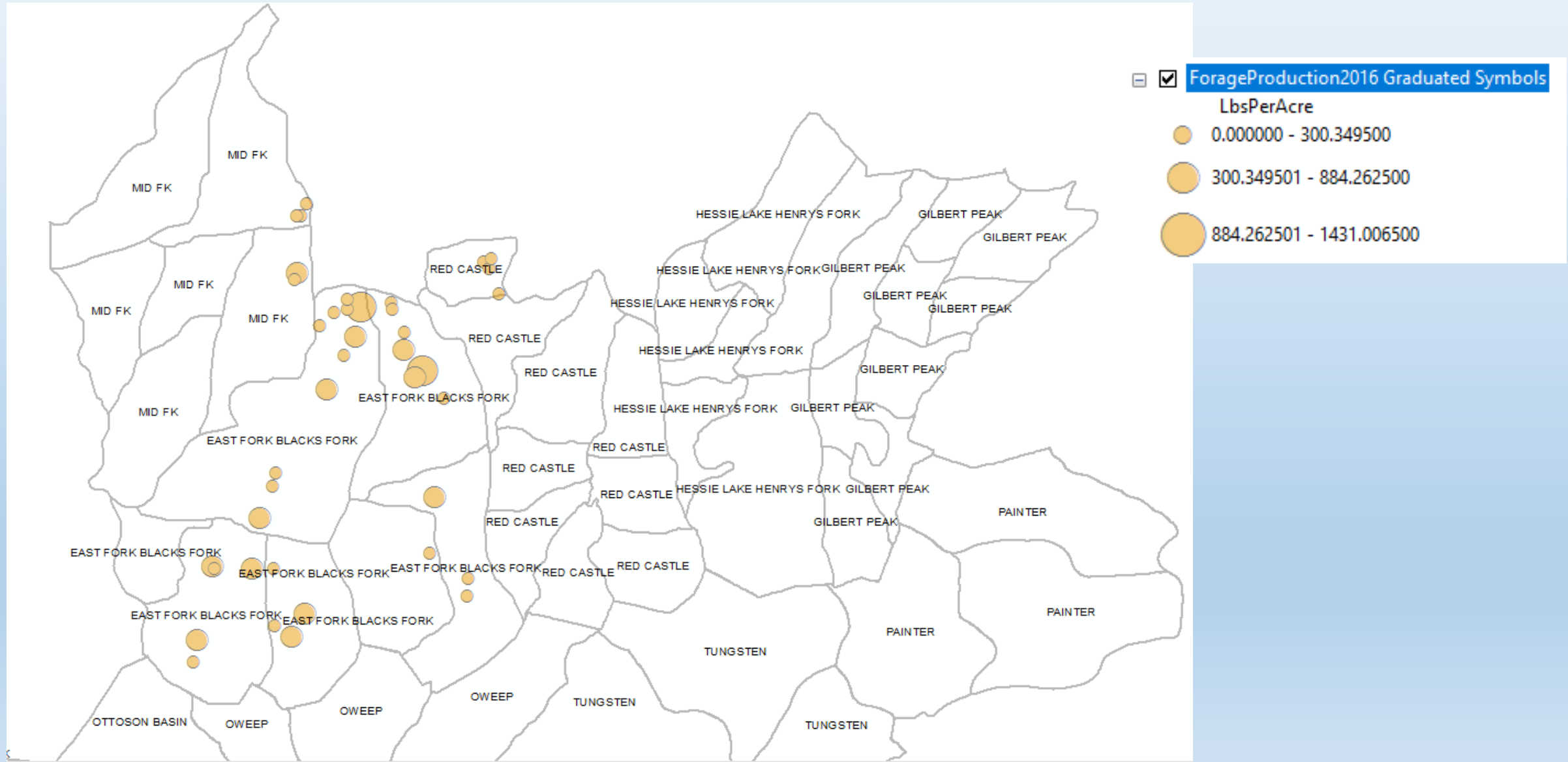
**2016**



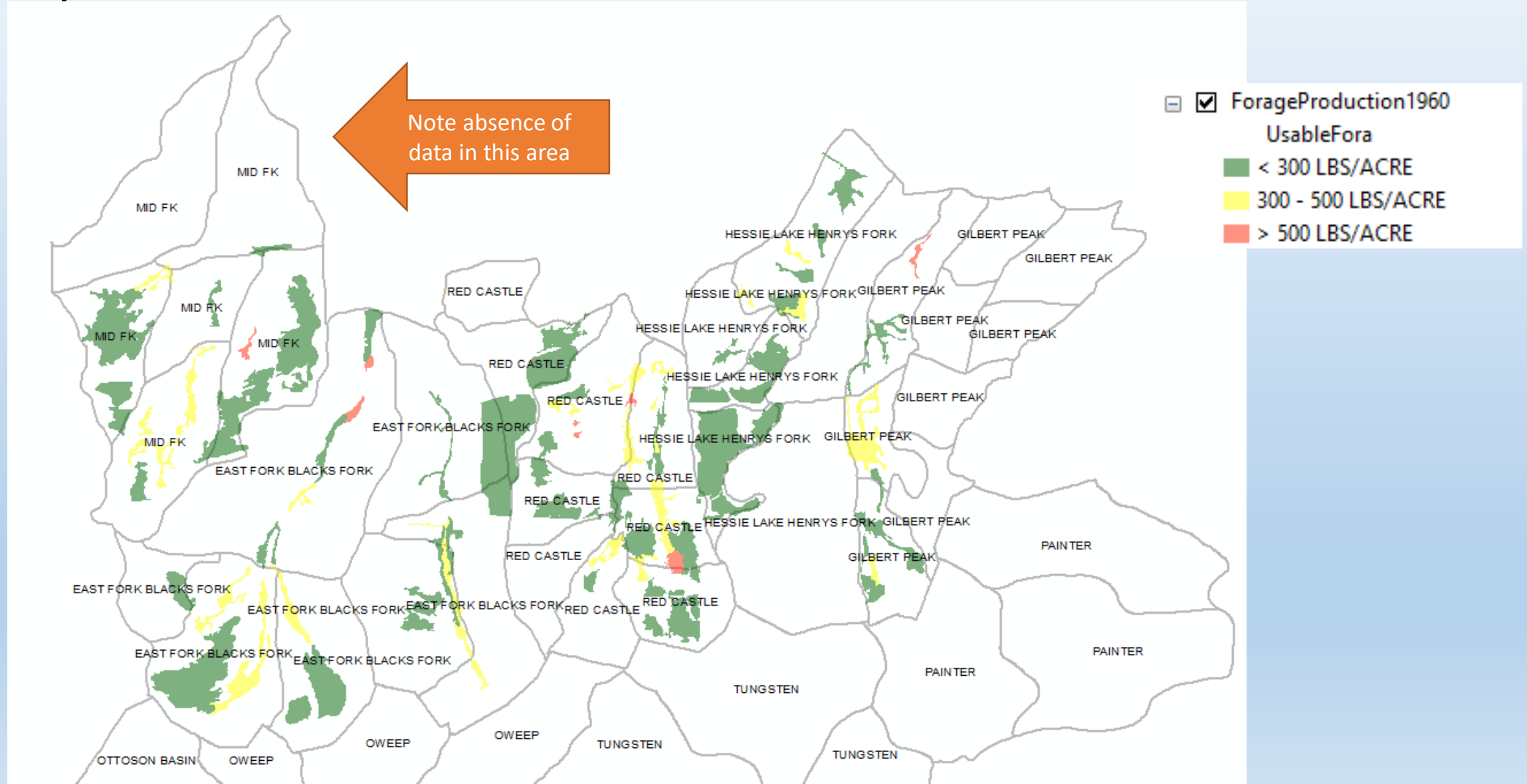
**1960s**



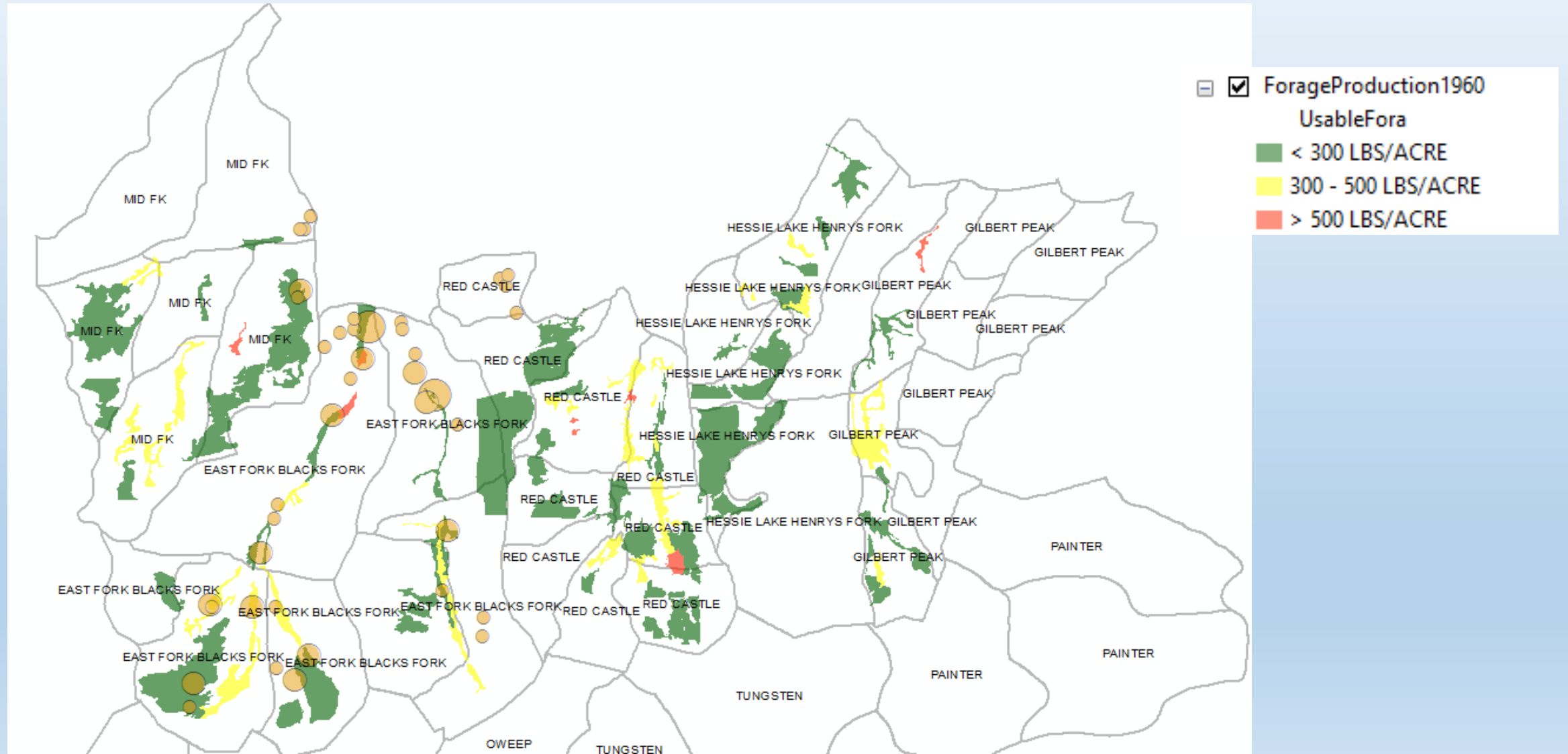
# Spatial extent of 2016 data



# Spatial extent of 1960s data

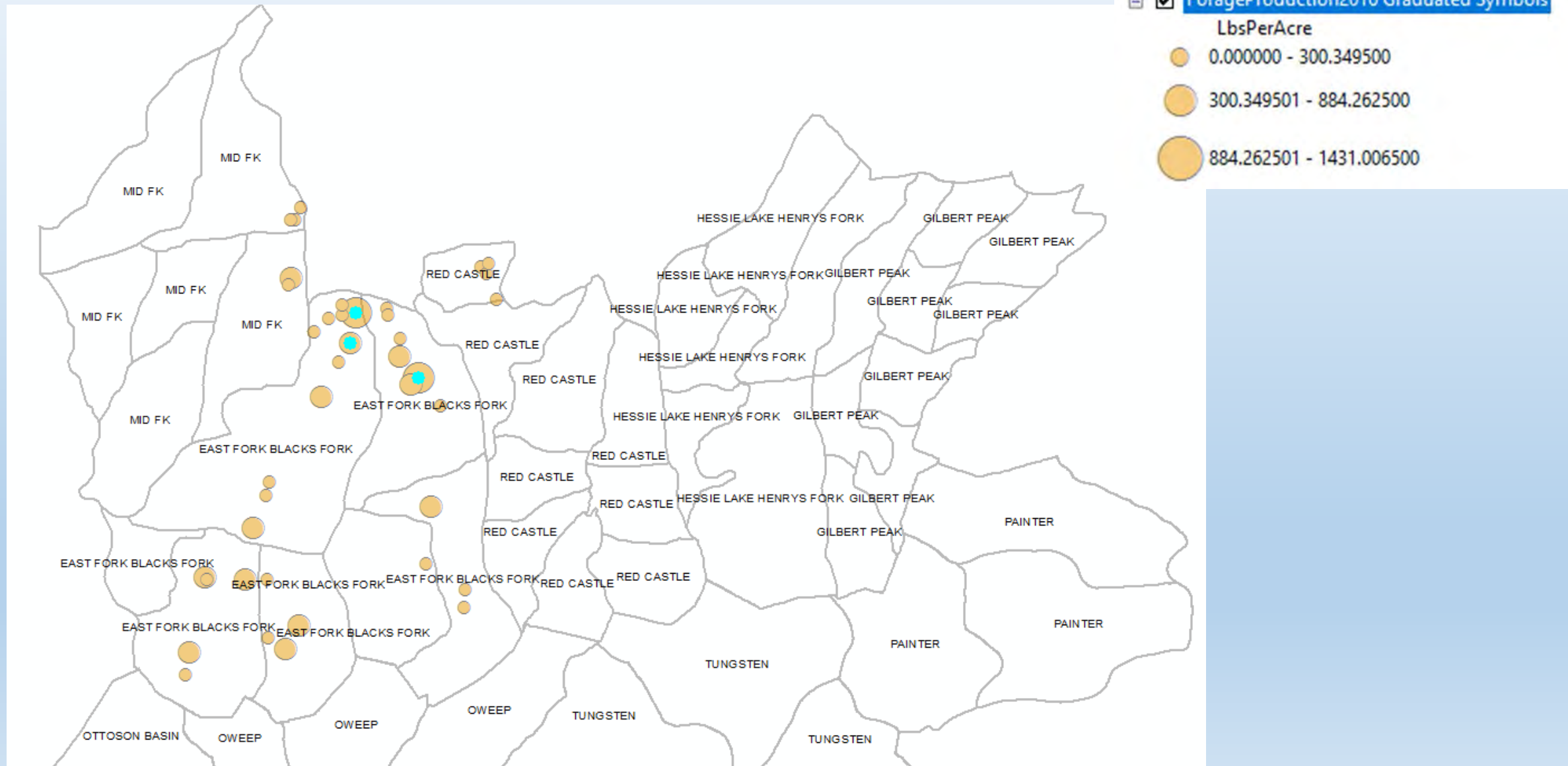


# Overlay 2016 data and 1960s data

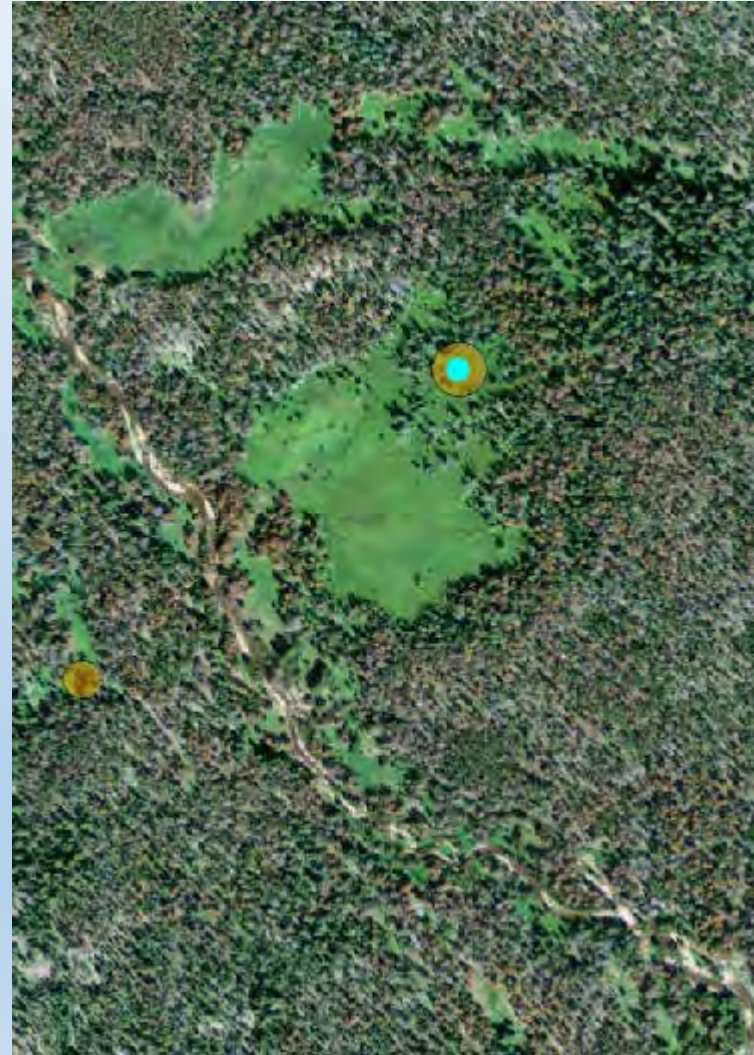




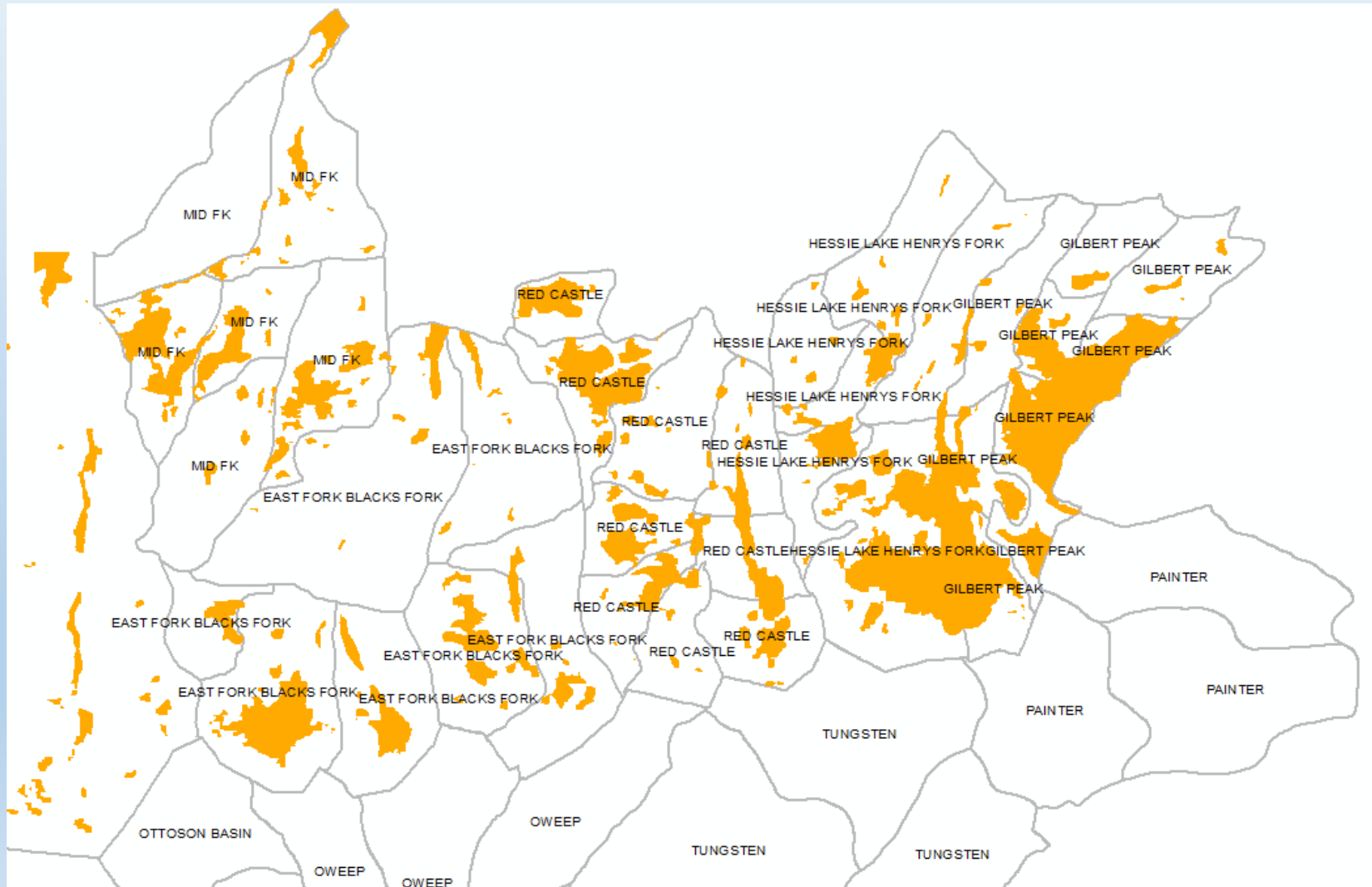
# Location of outliers in 2016



# Location of outliers in 2016 (close up)



# Current extent and location of sheep and cattle grazing capable areas (USFS)



# Uinta Sheep Capability and Stocking Rates

**Emanuel Vasquez, Wild Utah Project**

**John Carter, Yellowstone to Uintas Connection**

**July 2018**



## Some Examples of Conditions



**Alpine Ground Cover (Red Knob Pass) at 12,300'**





**Looking into East Fork Black's  
Fork from Red Knob – Sheep  
Graze These Slopes up to  
12,000' and more**



**Upper Lake Fork Grazed by Sheep Trailed thru WFBF/EFBF? across Red Knob Pass**





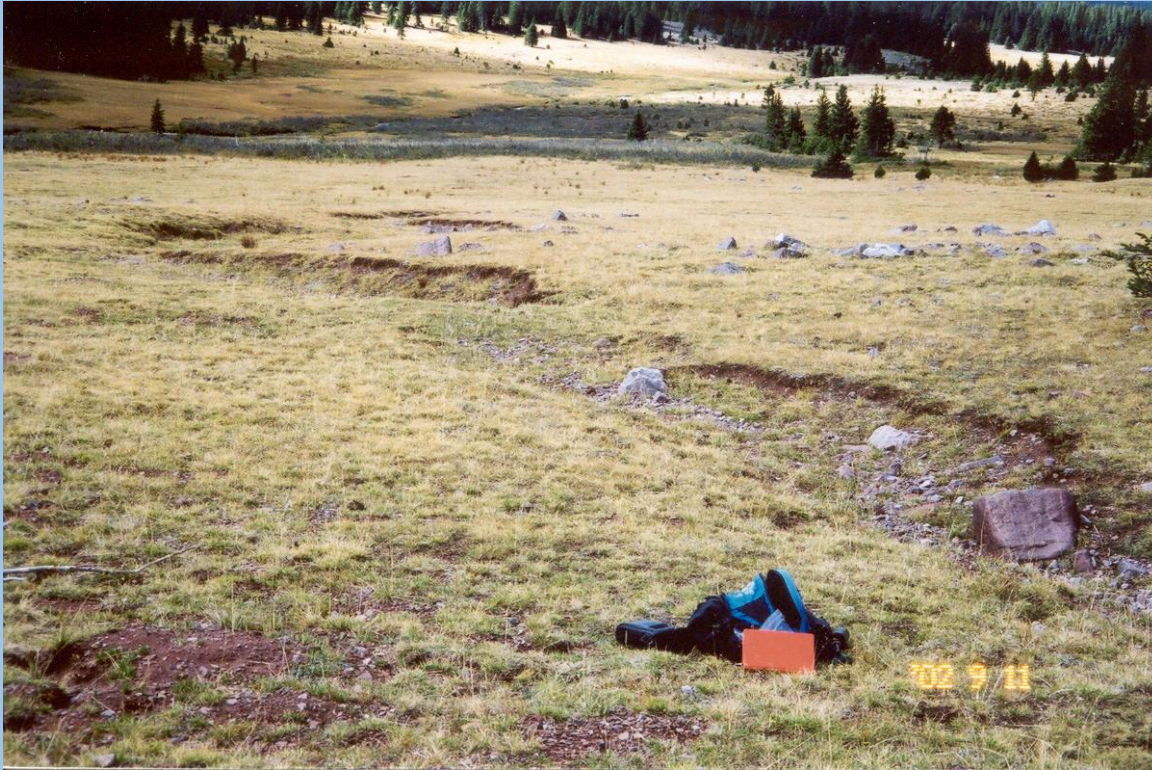
**East Fork Black's Fork – Steep Slopes Grazed**





**EFBF Upper Basin – note barren uplands, braided stream channel**





**East Fork Black's Fork - Active Headcuts**







**Middle Fork Beaver Creek