

**Initial Review of Livestock Grazing Effects
on Select Ecosystems of the
Dixie, Fishlake and Manti-La Sal National Forests**

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Introduction

The forest supervisors for the Dixie, Fishlake, and Manti-La Sal National Forests have decided to initiate a review of concerns related to range management and potential deficiencies in their forest plans. The initial review provides the forest supervisors with information to assist them further with setting the scope, scale, process, and content of a subsequent assessment to identify preliminary needs for changing the forest plans.

The three national forests are managed under the direction in their respective land and resource management plans (“forest plans”). The forest plans for all three national forests were approved in 1986 and subsequently amended as needed. Since 1986, ecosystem management science and methods have changed considerably, as well as how people view ecosystems and how they are managed.

Recent collaborative efforts have been aimed at determining appropriate management recommendations for grazing on National Forest System lands in Utah. Examples include the Collaborative Group on Sustainable Grazing for U.S. Forest Service Lands in Southern Utah (Final Report and Consensus Recommendations, December 2012) and the Utah Forest Restoration Working Group - Ecology Committee (“Guidelines for Aspen Restoration on the National Forests in Utah” 2010).

The forest supervisors for the Dixie, Fishlake, and Manti-La Sal National Forests have heard disagreements about desired rangeland conditions on National Forest System lands in southern Utah both internally within the Forest Service, and externally from the public. These disagreements are based on several factors such as:

- new science that was not available when the forest plans were developed,
- differing values about natural resources,
- differing understanding of how grazing permits are administered, and
- differing understanding of the role of the forest plans relative to allotment-specific planning.

Because of numerous issues and conflicting views surrounding livestock grazing, the forest supervisors of the three national forests requested a team of resource specialists to conduct an initial review to identify changes in resource conditions that have occurred since the 1986 forest plans were established. They asked the team to focus on identifying resource concerns, determining whether they might be related to livestock management and what, if anything, in the forest plans’ direction could be related to those resource concerns.

Where concerns about natural resource conditions were expressed, the team conducted a cursory review of existing conditions. The team based this review on readily available monitoring information; information about existing conditions, including observed changes in natural resource conditions; and new scientific information. The team also reviewed the forest plans and identified potential areas they felt did not provide adequate direction for managing resources potentially impacted by livestock grazing. This document summarizes what the team has found so far.

Based on this initial review, the forest supervisors felt it was appropriate to address the concerns identified by initiating an assessment process to determine whether a forest plan amendment is needed. Forest plan amendments are used to keep forest plan direction current and help managers adapt to new information or changing conditions.

In 2002, the Forest Service initiated the forest plan revision process for each of the three national forests; however, between 2002 and 2008, regulations directing forest planning underwent changes several times, including changes in procedural and forest plan content requirements. Because of the resulting uncertainty in plan revision requirements, the revision process was not completed. Funding is not currently available for completing the revision process on any of the three national forests, and re-engaging the revision process is not in the immediately foreseeable future.

The requirements for developing, amending, and revising forest plans are provided in the implementing regulations for the National Forest Management Act (NFMA), referred to as the “Planning Rule” (Title 36 CFR Part 219). Under the current Planning Rule (adopted in 2012), forest plan amendments are to be based on identified needs to change the plan. The preliminary identification of a need to change a forest plan may be based on a new assessment; a monitoring report; or other documentation of new information, changed conditions, or changed circumstances.

Historical Context of Livestock Grazing and Range Conditions

Livestock grazing has occurred across the area that is now the Dixie, Fishlake, and Manti-LaSal National Forests since before their designations as federally managed lands in the early 1900s. Livestock grazing continues to be an appropriate use of National Forest System lands and provides economic benefits while preserving open space, cultural values, and historic lifestyles. The demand for grazing is ultimately dependent on the demand for sheep and cattle products. Agriculture is a significant contributor to the economy of Utah. Production of cattle and calves dominates Utah agricultural receipts. In 2000, about 46.3 percent (\$468.4 million) of Utah farm receipts came from sales of cattle and sheep. Utah remains one of the leaders in the production of sheep and lambs (ranked sixth nationally).¹

Historic grazing (prior to the 1950s) on all three national forests contributed to severe watershed problems and soil erosion. Topsoil loss in some of these areas was significant enough that significantly enough that it substantially lowered the potential of the sites to ever produce forage at historic levels. The Forest Service did extensive watershed improvement work from the 1930s through the 1960s. This historical watershed restoration work (seeding for example) as well as grazing management changes (such as reduced AUMs and grazing systems, and changes in livestock class (sheep to cattle)), have increased soil coverage, eliminated the severe erosion observed in the past, and has led to improved watershed conditions. However, some specific allotment analysis work indicates that topsoil loss in some of these areas was significant enough that thresholds were crossed and the potential of the sites to produce forage at historic levels was substantially lowered.