Ungrazed - Healing Headcuts**





**Scouring, sediment in East Fork Black's Fork**





**EFBF Upper Basin – note barren upland slopes, stream bank damage**





**WFBF – Lake EJOD rapidly filling with sediment from eroding uplands.. Note deltas of sediment coming off grazed uplands..Mont Lewis described this effect in 1970 report.**

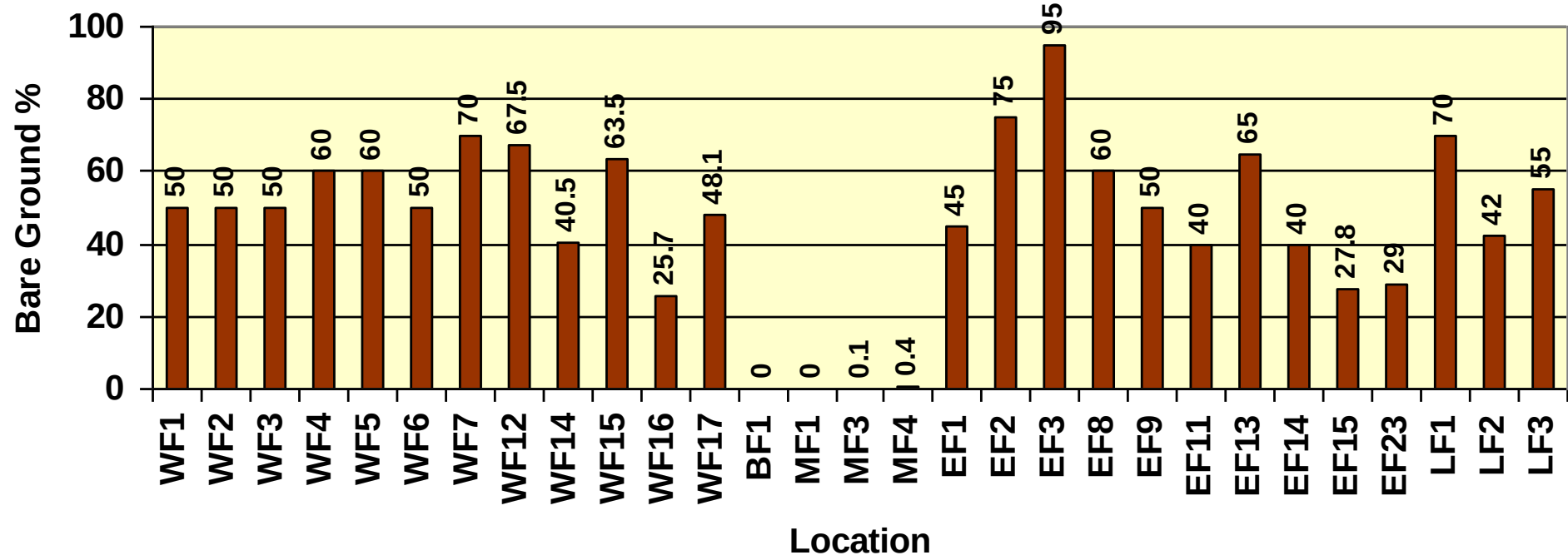




**Small Stream in WFBF on left, similar stream on right in closed watershed...**



# Bare Ground % at Transects and Ocular Photopoints Uinta Wilderness



# Mont Lewis 1970

- **Graze on slopes <20%**
- **Utilization 30%**
- **Bare ground <30%**
- **Wetlands not preferred**
- **Scattered suitable areas a problem**

# Stocking Rate Factors

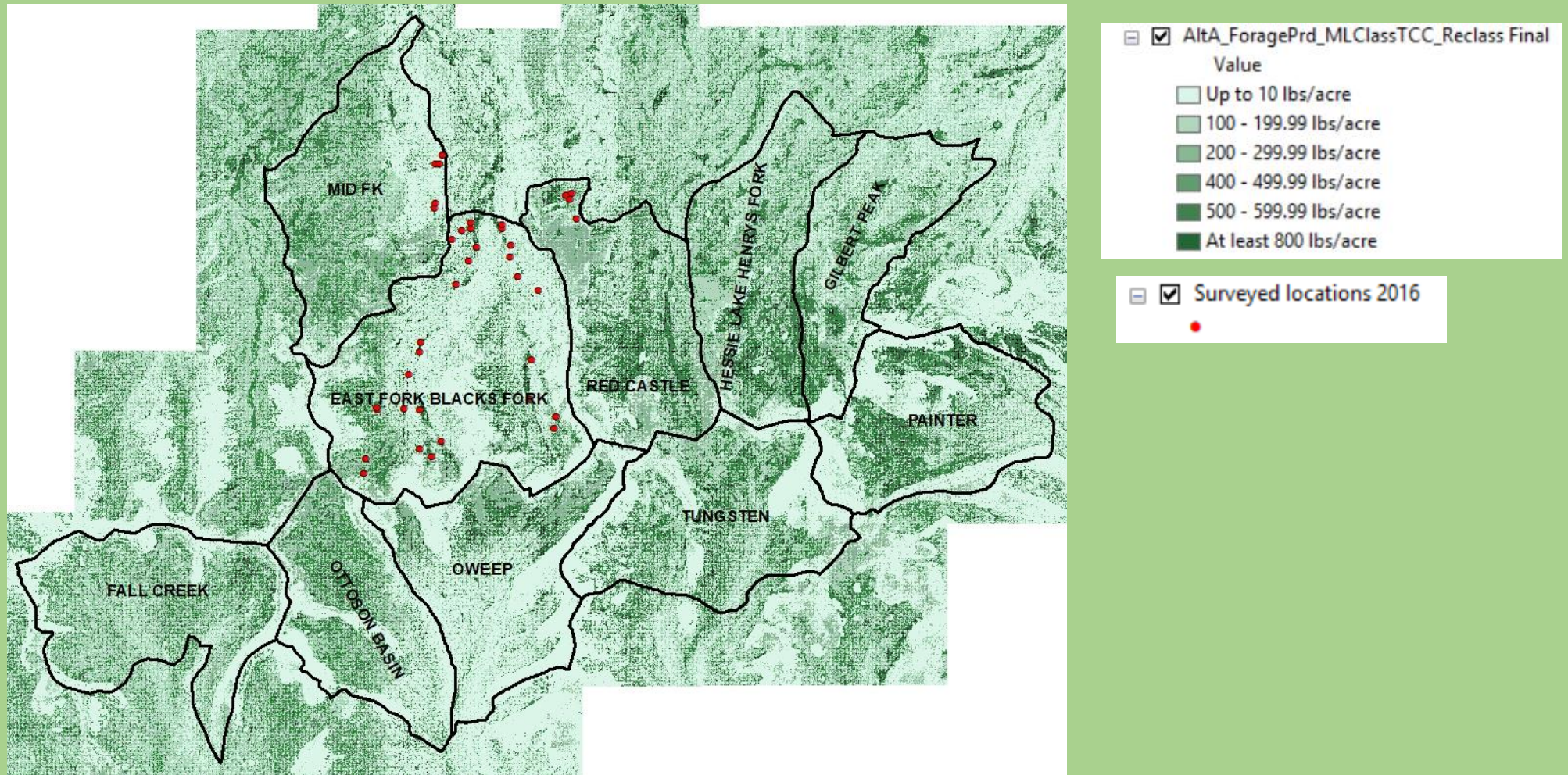
- Ewe/lambs forage consumption 9.9 lb/day or 301 lb/month (based on 125 lb ewe, 80 – 90 lb lambs 1964 R4 Range Analysis Hbk). Note Rambouillet ewes 200 lbs, rams 300. Current USDA weights 132 at slaughter.
- Utilization Rate 30% (Holechek et al recommend 20% during growing season or poor condition, while Lewis recommended 30%).
- Average forage production 294 lb/capable acre (included wetland samples. Would be 211 lb without. 1960's data average 240 lb/acre.