Results from the Initial Review of Existing Conditions

Ecosystems and Communities of Focus

Based on the resource concerns that the team of resource specialists identified, the forest supervisors focused their initial review on the following ecosystems or communities: riparian and aquatic ecosystems, aspen, and sagebrush ecosystems.

¹ From the Manti-LaSal draft forest plan background, 2006

Under each ecosystem identified, the following topics were identified by a team of resource specialists:

- Existing natural resource conditions
- Forest plan concerns (direction in the current forest plans that is unclear or absent)
- Potential sources of additional information that may be used in a more detailed assessment

Riparian and Aquatic Ecosystems

Both riparian areas and wetlands are recognized as unique, high value, hydrologic-biotic components of ecosystems. They represent a small percentage of the landscape but are critical for most other resources, including groundwater recharge, and habitat for threatened, endangered and sensitive wildlife and plant species.

The conditions of some riparian and wetland areas on the national forests are currently in a state where their capability to provide benefits are impaired. Some of the current riparian conditions may be attributable to large-scale ecosystem events like fire, or weather events like floods and drought. However, current and historic overuse of riparian areas by livestock appears to be a major factor in the riparian area impairment. This has lowered its resilience to catastrophic events, in some cases increasing the level of damage from such events. Riparian areas in poor condition are unable to trap soil and water, which results in increased erosion and sedimentation, lowered water tables, and an inability to buffer downstream areas from the effects of accelerated runoff.

Riparian Vegetation

Existing Condition

Riparian areas support plant species with water requirements that exceed annual precipitation. Riparian areas provide key ecological functions. They trap and store sediment, contaminants, and excess nutrients from upland areas; dissipate flood energies and store water to recharge aquifers and increase late summer base flows; and build and maintain streambanks that provide shade, wood and a suitable microclimate. This provides good habitat for fish (most notably trout), provides key wildlife habitat and movement corridors, and sustains highly productive forage-producing areas. Riparian areas cover a small percentage of the three national forests by area; however, they typically provide the highest biodiversity of any vegetation type.

Riparian and wetland areas across the three national forests have been impacted by past and ongoing activities including, but not limited to: roads, timber harvest and other vegetation management, dams and diversions, fires, and livestock grazing. Historically, livestock grazing and its effect on riparian vegetation have had significant effects on riparian area change. Cattle typically show stronger preferences for use of riparian areas than sheep. Roath and Krueger (1982) and Leonard et al. (1997) found that a riparian zone in a forested watershed comprised 1.9 percent of the allotment, but produced 21 percent of the available forage and 81 percent of the forage consumed. Similar disproportionate concentrations of livestock use in riparian areas have been documented in other studies (Marlow and Pogacnik 1986, Kovalchik and Elmore 1992, Reid and Pickford 1946, Ehrhart and Haosen 1998). New information and research related to both the physical and biological impacts of livestock grazing on riparian and aquatic ecosystems have occurred since the approval of the 1986 forest plans.

Current observations of riparian areas across the three national forests have shown that some riparian areas have impacts that appear to be at least partially related to cattle and sheep use. For example:

- In areas where a woody shrub component is expected, the majority of woody shrubs are heavily hedged.
- In some areas little to no evidence of new shrubs becoming established and growing above the height of the closely grazed grasses and sedges can be found.
- Some riparian communities lack species diversity and are dominated by Kentucky bluegrass, instead of multiple species of sedges; few forbs are evident, except dandelions or other early seral species.

Currently managers on the three national forests use some combination of annual use criteria and long-term trend monitoring to determine whether livestock are being managed in a way that will protect resources, including riparian area values.

Annual use standards, or indicators, (such as riparian stubble height) are intended as one proxy for providing natural resource conditions that are sustainable over the long term. For example, if riparian vegetation stubble height is 4 inches or more at the end of the grazing period, the plants should have the energy reserve to regrow, and the vegetation should be tall enough to trap sediment during high flows, as well as prevent streambank erosion. Meeting this annual use standard should be important to provide sustainable natural resource conditions. While the majority of annual use monitoring records indicates that grazing compliance standards are being met, the majority of the monitoring is taking place in uplands. Additionally there are current data gaps for some areas where no reported monitoring has occurred for the past 5 years. Likewise, there are ranger districts where no monitoring was reported in riparian areas.

Riparian vegetation trend monitoring using the Winward (2000) greenline methodology is designed to be the long-term validation for the stubble height and woody browse annual use criteria on at least a portion of the three national forests. There may be cumulative impacts to riparian areas; however, where greenline vegetation trend studies are not meeting objectives, the impacts of livestock management should be considered as one of the potential causes and solutions to the condition and trend.



Figure 1. Lost Creek in 2006 (L2 Inventory photo). Banks look stable but some species of willow should be evident.

The Dixie National Forest has set up four objectives for Winward greenline surveys:

- Late-seral vegetation should be present along the greenline in at least 60 percent of the potential for the stream's channel type. The potential percentage of late-seral vegetation along the greenline for different channel types is defined in Winward (2000). The greenline as defined by Winward (2000) is the "first perennial vegetation that forms a lineal grouping of community types on or near the water's edge." Given the annual scour of the stream, this line often forms at or just below the bankfull level of the stream channel. The greenline often coincides with the presence of water in the plant rooting zone, which allows for the growth of robust, hydrophytic plant species with deep roots that resist the erosive forces of the stream.
- Ground cover objectives should be based on the forest plan and management area direction.
- Percentage of invasive species should be based on the location of the greenline.
- A bank stability rating should be greater than moderate over 50 percent or more of the streambank. The stability rating is based on vegetation along the greenline (Winward 2000).

These objectives are also being used where the Fishlake and Manti-LaSal National Forests have established Winward (2002) greenline vegetation surveys.

Through 2012, long-term riparian vegetation trend data has been collected at 335 locations across the three national forests. The majority of these sites are on the Dixie National Forest. Eighty-three percent of these long-term riparian vegetation monitoring sites are on cattle allotments. The remaining sites are located on sheep allotments. Each location represents an approximately 110-meter length of stream, meaning we have survey data on less than 1 percent of the perennial stream miles (22.9 miles of greenline on 2,977 miles of perennial stream) across the three national forests.²

² Stream mileage calculation was based on National Hydrography Dataset (NHD) perennial stream class. NHD perennial streams are: "[B]ased on the stream symbolization on the 7.5-minute series topographic map that was digitized as the source for the NHD, and in some cases may have been revised based on the updates of local data producers such as the U.S. Forest Service. The accuracy of the stream classification is based primarily on photointerpretation and field checking at the time the map was compiled or revised. The USGS and its partner agencies made a considerable effort to correctly classify the stream within the observation methods available when the original maps were made."

It appears that long-term riparian vegetation trend data is somewhat limited on the Fishlake and Manti-La Sal National Forests. Additionally, the purpose of greenline monitoring is to indicate whether the vegetation is sufficient to buffer streambanks from erosion and preserve physical channel function. As noted in the “Physical Stream Channel Habitat” section below, there are concerns that the existing greenline vegetation objectives do not adequately buffer the streambanks from erosion and preserve physical channel function. Additionally, the vegetation community along the greenline does not necessarily infer that the remainder of the riparian area and floodplain is ecologically intact.

Through 2012, the last reading at each of the 335 data sites showed that 64 percent of the sites were meeting their riparian vegetation objectives and had a stable or upward trend. Slightly more than one-third (36 percent) of the riparian vegetation trend sites measured through 2012 were not meeting the objectives outlined for them. Most of the sites not meeting riparian vegetation objectives are on cattle allotments and only 6 percent of the sites on sheep allotments are not meeting riparian objectives. Only half of the sites not meeting objectives had more than one reading (a trend measurement), but about 65 percent of those with a trend showed either a stable trend at a level below objectives or continued decline.

The sampling described above is the most comprehensive and robust evaluation of the wetland/riparian conditions using vegetation as the metric. However, visual observations by field-going specialists indicate that this is not the complete story. In many instances, areas that meet the vegetation metric show indications of bank changes and bank instability, which are not included in the robust measurement of trends.

In summary, the long-term vegetation trend monitoring shows that two-thirds of riparian areas are meeting their designated objectives for greenline vegetation, while one-third are not. Concerns remain over whether the current long-term vegetation trend objectives are sufficient to protect ecological resources values in stream channels and the riparian area beyond the greenline and this will be discussed further in the “Physical Stream Channel Habitat” section below. Additionally, while there may be evaluation of the long-term trend monitoring results in relationship to compliance with annual use indicators, the success of the grazing management system, and potential alternative management strategies at the unit level, no large-scale evaluation of the relationship between management and the long-term trend monitoring results has been completed.