# Alternative A

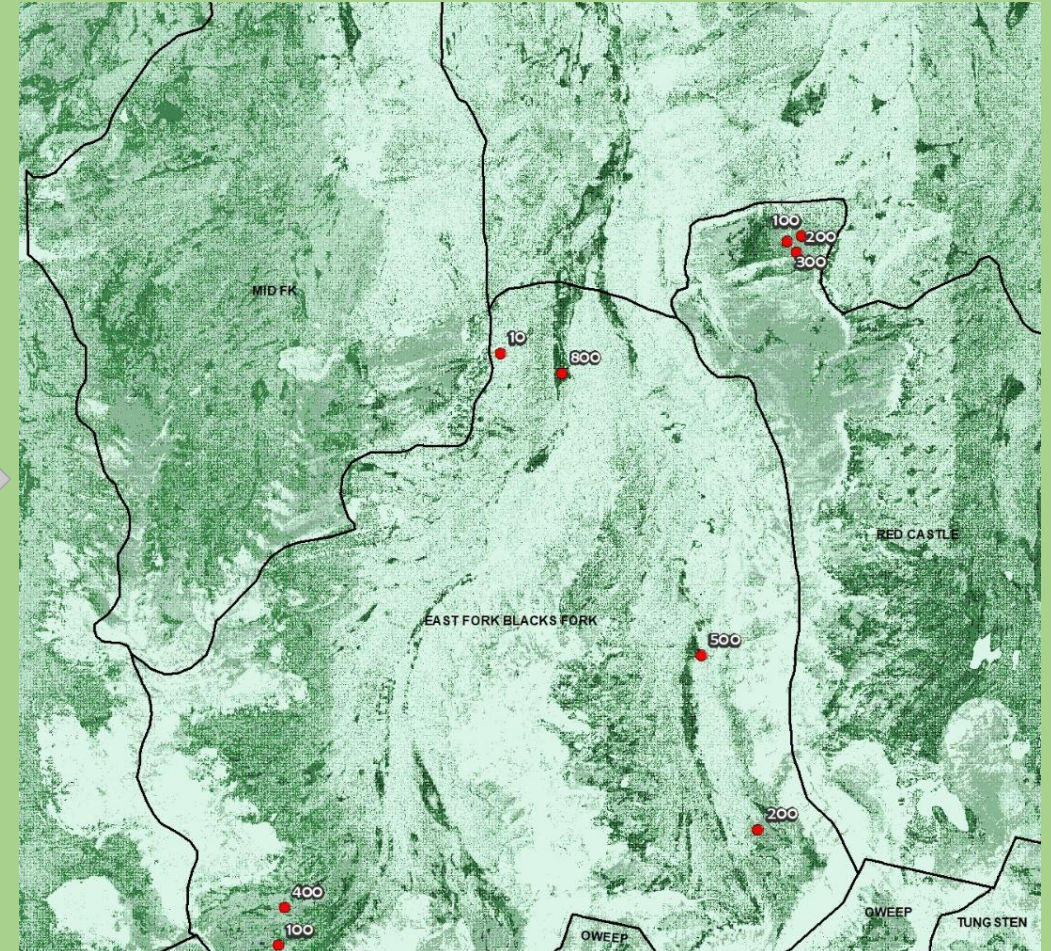
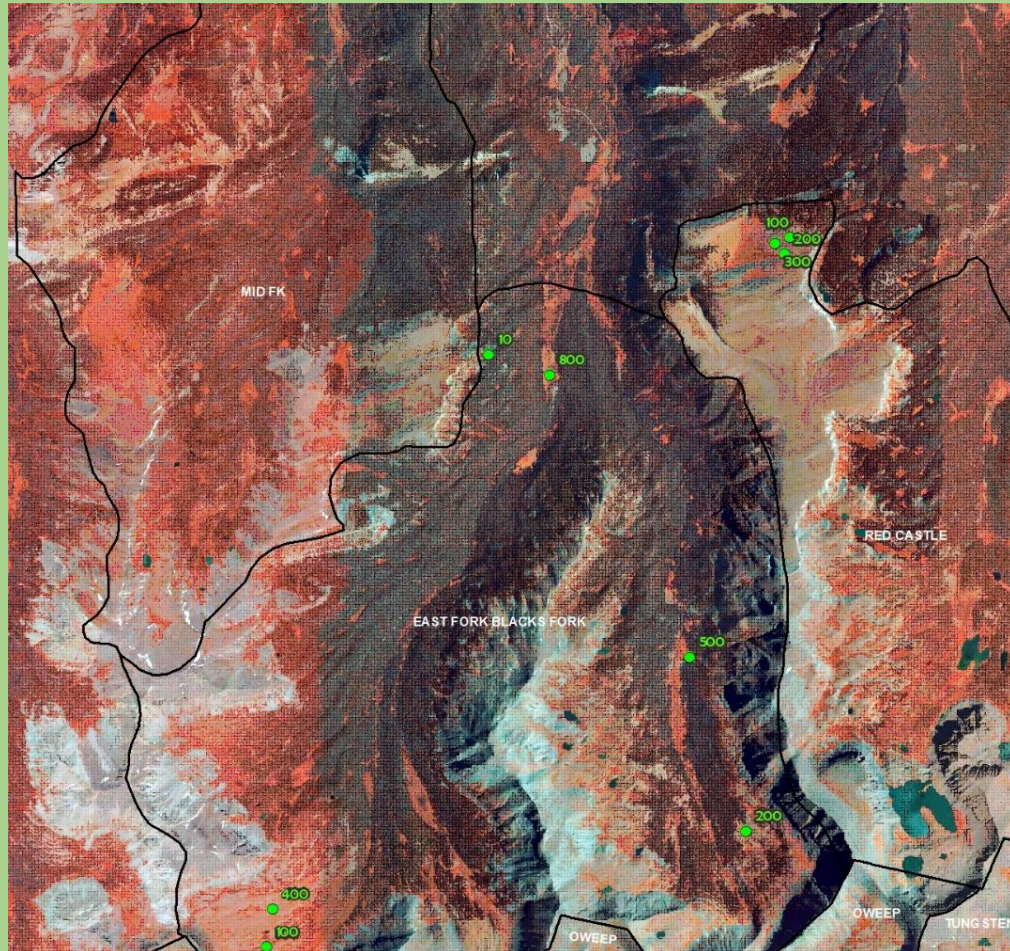
- **Alternative A:** In this alternative, grazing capability is estimated by using a forage production model developed by Wild Utah Project that integrates data collected in 2016 with NAIP-based aerial imagery and an evaluation of USFS grazing capability criteria.
- **Grazing Capability Criteria:**
  - Areas capable of grazing are:
    - < 45 % slope
    - Have a minimum forage production of 200 lbs/acre
    - Areas without dense timber, rock, or other physical barriers
    - Ground cover greater than 60%

# Extent and distribution of forage production model developed by Wild Utah Project



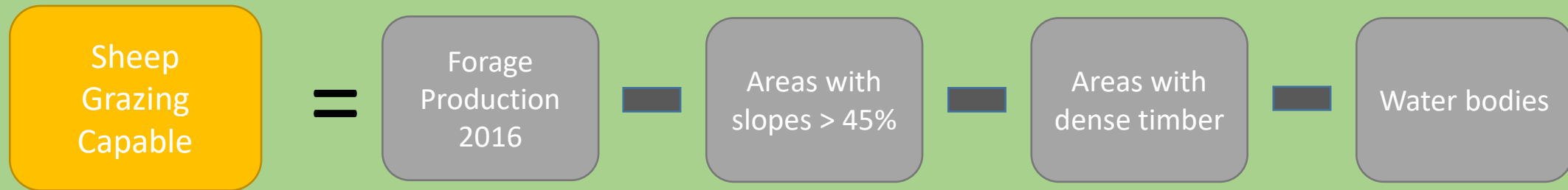


# Forage production derived from aerial imagery and collected data in the field

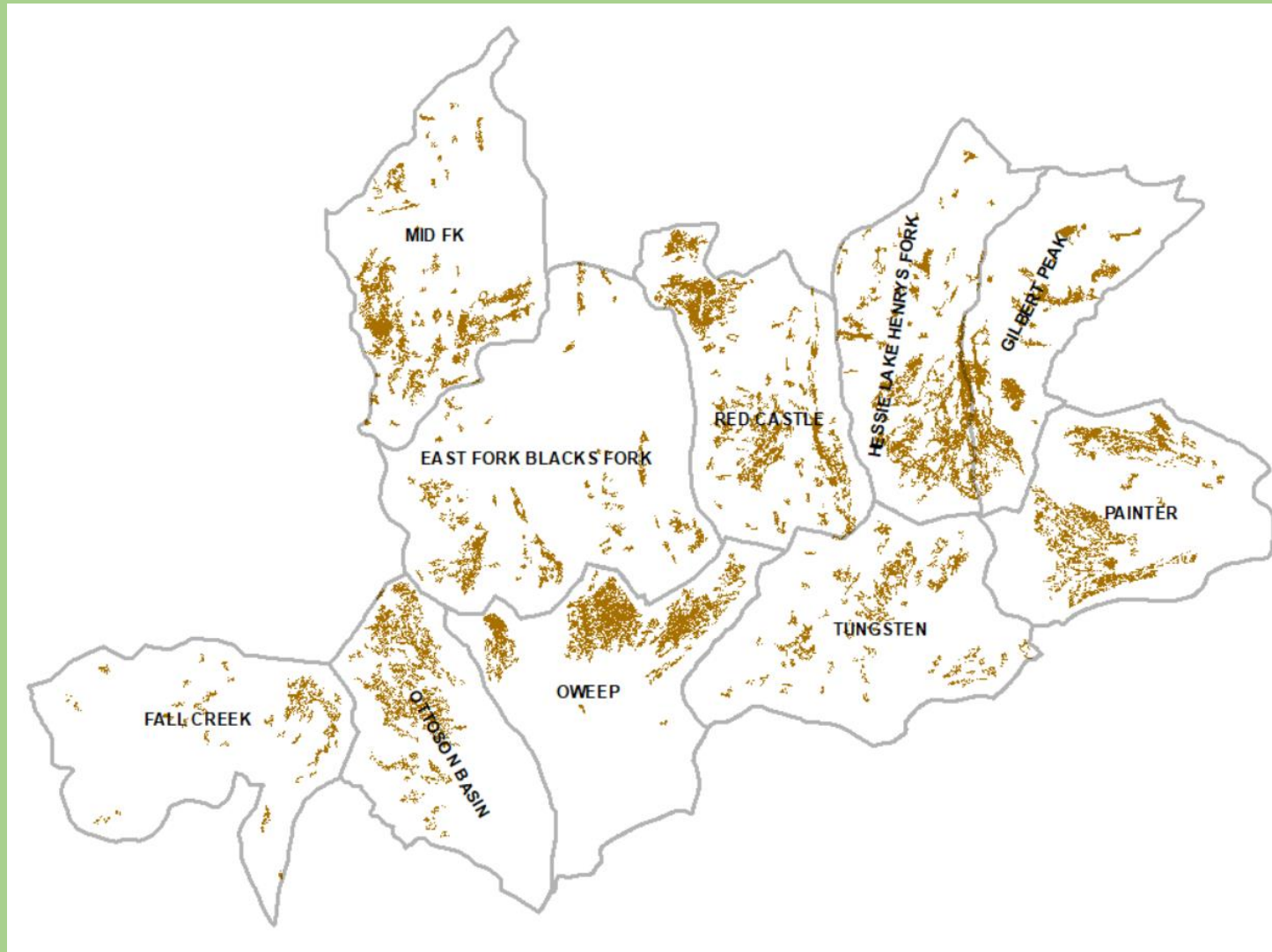




# Alternative A.1: Grazing capability GIS model

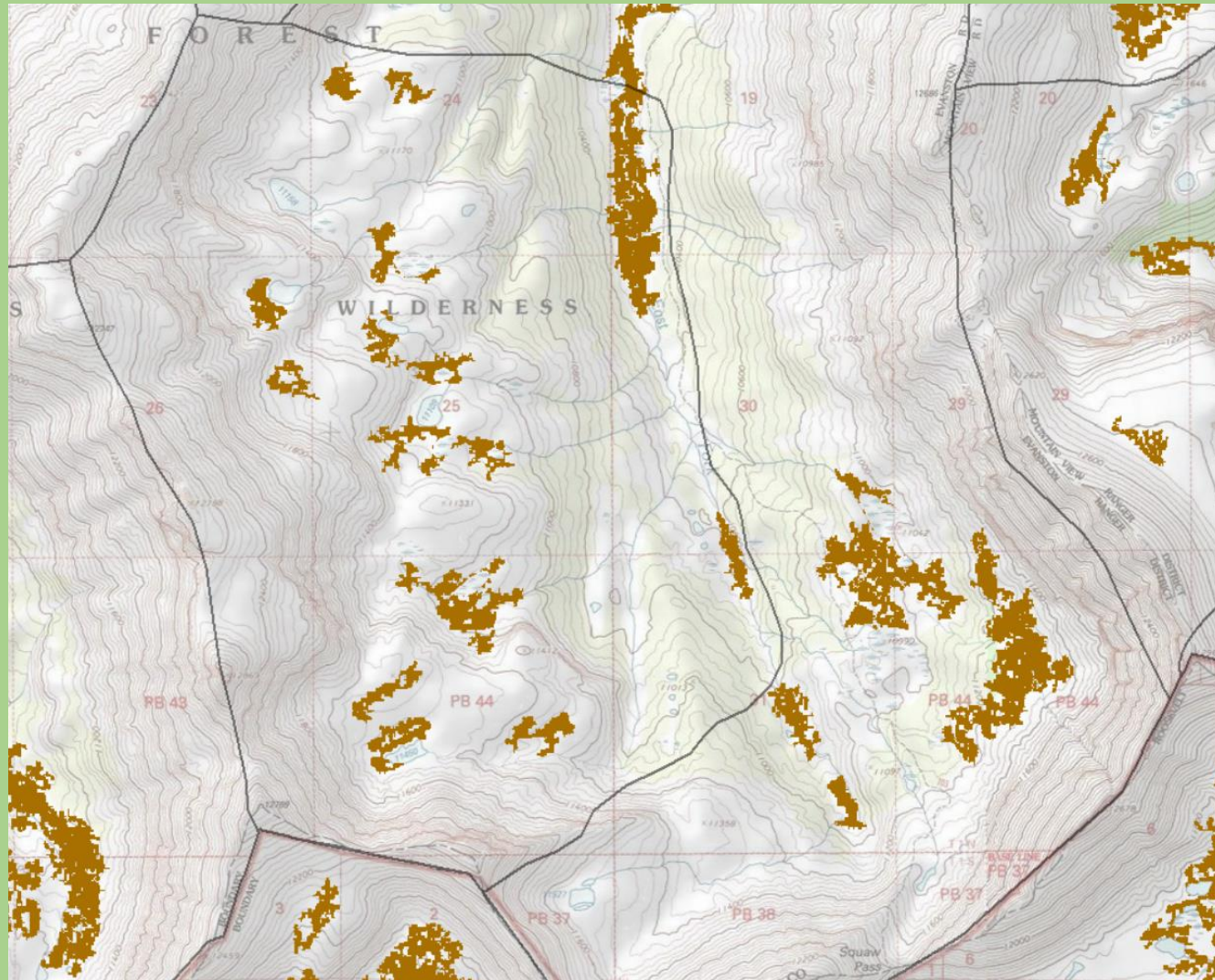


# GIS Results: Alternative A.1



Total acres in Alternative  
A.1 = **14,727**

# GIS Results: Alternative A.1 (close-up)





# GIS Results: Alternative A.1

## Grazing capable acres

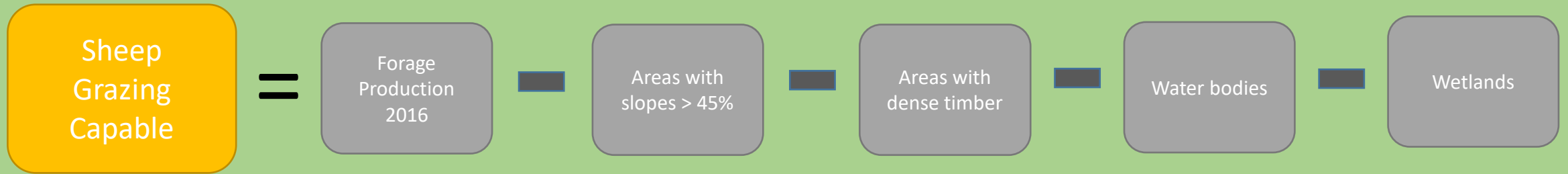
| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 1126.77          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 1324.44          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1905.74          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1711.09          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2167.79          |
| FALL CREEK              | Ashley National Forest              | 513.97           |
| OTTOSON BASIN           | Ashley National Forest              | 1401.96          |
| OWEEP                   | Ashley National Forest              | 1887.58          |
| PAINTER                 | Ashley National Forest              | 1656.45          |
| TUNGSTEN                | Ashley National Forest              | 1031.32          |
|                         | <b>TOTAL ACRES</b>                  | <b>14,727.13</b> |