Without any evaluation of the relationship between annual use indicators and the results of long-term riparian vegetation trend data, our ability to interpret long-term vegetation trend data is confounded by permit administration issues. Documented and undocumented noncompliance with stubble height standards has been observed across the three national forests by Forest Service personnel and the public (see Figures 2 and 3). Forest Service personnel and the public have also documented livestock in pastures and allotments before or after the season of use indicated in the annual operating instructions. In many cases, livestock have been documented in multiple pastures on the same allotment. Some allotments may indeed be managed with different permittees using different pastures at the same time by intent, for example, to spread them out or because of locations of turnout or removal. However, often these pastures have exceeded annual use criteria, as well. Without making the connection between permit compliance and long-term vegetation trend data, it is difficult to validate the existing annual use criteria in terms of whether they are moving the resource toward ecological desired conditions. Another factor is frequency of defoliation. How many times during a grazing season will a plant be grazed and does it have a chance to regrow. Best management is to only have one defoliation event. This becomes difficult with both livestock and wildlife in the same location.



Figure 2. Stubble height exceeded on Bear Creek, Sevier River drainage



Figure 3. Stubble height exceeded on Water Canyon Creek, Santa Clara River drainage

Resource Concerns

- Excessive bare ground which can lead to erosion, invasive plants being present, and aquatic habitat degradation.
- Lack of woody vegetation and diversity of ages and size classes which can lead to more erosion-prone streambanks, higher water temperatures, less value for wildlife species, aquatic habitat degradation.
- Unstable banks which can lead to more erosion, lower water quality, and aquatic habitat degradation.
- Lack of vegetation species diversity which can lead to lower forage production and less value for wildlife species.

- Lack of desirable deep rooted native riparian species which can lead to more erosion, channel incision, lower forage production, less value for wildlife, and aquatic habitat degradation.
- Conversion of hydric species to upland species which can lead to more erosion and lower forage production.
- Vegetation in the transition area between greenline and uplands is lacking diversity and vigor which can lead to erosion, lower water quality, and aquatic habitat degradation and less value for wildlife species.

Forest Plan Concerns

An important part of fulfilling the Forest Service mission includes evaluating management actions related to streams and riparian areas to restore or maintain water quality, water quantity, and biotic integrity. In general, the current desired conditions in the forest plans for riparian areas are limited to vegetation and do not adequately describe channel form and bank condition for stream channel and wetland areas. Where desired conditions are described, they are not sufficient (they do not describe all the natural resource conditions we need to monitor to determine the health of the system), some are conflicting, and some are not supported by current best available science. If desired conditions are not established, it will be impossible to determine if conditions are improving or being maintained. In addition, short-term and long-term objectives, indicators, attributes, and best management practices are not sufficiently developed to appropriately identify concerns necessary for proactive management. If objectives are not established, success cannot be measured and direction is lost. Where these objectives, indicators and best management practices have been developed, they have not been adequately applied.

Annual use standards and guidelines for riparian areas are different across the three national forests. The Dixie National Forest uses three general annual use indicators to determine when proper use has been achieved: stubble height, bank alteration, and percent use on woody browse. The Dixie National Forest specifies that the evaluation of maximum allowable forage use for stubble height occurs at the end of the growing season. The Fishlake National Forest uses stubble height, percent use on woody browse and percent bare ground as annual use indicators. The Fishlake National Forest specifies that the evaluation of maximum allowable forage use for stubble height occurs at any time during the grazing season (“point in time” measurement). The Manti-La Sal National Forest uses stubble height, soil disturbance and percent utilization of key species. The Manti-La Sal National Forest specifies that the evaluation of maximum allowable forage use for stubble height and percent utilization occurs at any time during the grazing season (“point in time” measurement).

Whether annual use indicators should be “point in time” or “end of season” is a source of debate. While the annual operating instructions provide for the potential for administrative response, whenever any of the three annual use indicators are exceeded, the end of season language can result in stubble heights not being monitored until the end of the season. If stubble height is exceeded prior to the end of the season, resource damage may have already occurred and the window to take administrative action has been missed. Specifying that all annual use indicators are point in time measures would allow for a quicker administrative response. Additionally, other indicators (such as bank alteration and woody browse) are point in time measures by nature, but because of the end of season forest plan language related to stubble height, these are often at least perceived to be end of season measures.

Conversely, some of the literature regarding stubble height would indicate that as long as regrowth to the desired height occurs after the season of use, the plant should maintain its vigor and root

mass in order to provide the desired streambank stability (Myer 1989). The ability of plants to regrow is affected by plant species, climate and weather. Other authors have noted the risks in counting on regrowth, as well as the potential detrimental effects of grazing once certain stubble heights are reached (Hall and Bryant 1995, Skinner 1998, Clary and Leininger 2000).

Across the three national forests, little local data are available to validate indicators other than stubble height and percent utilization. The vast majority of riparian areas across all three national forests have a stubble height indicator of 4 inches for hydric species and 1.5 to 2 inches for Kentucky bluegrass. When stubble height indicators were developed, 4 inches was intended to be a starting point, not necessarily a goal. Clary and Leininger (2000) clearly indicated that stubble height objectives should be set on a case-by-case basis depending on environmental variables, condition and trend of the stream, species composition, and livestock management strategy. Additionally, when non-hydric species have overtaken the greenline, such as Kentucky bluegrass, they are usually considered early seral species. Our current objectives are based on the levels of late seral vegetation along the greenline. If late-seral vegetation (hydric species) cannot be expected to colonize and perpetuate from a 1.5- to 2-inch stubble height on the greenline, then having that standard for an early seral species like Kentucky bluegrass will only prevent the desired late-seral vegetation from establishing along the greenline. Hincz (2009) showed that hydric species did indeed recolonize areas dominated by more xeric colonizer species when livestock grazing was excluded.

Enforcing current forest plan standards can be problematic. Current browse utilization standards are not written in such a way that compliance monitoring can easily be done. Browse standards need to be developed so that (1) compliance with the standard will provide for variable height classes, and (2) a methodology exists that affordably allows for monitoring to be accomplished.

Specific forest plan concerns that were identified include:

- Desired conditions should reflect the need for variable age or height structure in cottonwood and willow.
- Desired conditions do not address the channel form and function necessary to maintain a stable system.
- There is no clear direction on how utilization should be evaluated in the riparian zone away from the greenline.
- The stubble height standard for Kentucky bluegrass dominated riparian sites does not allow desirable species to increase in the area and improve the seral stage.
- The Manti-La Sal forest plan calls for 30 to 60 percent utilization in riparian areas and literature suggests no more than 35 percent. There needs to be consistency between national forests either using stubble height or percent utilization, but not both.
- The amended forest plan for the Dixie National Forest provides standards and guidelines for riparian areas by three different management levels: Level 1 streams were to be managed for 90 percent of their potential for late seral vegetation along the greenline, Level 2 streams for 75 percent of potential late seral vegetation along the greenline, and Level 3 streams at 60 percent of their potential for late seral vegetation along the greenline. While a management level classification system was developed for a draft forest plan amendment, these designations were never carried forward into the forest plan. The current objectives for riparian vegetation is “60 percent of the potential” late-seral vegetation along the greenline for all streams, with potential being identified in Winward (2000); therefore, we are managing all streams at a level that was

intended to be for the lowest priority streams in the original forest plan amendment. How the percentages of potential assigned to the three management levels were originally derived is unclear, but what is clear is that riparian areas along most adjustable channels and almost all fish-bearing streams were intended to be managed to 75 percent or 90 percent their potential for late-seral vegetation along the greenline.

Potential Sources of Additional Information That May be Used for the Assessment:

- The Utah Geological Survey has an online library of scanned aerial photos (not georeferenced) going back to the late 1930s. These photos could be used to look at trends in woody vegetation in riparian areas.
- Multiple Indicator Monitoring (MIM; Burton et al. 2011), Proper Functioning Condition (PFC; Prichard et al. 1998) and EPA Wadeable stream assessment (Barbour et al. 1999) data collected by Forest Watershed and Fisheries Programs. These are current condition assessments to help determine apparent trend and if degradation is occurring.
- “Effects of Life Stock Grazing at Proper Use”
- Level II Riparian Inventory information.
- Information on vegetation communities in grazed and ungrazed areas of the three national forests (for example, “Exclosures of the Dixie National Forest 2010 Long-Term Condition and Trend Comparison Report” [Madsen 2010], Ranch Creek exclosure monitoring).
- Personal observations by Forest Service personnel have indicated the following conditions that support the stated resource concerns: Where efforts have been made to protect riparian vegetation by exclosure or other methods, riparian vegetation is quick to improve. For example, the Lake Fork exclosure on the Manti-La Sal, after less than 10 years is a demonstration of the potential riparian area size.