# GIS Results: Alternative A.1

## Grazing stocking rates

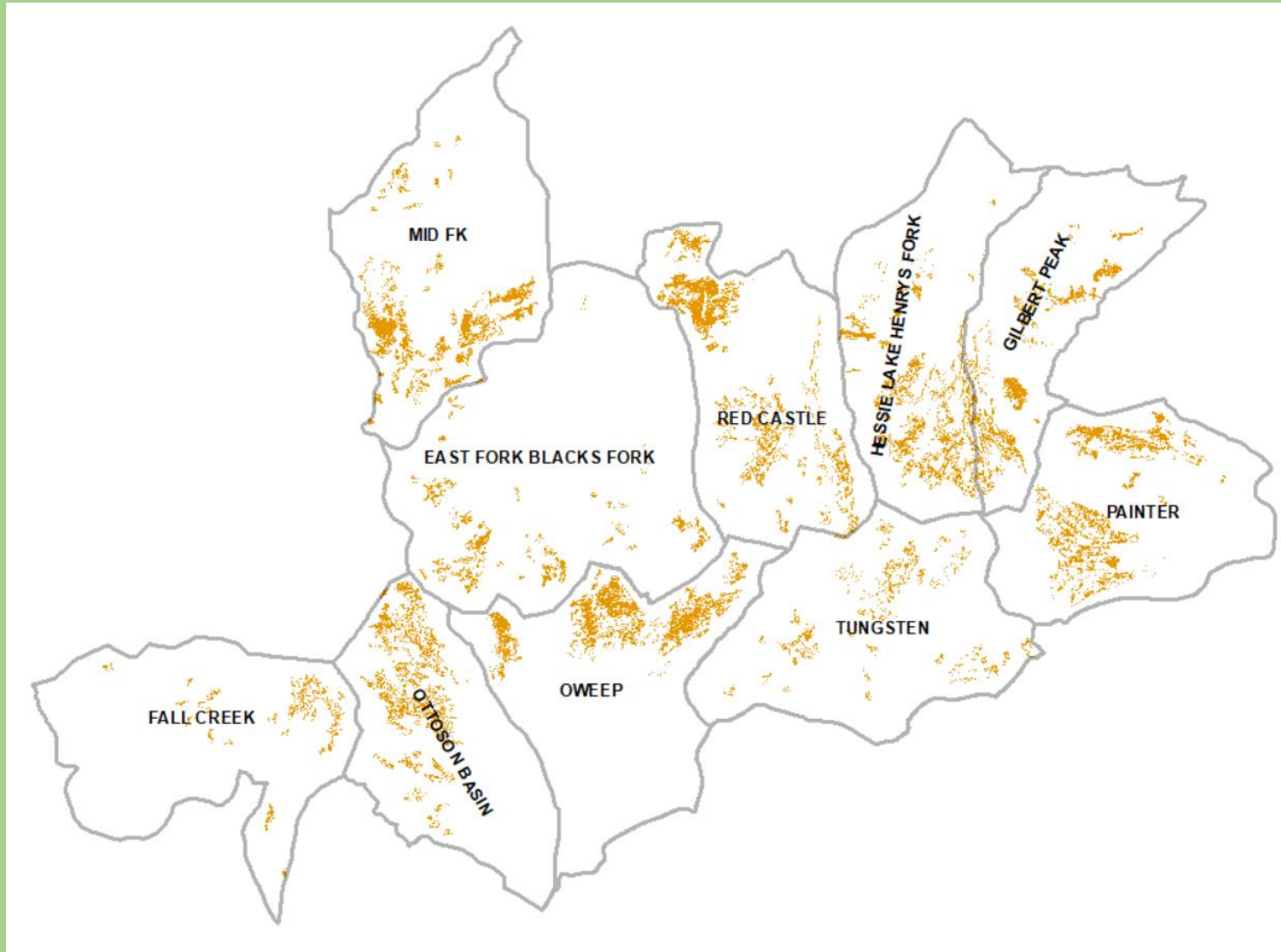
| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 14727         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1126          | 294                                | 331044                          | 99313                       | 301                                                    | 1350                     | 0.24                                      |
| FALL CREEK              | 514           | 294                                | 151116                          | 45335                       | 301                                                    | 1100                     | 0.14                                      |
| GILBERT PEAK            | 1324          | 294                                | 389256                          | 116777                      | 301                                                    | 1400                     | 0.28                                      |
| HESSIE LAKE HENRYS FORK | 1905          | 294                                | 560070                          | 168021                      | 301                                                    | 1400                     | 0.40                                      |
| MID FK                  | 1711          | 294                                | 503034                          | 150910                      | 301                                                    | 1200                     | 0.42                                      |
| OTTOSON BASIN           | 1401          | 294                                | 411894                          | 123568                      | 301                                                    | 1300                     | 0.32                                      |
| OWEEP                   | 1887          | 294                                | 554778                          | 166433                      | 301                                                    | 1400                     | 0.39                                      |
| PAINTER                 | 1656          | 294                                | 486864                          | 146059                      | 301                                                    | 1200                     | 0.40                                      |
| RED CASTLE              | 2167          | 294                                | 637098                          | 191129                      | 301                                                    | 1300                     | 0.49                                      |
| TUNGSTEN                | 1031          | 294                                | 303114                          | 90934                       | 301                                                    | 1200                     | 0.25                                      |

# Alternative A.2: GIS model



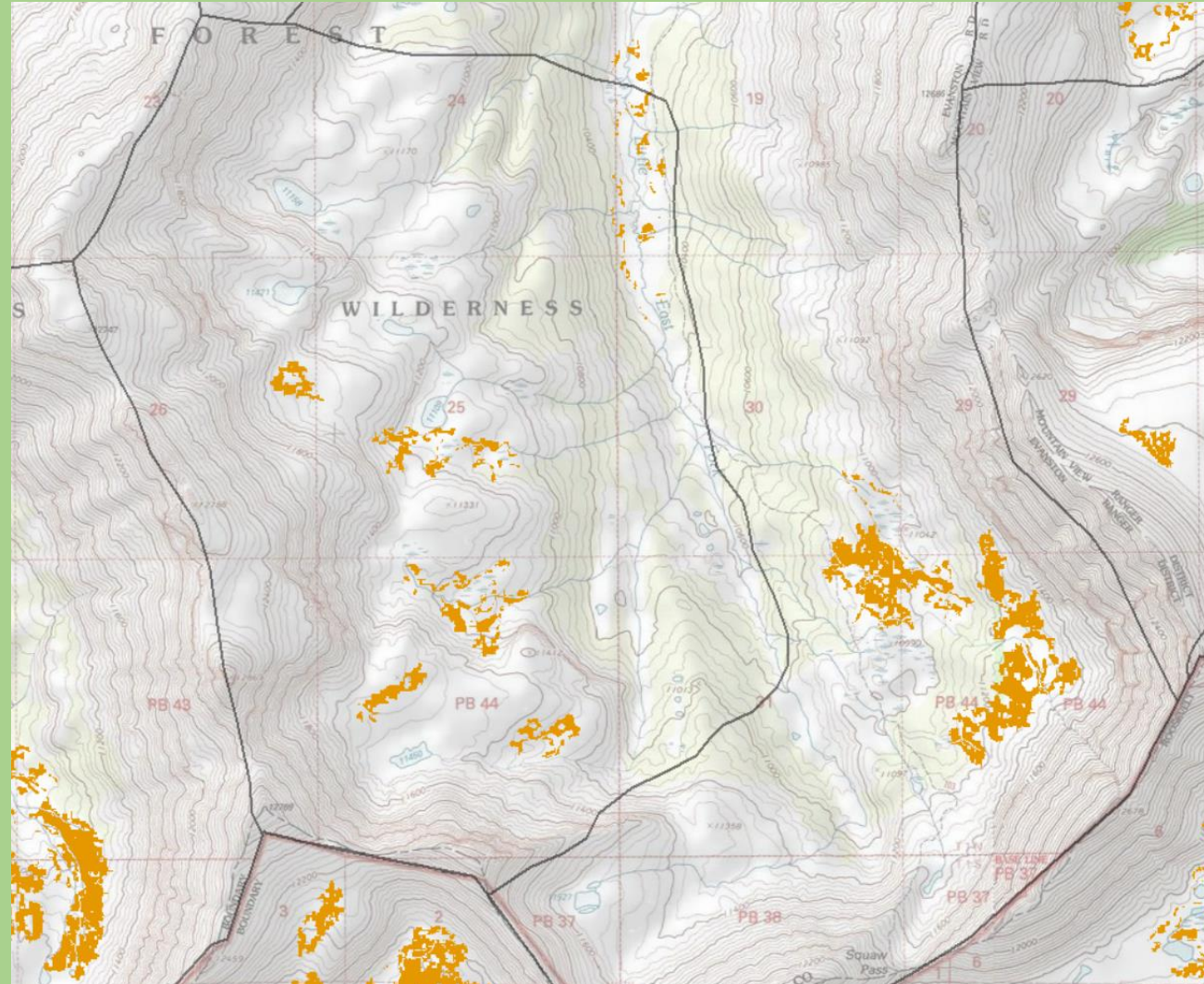


# GIS Results: Alternative A.2



Total acres in Alternative  
A.2 = **9,684**

# GIS Results: Alternative A.2 (close-up)



# GIS Results: Alternative A.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 612.96           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 846.03           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1102.71          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1196.75          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 1449.20          |
| FALL CREEK              | Ashley National Forest              | 319.32           |
| OTTOSON BASIN           | Ashley National Forest              | 1098.64          |
| OWEEP                   | Ashley National Forest              | 1345.76          |
| PAINTER                 | Ashley National Forest              | 1186.43          |
| TUNGSTEN                | Ashley National Forest              | 526.71           |
|                         | <b>TOTAL ACRES</b>                  | <b>9,684.50</b>  |

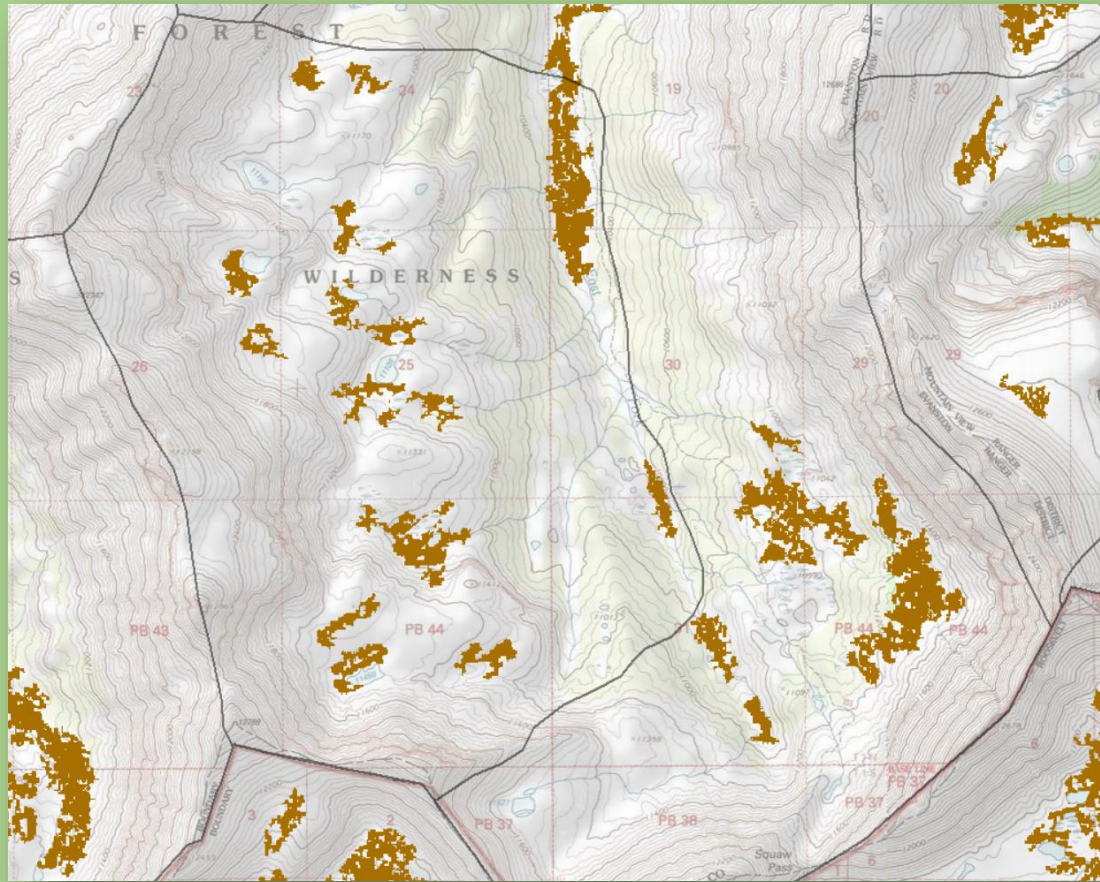


# GIS Results: Alternative A.2

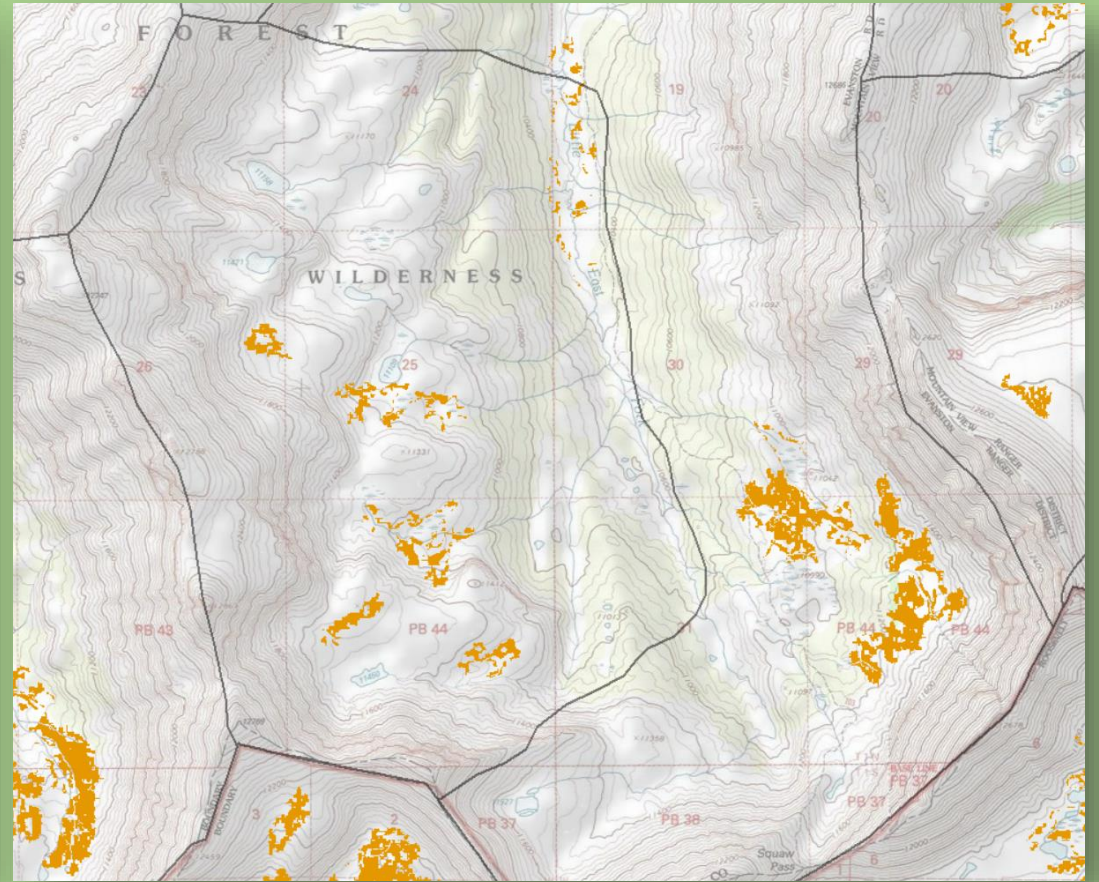
## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 9685          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 613           | 294                                | 180222                          | 54066.6                     | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 319           | 294                                | 93786                           | 28135.8                     | 301                                                    | 1100                     | 0.08                                      |
| GILBERT PEAK            | 846           | 294                                | 248724                          | 74617.2                     | 301                                                    | 1400                     | 0.18                                      |
| HESSIE LAKE HENRYS FORK | 1103          | 294                                | 324282                          | 97284.6                     | 301                                                    | 1400                     | 0.23                                      |
| MID FK                  | 1197          | 294                                | 351918                          | 105575.4                    | 301                                                    | 1200                     | 0.29                                      |
| OTTOSON BASIN           | 1099          | 294                                | 323106                          | 96931.8                     | 301                                                    | 1300                     | 0.25                                      |
| OWEEP                   | 1346          | 294                                | 395724                          | 118717.2                    | 301                                                    | 1400                     | 0.28                                      |
| PAINTER                 | 1186          | 294                                | 348684                          | 104605.2                    | 301                                                    | 1200                     | 0.29                                      |
| RED CASTLE              | 1449          | 294                                | 426006                          | 127801.8                    | 301                                                    | 1300                     | 0.33                                      |
| TUNGSTEN                | 527           | 294                                | 154938                          | 46481.4                     | 301                                                    | 1200                     | 0.13                                      |

# GIS Results: Comparison between A.1 and A.2 (close-up)



A.1



A.2

# GIS Results: Comparison between A.1 and A.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A1          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 14727         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1126          | 294                                | 331044                          | 99313                       | 301                                                    | 1350                     | 0.24                                      |
| FALL CREEK              | 514           | 294                                | 151116                          | 45335                       | 301                                                    | 1100                     | 0.14                                      |
| GILBERT PEAK            | 1324          | 294                                | 389256                          | 116777                      | 301                                                    | 1400                     | 0.28                                      |
| HESSIE LAKE HENRYS FORK | 1905          | 294                                | 560070                          | 168021                      | 301                                                    | 1400                     | 0.40                                      |
| MID FK                  | 1711          | 294                                | 503034                          | 150910                      | 301                                                    | 1200                     | 0.42                                      |
| OTTOSON BASIN           | 1401          | 294                                | 411894                          | 123568                      | 301                                                    | 1300                     | 0.32                                      |
| OWEEP                   | 1887          | 294                                | 554778                          | 166433                      | 301                                                    | 1400                     | 0.39                                      |
| PAINTER                 | 1656          | 294                                | 486864                          | 146059                      | 301                                                    | 1200                     | 0.40                                      |
| RED CASTLE              | 2167          | 294                                | 637098                          | 191129                      | 301                                                    | 1300                     | 0.49                                      |
| TUNGSTEN                | 1031          | 294                                | 303114                          | 90934                       | 301                                                    | 1200                     | 0.25                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative A2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 9685          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 613           | 294                                | 180222                          | 54066.6                     | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 319           | 294                                | 93786                           | 28135.8                     | 301                                                    | 1100                     | 0.08                                      |
| GILBERT PEAK            | 846           | 294                                | 248724                          | 74617.2                     | 301                                                    | 1400                     | 0.18                                      |
| HESSIE LAKE HENRYS FORK | 1103          | 294                                | 324282                          | 97284.6                     | 301                                                    | 1400                     | 0.23                                      |
| MID FK                  | 1197          | 294                                | 351918                          | 105575.4                    | 301                                                    | 1200                     | 0.29                                      |
| OTTOSON BASIN           | 1099          | 294                                | 323106                          | 96931.8                     | 301                                                    | 1300                     | 0.25                                      |
| OWEEP                   | 1346          | 294                                | 395724                          | 118717.2                    | 301                                                    | 1400                     | 0.28                                      |
| PAINTER                 | 1186          | 294                                | 348684                          | 104605.2                    | 301                                                    | 1200                     | 0.29                                      |
| RED CASTLE              | 1449          | 294                                | 426006                          | 127801.8                    | 301                                                    | 1300                     | 0.33                                      |
| TUNGSTEN                | 527           | 294                                | 154938                          | 46481.4                     | 301                                                    | 1200                     | 0.13                                      |



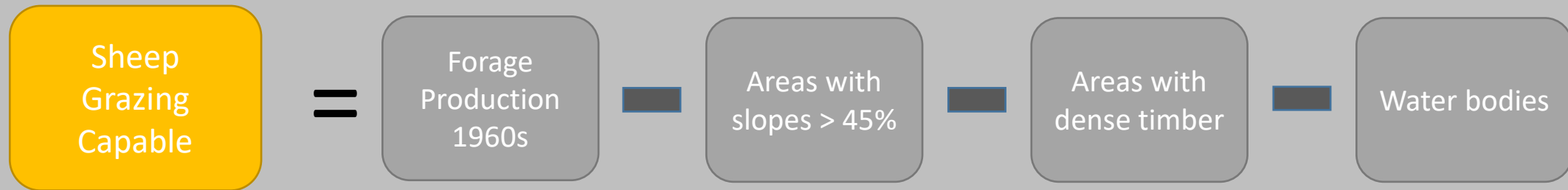
# Alternative B

- Alternative B: grazing capability is derived from the forage production (digitized) data that was collected back in the 1960s and implementation of the USFS grazing capability criteria.
- Grazing Capability Criteria:
  - Areas capable of grazing are:
    - < 45 % slope
    - Have a minimum forage production of 200 lbs/acre
    - Areas without dense timber, rock, or other physical barriers
    - Ground cover greater than 60%

# Original extent and distribution of forage production data from 1960



# Alternative B.1: GIS model





# GIS Results: Alternative B.1



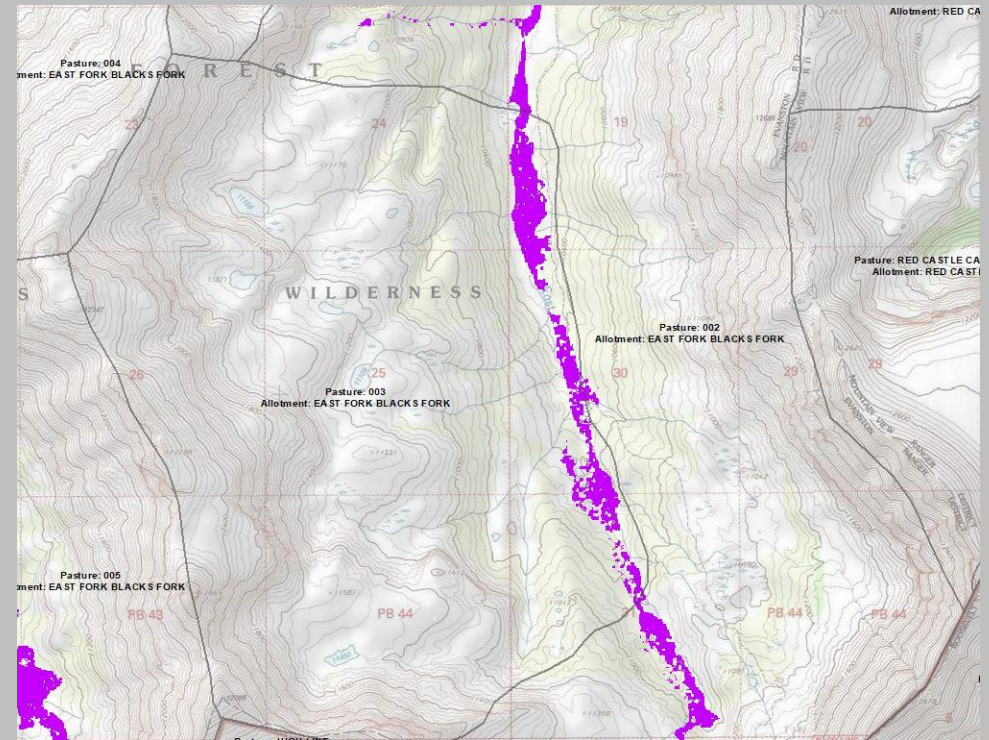
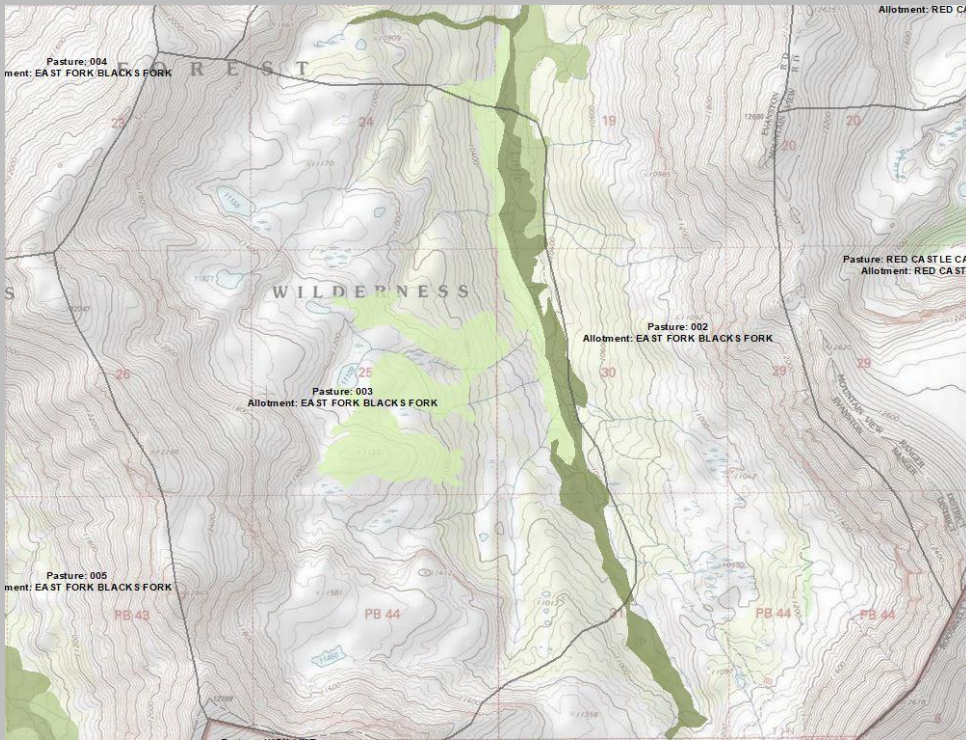
Total acres in Alternative  
B.1 = **4,485**

# GIS Results: Alternative B.1

BEFORE

Forage production -> capable

AFTER



# GIS Results: Alternative B.1

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 580.01           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 577.14           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 180.17           |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1009.25          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 843.75           |
| FALL CREEK              | Ashley National Forest              | 869.93           |
| OTTOSON BASIN           | Ashley National Forest              | 24.42            |
| OWEEP                   | Ashley National Forest              | 15.57            |
| PAINTER                 | Ashley National Forest              | 384.82           |
| TUNGSTEN                | Ashley National Forest              | 0                |
|                         | <b>TOTAL ACRES</b>                  | <b>4,485.06</b>  |

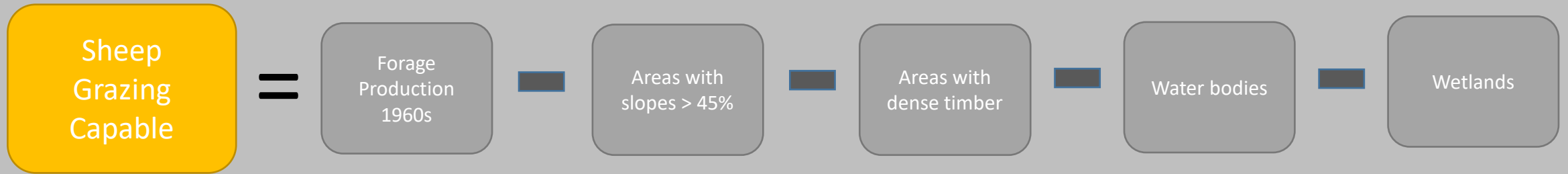


# GIS Results: Alternative B.1

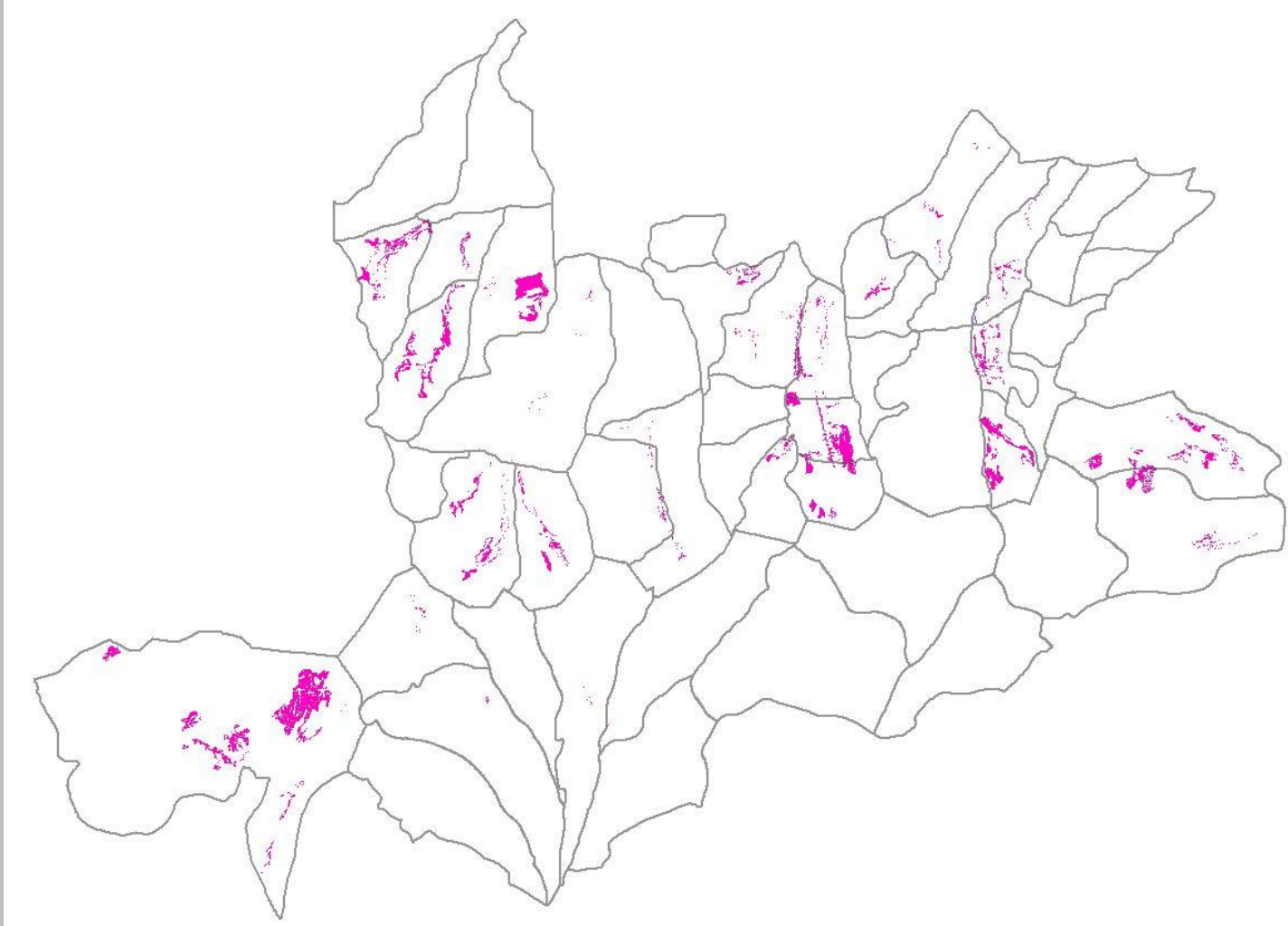
## Grazing stocking rates

| Allotment                      | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B1</b>          |               |                                    |                                 |                             |                                                        |                          |                                           |
| <b>Grand Total</b>             | <b>4485</b>   |                                    |                                 |                             |                                                        |                          |                                           |
| <b>EAST FORK BLACKS FORK</b>   | <b>580</b>    | <b>294</b>                         | <b>170520</b>                   | <b>51156</b>                | <b>301</b>                                             | <b>1350</b>              | <b>0.13</b>                               |
| <b>FALL CREEK</b>              | <b>870</b>    | <b>294</b>                         | <b>255780</b>                   | <b>76734</b>                | <b>301</b>                                             | <b>1100</b>              | <b>0.23</b>                               |
| <b>GILBERT PEAK</b>            | <b>577</b>    | <b>294</b>                         | <b>169638</b>                   | <b>50891.4</b>              | <b>301</b>                                             | <b>1400</b>              | <b>0.12</b>                               |
| <b>HESSIE LAKE HENRYS FORK</b> | <b>180</b>    | <b>294</b>                         | <b>52920</b>                    | <b>15876</b>                | <b>301</b>                                             | <b>1400</b>              | <b>0.04</b>                               |
| <b>MID FK</b>                  | <b>1009</b>   | <b>294</b>                         | <b>296646</b>                   | <b>88993.8</b>              | <b>301</b>                                             | <b>1200</b>              | <b>0.25</b>                               |
| <b>OTTOSON BASIN</b>           | <b>24</b>     | <b>294</b>                         | <b>7056</b>                     | <b>2116.8</b>               | <b>301</b>                                             | <b>1300</b>              | <b>0.01</b>                               |
| <b>OWEEP</b>                   | <b>16</b>     | <b>294</b>                         | <b>4704</b>                     | <b>1411.2</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.00</b>                               |
| <b>PAINTER</b>                 | <b>385</b>    | <b>294</b>                         | <b>113190</b>                   | <b>33957</b>                | <b>301</b>                                             | <b>1200</b>              | <b>0.09</b>                               |
| <b>RED CASTLE</b>              | <b>855</b>    | <b>294</b>                         | <b>251370</b>                   | <b>75411</b>                | <b>301</b>                                             | <b>1300</b>              | <b>0.19</b>                               |
| <b>TUNGSTEN</b>                | <b>0</b>      | <b>294</b>                         | <b>0</b>                        | <b>0</b>                    | <b>301</b>                                             | <b>1200</b>              | <b>0.00</b>                               |

# Alternative B.2: GIS model



# GIS Results: Alternative B.2



Total acres in Alternative  
B.2 = **2,888**

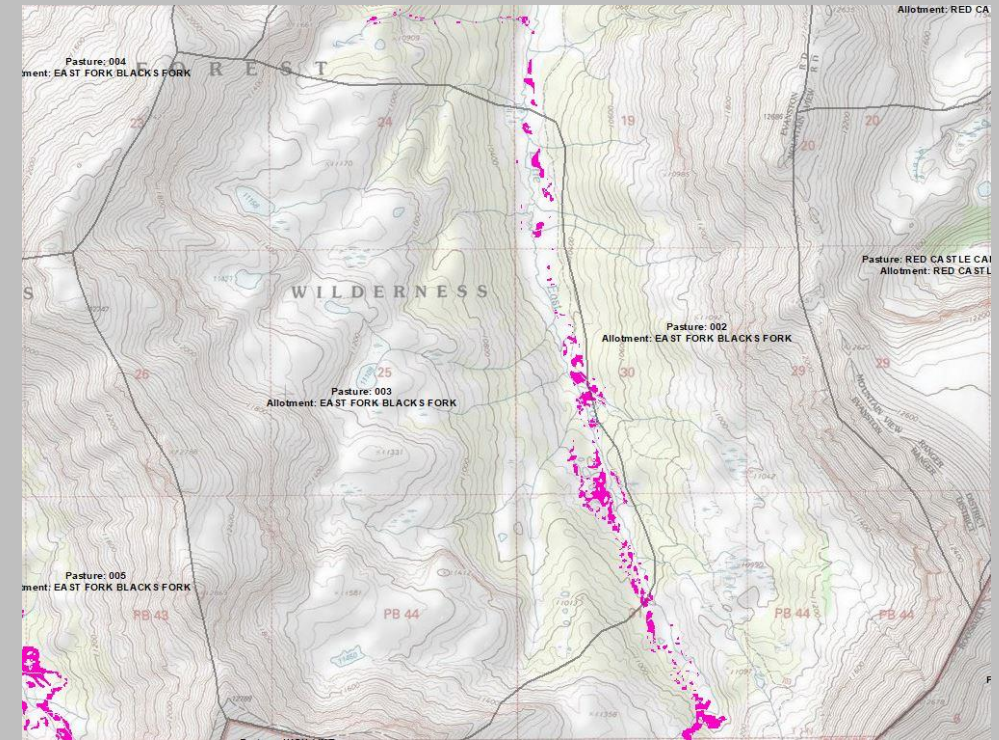
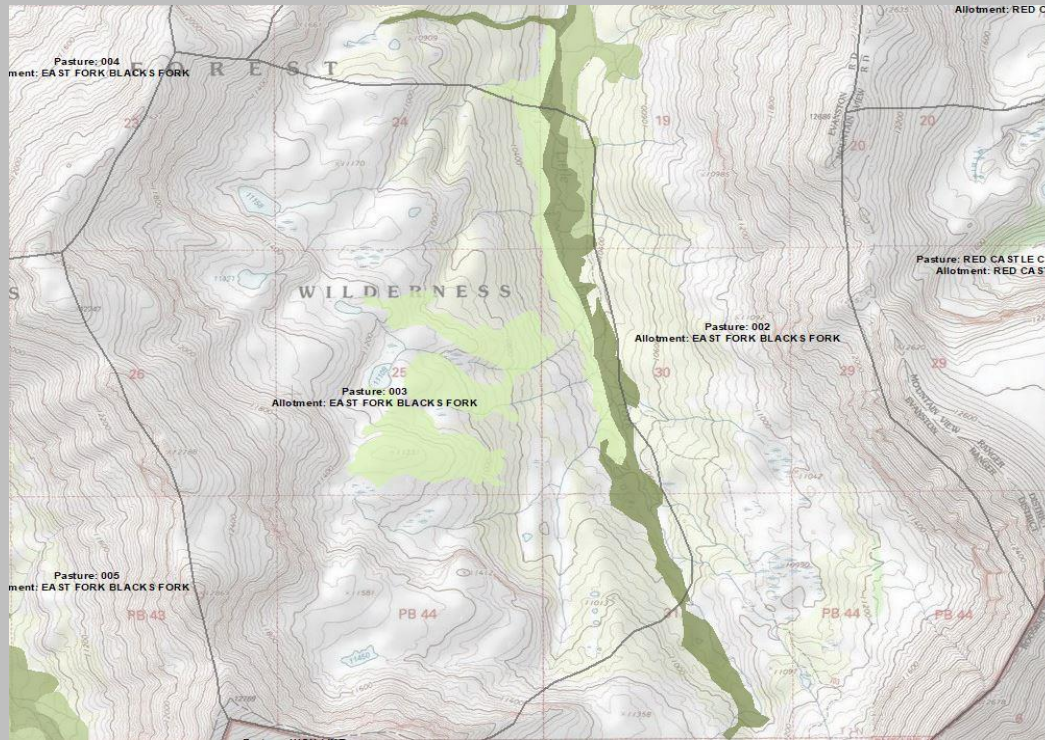


# GIS Results: Alternative B.2

BEFORE

Forage production -> capable

AFTER



# GIS Results: Alternative B.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 262.92           |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 354.74           |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 55.80            |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 634.63           |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 510.21           |
| FALL CREEK              | Ashley National Forest              | 734.38           |
| OTTOSON BASIN           | Ashley National Forest              | 13.81            |
| OWEEP                   | Ashley National Forest              | 4.26             |
| PAINTER                 | Ashley National Forest              | 317.96           |
| TUNGSTEN                | Ashley National Forest              | 0                |
|                         | <b>TOTAL ACRES</b>                  | <b>2,888.69</b>  |

# GIS Results: Alternative B.2

## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative B2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 2889          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 263           | 294                                | 77322                           | 23196.6                     | 301                                                    | 1350                     | 0.06                                      |
| FALL CREEK              | 734           | 294                                | 215796                          | 64738.8                     | 301                                                    | 1100                     | 0.20                                      |
| GILBERT PEAK            | 355           | 294                                | 104370                          | 31311                       | 301                                                    | 1400                     | 0.07                                      |
| HESSIE LAKE HENRYS FORK | 56            | 294                                | 16464                           | 4939.2                      | 301                                                    | 1400                     | 0.01                                      |
| MID FK                  | 634           | 294                                | 186396                          | 55918.8                     | 301                                                    | 1200                     | 0.15                                      |
| OTTOSON BASIN           | 14            | 294                                | 4116                            | 1234.8                      | 301                                                    | 1300                     | 0.00                                      |
| OWEEP                   | 4             | 294                                | 1176                            | 352.8                       | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 317           | 294                                | 93198                           | 27959.4                     | 301                                                    | 1200                     | 0.08                                      |
| RED CASTLE              | 510           | 294                                | 149940                          | 44982                       | 301                                                    | 1300                     | 0.11                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |



# GIS Results: Comparison between B.1 and B.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B1</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 4485          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 580           | 294                                | 170520                          | 51156                       | 301                                                    | 1350                     | 0.13                                      |
| FALL CREEK              | 870           | 294                                | 255780                          | 76734                       | 301                                                    | 1100                     | 0.23                                      |
| GILBERT PEAK            | 577           | 294                                | 169638                          | 50891.4                     | 301                                                    | 1400                     | 0.12                                      |
| HESSIE LAKE HENRYS FORK | 180           | 294                                | 52920                           | 15876                       | 301                                                    | 1400                     | 0.04                                      |
| MID FK                  | 1009          | 294                                | 296646                          | 88993.8                     | 301                                                    | 1200                     | 0.25                                      |
| OTTOSON BASIN           | 24            | 294                                | 7056                            | 2116.8                      | 301                                                    | 1300                     | 0.01                                      |
| OWEET                   | 16            | 294                                | 4704                            | 1411.2                      | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 385           | 294                                | 113190                          | 33957                       | 301                                                    | 1200                     | 0.09                                      |
| RED CASTLE              | 855           | 294                                | 251370                          | 75411                       | 301                                                    | 1300                     | 0.19                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative B2</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 2889          |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 263           | 294                                | 77322                           | 23196.6                     | 301                                                    | 1350                     | 0.06                                      |
| FALL CREEK              | 734           | 294                                | 215796                          | 64738.8                     | 301                                                    | 1100                     | 0.20                                      |
| GILBERT PEAK            | 355           | 294                                | 104370                          | 31311                       | 301                                                    | 1400                     | 0.07                                      |
| HESSIE LAKE HENRYS FORK | 56            | 294                                | 16464                           | 4939.2                      | 301                                                    | 1400                     | 0.01                                      |
| MID FK                  | 634           | 294                                | 186396                          | 55918.8                     | 301                                                    | 1200                     | 0.15                                      |
| OTTOSON BASIN           | 14            | 294                                | 4116                            | 1234.8                      | 301                                                    | 1300                     | 0.00                                      |
| OWEET                   | 4             | 294                                | 1176                            | 352.8                       | 301                                                    | 1400                     | 0.00                                      |
| PAINTER                 | 317           | 294                                | 93198                           | 27959.4                     | 301                                                    | 1200                     | 0.08                                      |
| RED CASTLE              | 510           | 294                                | 149940                          | 44982                       | 301                                                    | 1300                     | 0.11                                      |
| TUNGSTEN                | 0             | 294                                | 0                               | 0                           | 301                                                    | 1200                     | 0.00                                      |

# Alternative C

- **Alternative C correspond to an evaluation of the grazing capability layer by USFS against the criteria for capability also proposed by USFS**
- **Grazing Capability Criteria:**
  - **Areas capable of grazing are:**
    - **< 45 % slope**
    - **Have a minimum forage production of 200 lbs/acre**
    - **Areas without dense timber, rock, or other physical barriers**
    - **Ground cover greater than 60%**

# Assumption about the USFS Capability Dataset

Given that the provided dataset does not provide specific values for forage production and ground cover we made the following assumptions:

- Forage production in polygons classified as capable is at least 200 lbs/acre
- Ground cover is at least 60%



# Original extent and distribution of capable lands according to USFS

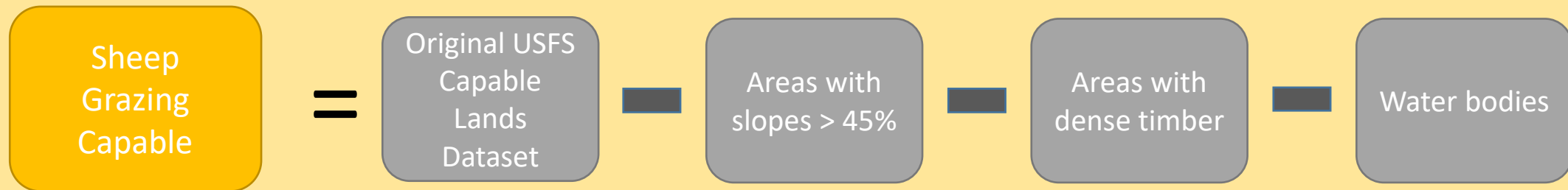


Total acres of USFS capable areas = **57,399**

# Estimated capable acres by allotment

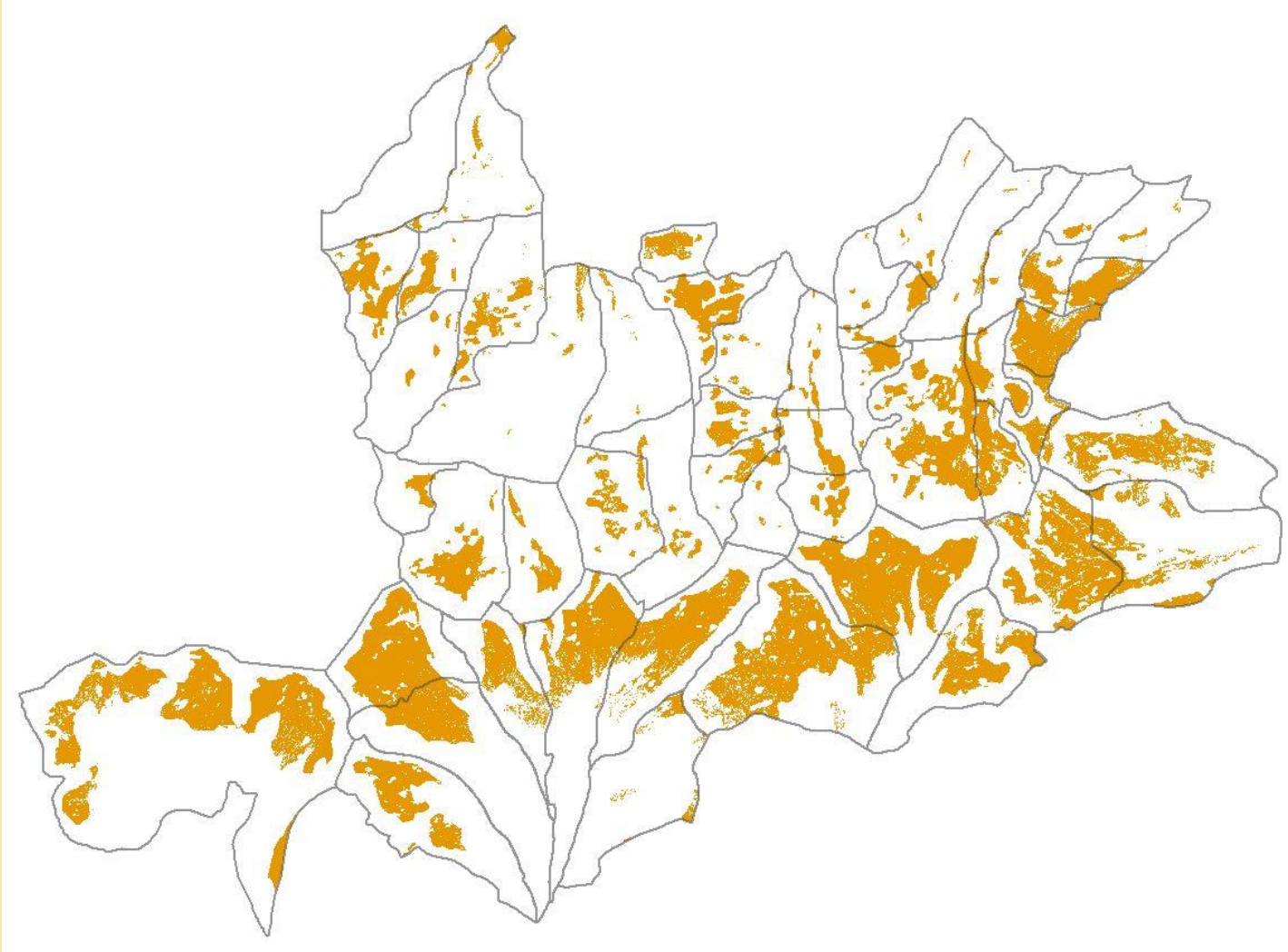
| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 2496.03          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3954.12          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2838.68          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 2090.37          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2873.79          |
| FALL CREEK              | Ashley National Forest              | 5604.55          |
| OTTOSON BASIN           | Ashley National Forest              | 6103.67          |
| OWEEP                   | Ashley National Forest              | 8582.39          |
| PAINTER                 | Ashley National Forest              | 7657.22          |
| TUNGSTEN                | Ashley National Forest              | 15198.88         |
|                         | <b>TOTAL ACRES</b>                  | <b>57,399.72</b> |

# Alternative C.1: GIS model





# GIS Results: Alternative C.1

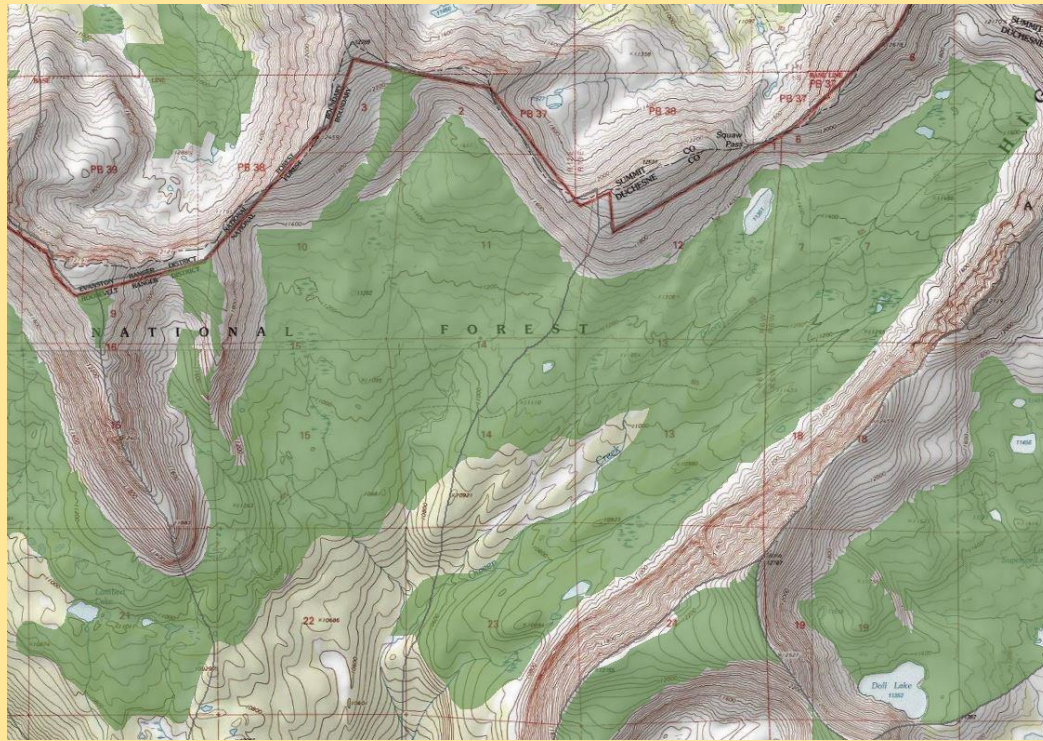


Total acres in Alternative  
C.1 = **36,965**

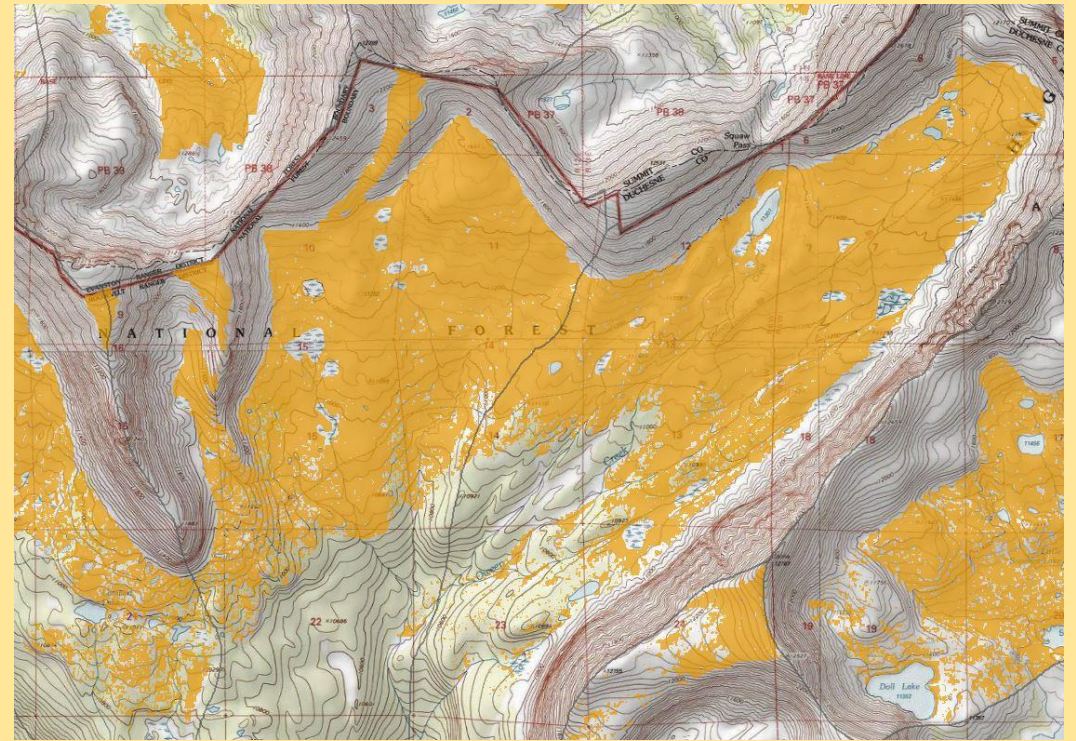


# GIS Results: Alternative C.1

BEFORE



AFTER



# GIS Results: Alternative C.1

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 2008.97          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3529.52          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2560.48          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1826.14          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2546.87          |
| FALL CREEK              | Ashley National Forest              | 4072.34          |
| OTTOSON BASIN           | Ashley National Forest              | 4039.04          |
| OWEEP                   | Ashley National Forest              | 4483.14          |
| PAINTER                 | Ashley National Forest              | 4431.90          |
| TUNGSTEN                | Ashley National Forest              | 7197.16          |
|                         | <b>TOTAL ACRES</b>                  | <b>36,695.57</b> |

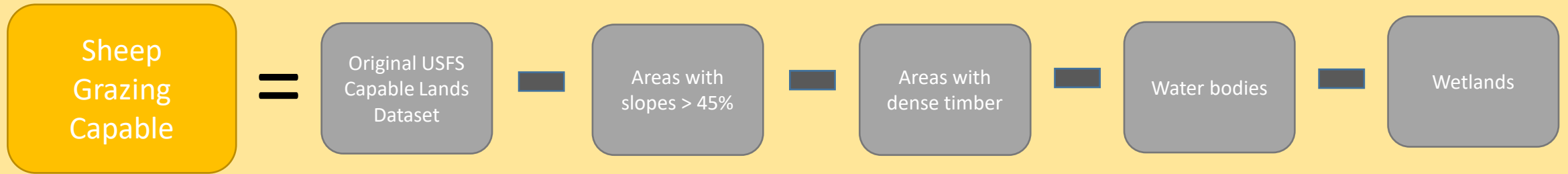


# GIS Results: Alternative C.1

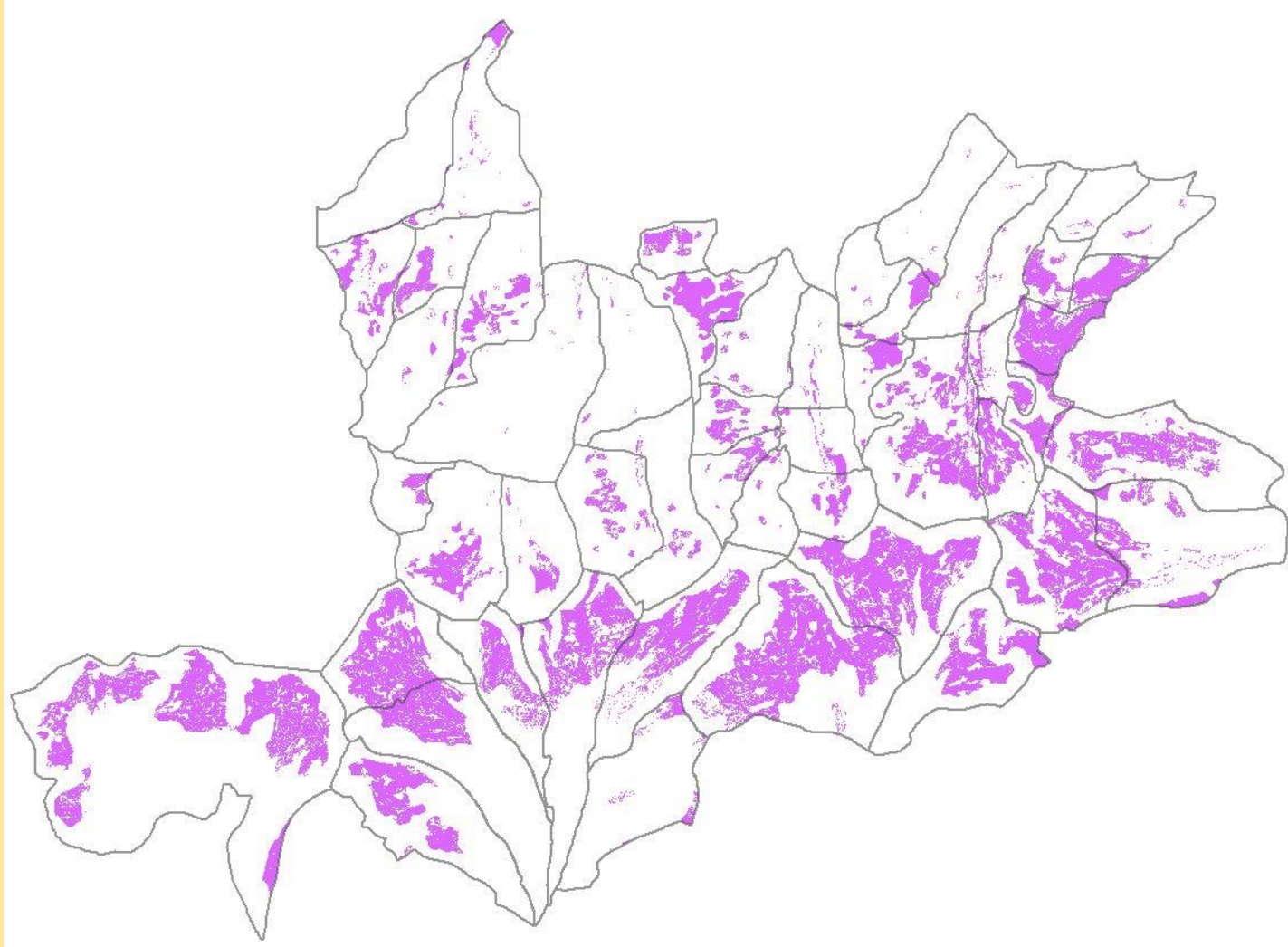
## Grazing stocking rates

| Allotment                      | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C1</b>          |               |                                    |                                 |                             |                                                        |                          |                                           |
| <b>Grand Total</b>             | <b>36696</b>  |                                    |                                 |                             |                                                        |                          |                                           |
| <b>EAST FORK BLACKS FORK</b>   | <b>2009</b>   | <b>294</b>                         | <b>590646</b>                   | <b>177193.8</b>             | <b>301</b>                                             | <b>1350</b>              | <b>0.44</b>                               |
| <b>FALL CREEK</b>              | <b>4072</b>   | <b>294</b>                         | <b>1197168</b>                  | <b>359150.4</b>             | <b>301</b>                                             | <b>1100</b>              | <b>1.08</b>                               |
| <b>GILBERT PEAK</b>            | <b>3530</b>   | <b>294</b>                         | <b>1037820</b>                  | <b>311346</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.74</b>                               |
| <b>HESSIE LAKE HENRYS FORK</b> | <b>2560</b>   | <b>294</b>                         | <b>752640</b>                   | <b>225792</b>               | <b>301</b>                                             | <b>1400</b>              | <b>0.54</b>                               |
| <b>MID FK</b>                  | <b>1826</b>   | <b>294</b>                         | <b>536844</b>                   | <b>161053.2</b>             | <b>301</b>                                             | <b>1200</b>              | <b>0.45</b>                               |
| <b>OTTOSON BASIN</b>           | <b>4039</b>   | <b>294</b>                         | <b>1187466</b>                  | <b>356239.8</b>             | <b>301</b>                                             | <b>1300</b>              | <b>0.91</b>                               |
| <b>OWEEP</b>                   | <b>4483</b>   | <b>294</b>                         | <b>1318002</b>                  | <b>395400.6</b>             | <b>301</b>                                             | <b>1400</b>              | <b>0.94</b>                               |
| <b>PAINTER</b>                 | <b>4432</b>   | <b>294</b>                         | <b>1303008</b>                  | <b>390902.4</b>             | <b>301</b>                                             | <b>1200</b>              | <b>1.08</b>                               |
| <b>RED CASTLE</b>              | <b>2546</b>   | <b>294</b>                         | <b>748524</b>                   | <b>224557.2</b>             | <b>301</b>                                             | <b>1300</b>              | <b>0.57</b>                               |
| <b>TUNGSTEN</b>                | <b>7197</b>   | <b>294</b>                         | <b>2115918</b>                  | <b>634775.4</b>             | <b>301</b>                                             | <b>1200</b>              | <b>1.76</b>                               |

# Alternative C.2: GIS model



# GIS Results: Alternative C.2

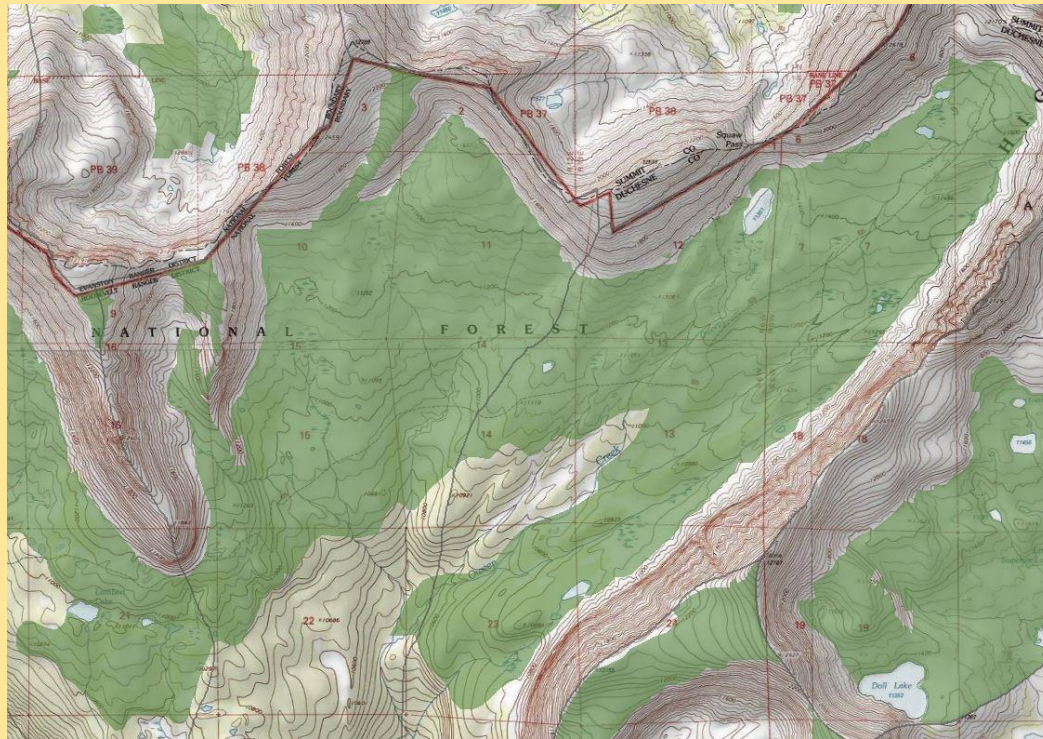


Total acres in Alternative  
C.2 = **31,384**

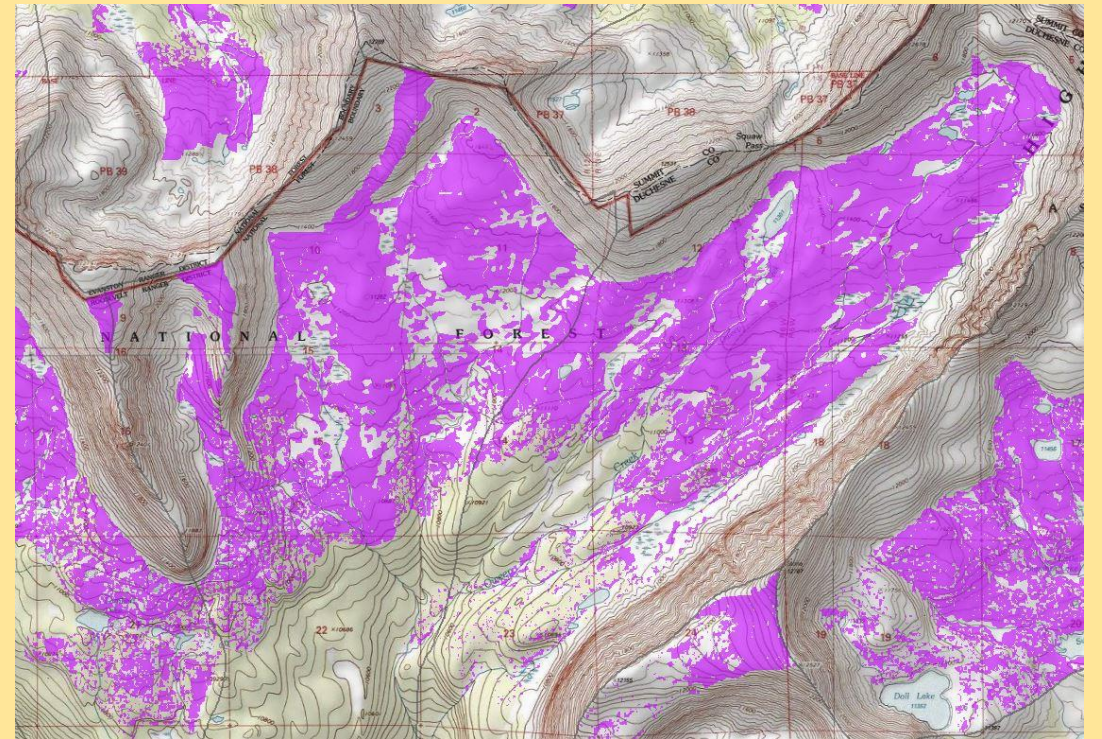


# GIS Results: Alternative C.2

BEFORE



AFTER



# GIS Results: Alternative C.2

## Grazing capable acres

| Allotment               | National Forest                     | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK   | Uinta-Wasatch-Cache National Forest | 1486.01          |
| GILBERT PEAK            | Uinta-Wasatch-Cache National Forest | 3056.67          |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2033.28          |
| MID FK                  | Uinta-Wasatch-Cache National Forest | 1429.04          |
| RED CASTLE              | Uinta-Wasatch-Cache National Forest | 2080.51          |
| FALL CREEK              | Ashley National Forest              | 3652.04          |
| OTTOSON BASIN           | Ashley National Forest              | 3580.17          |
| OWEEP                   | Ashley National Forest              | 3797.85          |
| PAINTER                 | Ashley National Forest              | 3875.04          |
| TUNGSTEN                | Ashley National Forest              | 6393.87          |
|                         | <b>TOTAL ACRES</b>                  | <b>31,384.50</b> |

# GIS Results: Alternative C.2

## Grazing stocking rates

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| Alternative C2          |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             |               |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1486          | 294                                | 436888                          | 131066                      | 301                                                    | 1350                     | 0.32                                      |
| FALL CREEK              | 3652          | 294                                | 1073699                         | 322110                      | 301                                                    | 1100                     | 0.97                                      |
| GILBERT PEAK            | 3057          | 294                                | 898662                          | 269599                      | 301                                                    | 1400                     | 0.64                                      |
| HESSIE LAKE HENRYS FORK | 2033          | 294                                | 597785                          | 179336                      | 301                                                    | 1400                     | 0.43                                      |
| MID FK                  | 1429          | 294                                | 420139                          | 126042                      | 301                                                    | 1200                     | 0.35                                      |
| OTTOSON BASIN           | 3580          | 294                                | 1052570                         | 315771                      | 301                                                    | 1300                     | 0.81                                      |
| OWEEP                   | 3798          | 294                                | 1116567                         | 334970                      | 301                                                    | 1400                     | 0.79                                      |
| PAINTER                 | 3875          | 294                                | 1139263                         | 341779                      | 301                                                    | 1200                     | 0.95                                      |
| RED CASTLE              | 2081          | 294                                | 611671                          | 183501                      | 301                                                    | 1300                     | 0.47                                      |
| TUNGSTEN                | 6394          | 294                                | 1879799                         | 563940                      | 301                                                    | 1200                     | 1.56                                      |



# GIS Results: Comparison between C.1 and C.2 (acres)

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C1</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             | 36696         |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 2009          | 294                                | 590646                          | 177193.8                    | 301                                                    | 1350                     | 0.44                                      |
| FALL CREEK              | 4072          | 294                                | 1197168                         | 359150.4                    | 301                                                    | 1100                     | 1.08                                      |
| GILBERT PEAK            | 3530          | 294                                | 1037820                         | 311346                      | 301                                                    | 1400                     | 0.74                                      |
| HESSIE LAKE HENRYS FORK | 2560          | 294                                | 752640                          | 225792                      | 301                                                    | 1400                     | 0.54                                      |
| MID FK                  | 1826          | 294                                | 536844                          | 161053.2                    | 301                                                    | 1200                     | 0.45                                      |
| OTTOSON BASIN           | 4039          | 294                                | 1187466                         | 356239.8                    | 301                                                    | 1300                     | 0.91                                      |
| OWEET                   | 4483          | 294                                | 1318002                         | 395400.6                    | 301                                                    | 1400                     | 0.94                                      |
| PAINTER                 | 4432          | 294                                | 1303008                         | 390902.4                    | 301                                                    | 1200                     | 1.08                                      |
| RED CASTLE              | 2546          | 294                                | 748524                          | 224557.2                    | 301                                                    | 1300                     | 0.57                                      |
| TUNGSTEN                | 7197          | 294                                | 2115918                         | 634775.4                    | 301                                                    | 1200                     | 1.76                                      |

| Allotment               | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Alternative C2</b>   |               |                                    |                                 |                             |                                                        |                          |                                           |
| Grand Total             |               |                                    |                                 |                             |                                                        |                          |                                           |
| EAST FORK BLACKS FORK   | 1486          | 294                                | 436888                          | 131066                      | 301                                                    | 1350                     | 0.32                                      |
| FALL CREEK              | 3652          | 294                                | 1073699                         | 322110                      | 301                                                    | 1100                     | 0.97                                      |
| GILBERT PEAK            | 3057          | 294                                | 898662                          | 269599                      | 301                                                    | 1400                     | 0.64                                      |
| HESSIE LAKE HENRYS FORK | 2033          | 294                                | 597785                          | 179336                      | 301                                                    | 1400                     | 0.43                                      |
| MID FK                  | 1429          | 294                                | 420139                          | 126042                      | 301                                                    | 1200                     | 0.35                                      |
| OTTOSON BASIN           | 3580          | 294                                | 1052570                         | 315771                      | 301                                                    | 1300                     | 0.81                                      |
| OWEET                   | 3798          | 294                                | 1116567                         | 334970                      | 301                                                    | 1400                     | 0.79                                      |
| PAINTER                 | 3875          | 294                                | 1139263                         | 341779                      | 301                                                    | 1200                     | 0.95                                      |
| RED CASTLE              | 2081          | 294                                | 611671                          | 183501                      | 301                                                    | 1300                     | 0.47                                      |
| TUNGSTEN                | 6394          | 294                                | 1879799                         | 563940                      | 301                                                    | 1200                     | 1.56                                      |

# Yellowstone to Uintas Connection

[www.yellowstoneuintas.org](http://www.yellowstoneuintas.org)

February 18, 2015

Chris Iverson, Deputy Regional Forester Intermountain Region Forest Service  
Terry Padilla, Range Lead Intermountain Region Forest Service  
John Erickson, Supervisor Ashley NF  
David Whittekiend, Supervisor Uinta-Wasatch-Cache NF

Re: An Alpine Plant Community Classification for the Uinta Mountains, Utah

Sent via email

Dear Chris, Terry, John and David:

Some time ago, I obtained a hard copy of the Forest Service publication, "An Alpine Plant Community Classification for the Uinta Mountains, Utah", dated 2006 and authored by Garry D. Brown. A review of that publication caused me great concern for reasons I will outline below. In order to be able to do word searches on the document, I requested an electronic version in a FOIA in August, 2014. The attached file is what I received. It is an MS thesis from the Department of Integrative Biology, Brigham Young University. The Forest Service version is formatted differently and, being a paper copy, I have been unable to do a comparison between the texts. So I am again requesting the electronic version of the publication. The front cover is reproduced below for reference.

The overriding concern about this publication is the acceptance of degraded conditions as a baseline or reference for the potential state for the communities described. Many of the sites used in the publication are from heavily grazed areas used by thousands of domestic sheep annually. This appears to be an effort to redefine the plant and soil communities as natural and pristine as if the grazing impacts do not affect them. Principal advisors to the author included Forest Service employees, Sheryl Goodrich, Forest Ecologist; Allen Huber, Range Ecologist; and Richard Zobell, Rangeland Management Specialist.

Mr. Brown states (Thesis page 1) that: *"This study will help ecologists and managers understand the distribution and dynamics of alpine plant communities specific to the Uinta Mountains. Not only will this study help identify these plant communities, but it will also help determine the patterns and processes that form these communities correlated to climate, topography, substrate and other environmental gradients."* Livestock impacts are not included in the factors determining the current status of these communities, while other limitations of this study are not discussed.

Later, in the Discussion (Thesis page 98), Mr. Brown states that: *"Ground cover for alpine plots varied from 99 percent rock cover to 100 percent vegetation to 50 percent soil cover. This shows that the potential ground cover for a given site may not always be 100 percent vegetation in its pristine or undisturbed condition."* Here he is referring to these as "pristine" or "undisturbed" sites, yet there is

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no mention of lichens, cyanobacteria, or other ground cover elements that would be expected as a component of ecological types in their true reference state. See the attached paper for an overview of lichen/vascular plant communities on environmental gradients compared to those under the influence of domestic sheep grazing in the Uintas.<sup>1</sup> In areas isolated from domestic sheep grazing, ground cover approaches 100% with a substantial lichen/crust component. In grazed sites, the composition of the community is significantly altered.

I spent many years backpacking and studying the impacts of domestic sheep in places such as West Fork Black's Fork, East Fork Black's Fork and other grazed alpine and subalpine areas. I also visited areas that I was informed by the Forest Service had not been grazed for long periods. I produced a report in 2006 which was provided to the Forest Service along with earlier versions.<sup>2</sup> The report documented erosion, bare soil (about 50%), stream bank scouring and the stripping of vegetation from uplands and alpine meadows by domestic sheep. Grazed areas were compared to areas that were not grazed for decades. This comparison demonstrated stark differences with ground cover approaching 100%, healthy forest understory, and healing erosion features in the ungrazed areas.<sup>3</sup> The Forest Service either ignored or denied these impacts, and blamed gophers, avalanches, or tie hacking for any damage or dysfunction. Forest Ecologist Goodrich was heavily involved in the West Fork Black's Fork EIS and is the principal advisor for this current "Alpine Plant Community Classification", so I am not surprised at the premise presented that these are systems only driven by climate and natural factors, while ignoring the effects of thousands of sheep grazing, trampling and bedding in these areas each year.

When I did a word search of the Thesis, I found 1 reference to "sheep", 3 references to "livestock" and 20 references to gophers. It seems the author and advisors can identify gopher activity (while ignoring gopher ecology) but cannot recognize sites that are grazed by domestic sheep, or impacts from domestic sheep grazing. When you look further in the document, Table 2 (Thesis page 100) provides a table showing historic numbers of sheep grazing in the Ashley NF. It does not include the Uinta-Wasatch-Cache and appears not to represent today's numbers for both Forests and does not represent current numbers/seasons/management for the allotments in which the study sites are located. The claim is made (Thesis page 99) that *"Today livestock impact the alpine much less due to proper management and light use."* Yet there is no review of what constitutes proper management and no presentation of utilization or past trend data or comparison to long term ungrazed sites. These statements are all made without any apparent understanding of the ecology of these places or the impacts incurred under grazing livestock in these sensitive watersheds.

I am asking that this document be withdrawn and revised. The revision should do several things, including the following:

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<sup>1</sup> St. Clair, L, Johansen, J, St. Clair, S, and Knight, K. 2007. The influence of grazing and other environmental factors on lichen community structure along an alpine tundra ridge in the Uinta Mountains, Utah, USA. *Arctic, Antarctic, and Alpine Research*: 39 p 603-613.

<sup>2</sup> <https://app.box.com/s/944957604b8618539585>

<sup>3</sup> A discussion with retired Ashley NF Soil Scientist, Darlene Voerner, also indicates that recovery after cessation of domestic sheep grazing in the Uintas has lead to ground cover values near 100% with a substantial component of biological soil crusts/lichens.



1. Describe the current and past grazing, stocking rate (one ewe/lamb pair can be up to 3 sheep), and management for each study site.
2. Analyze the long term trend, utilization and ground cover data (including its components) for all alpine/subalpine Forest Service monitoring sites in these allotments. In addition include data for sites I included in the 2006 report referenced. Compare these to the data in this current version of the publication.
3. Collect data from long term ungrazed locations in the Uinta alpine/subalpine areas that are on similar soils, slope, and aspect as the ones included in this publication.
4. Include soil scientists in the determination and evaluation of sites.
5. Integrate all this data into a new publication that shows the condition of the sites relative to past and potential as found in the long term ungrazed locations.

Essentially this Thesis or Publication amounts to a one-time trend data set. It needs context to be meaningful. I look forward to receiving a response regarding what steps the Forest Service will take to rectify this situation and am willing to discuss further study designs and analysis so that we can have a truly valuable resource that defines the potential state of these communities and against which impacts of continued grazing of domestic sheep can be compared.

Sincerely,

A handwritten signature in blue ink that reads "John G. Carter". The signature is written in a cursive style. Above the signature, there is a small, faint line of text that reads: "at your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again."

Manager

United States  
Department of  
Agriculture

Forest Service

Intermountain  
Region

Ashley and Wasatch-  
Cache National  
Forests

2006



# An Alpine Plant Community Classification for the Uinta Mountains, Utah

Garry D. Brown



*Oxyria digyna* - Alpine Mountainsorrel