Lakes, Ponds, Springs, and Wetlands

Existing Conditions

These aquatic systems provide a sponge filter system for all areas. Small riparian areas associated with isolated springs may be small in size but are important because they are often the only habitat of this type for miles. Springs provide islands of riparian habitat within large expanses of pinyon-juniper and mountain laurel.

General observations by Forest Service personnel are that springs and wetlands can receive heavy livestock use that results in considerable trampling and hummocking. Many small springs and wetlands appear to have received concentrated use over many years showing both recent trampling and historic hummocking. These conditions can cause a loss of wet areas and excessive bare ground leading to a conversion of hydric species to upland species. See Figure 4 through Figure 7 depicting these resource concerns. Many high elevation meadows that contain wetlands have significant compaction, which is expressed by the presence of pedestaling and soil staining on residual boulders in these meadows (see Figure 7).

Where efforts have been made to protect riparian vegetation by exclosure or other methods, riparian vegetation is quick to improve. For example, the Lake Fork exclosure on the Manti-La Sal, after less than 10 years is a demonstration of the potential riparian area.



Figure 4. Christensen Spring, Fillmore RD. Summer 2012



Figure 5. Hummocking of a small spring along Willow Creek, Escalante River drainage



Figure 6. Bank alteration at Trail Lake, Escalante Mountain



Figure 7. Pedestaling on the Teasdale Ranger District

Resource Concerns

- Trampling and hummocking can lead to soil compaction, reduction in forage productivity, and increased erosion.
- Conversion of hydric to upland species (which are less productive for all species) and a general loss of what is currently a limiting resource for many other uses.
- Loss of wetted area that can lead to a potential reduction in ground water recharge, and loss of forage production as well as loss of wildlife habitat.
- Increase in invasive plant species.
- Excessive bare ground can lead to increased abundance of invasive undesirable plants and increased erosion.
- Lack of diversity of plant species or vegetation communities.
- Lack of diversity of species and age classes of woody species, when present.
- Potential for a loss of ground water recharge and a loss of available surface water for all users.

Forest Plan Concerns

- Current forest plans lack desired conditions for lakes, ponds, springs and wetlands ecosystems
- Best available science would suggest that portions of the direction including standards and guidelines related to aquatic habitat in all three forest plans are outdated or inappropriate for the geologic setting.
- Indicators, attributes, and best management practices are not developed to identify concerns appropriately and proactively.
- There is a need for clear direction meeting the intent of Executive Orders (11988 for Floodplains and 11990 for Wetlands). Proposed actions are usually designed to avoid impacts to wetlands and floodplains by buffering these areas. However, in the case of livestock grazing, this is not always possible.

Potential Sources of Additional Information That May be Used for the Assessment

- Forest Service personnel observations and photos (see existing conditions above).
- Groundwater-dependent ecosystems database
- Range inventory of springs
- Lentic Proper Functioning Condition (PFC)(Prichard et al. 1998) information

Physical Stream Channel Habitat

Existing Condition

Streams are dynamic systems that are constantly undergoing erosion and depositional processes, while at the same time trying to move toward a stable configuration that is in harmony with the water volume, sediment transport, and slope of the valley type they are in. Disturbances that alter sediment transport, flow volume and bank stability may have significant consequences on a stream's ability to maintain a stable configuration. Riparian areas across the three Forests have been impacted by past and ongoing activities including, but not limited to: roads, timber harvest and other vegetation management, dams and diversions, fires and livestock grazing. Historically

livestock grazing and its effect on riparian vegetation and streambank integrity have had significant effects on stream channel form and function.

- Across the three national forests streambank trampling and trailing along streams are causing resource concerns (see Figure 8). Conditions vary considerably but many of the adjustable (Rosgen: C, E, D, G and F channels) and some of the non-adjustable (Rosgen: A and B channels) streams show signs of compaction, bank damage and bank instability. Use of mechanized equipment to maintain stock driveways has been allowed within the inner gorge of stream channels and on steep and highly erosive soils. This has contributed to increased erosion, sedimentation and stream channel damage.



Figure 8. Concentrated Herding Long Valley Creek Cedar Ranger District

Lower elevation fine-grained streams are often deeply incised (see Figure 9). Some of this incision is the result of historic factors; however, in many cases streams are still actively eroding and incising. In other areas banks are slumping, sloughing or eroding (see Figure 10).



Figure 9. South Creek, East Fork Sevier River drainage



Figure 10. Slumping banks on Shinbone Creek, Escalante Desert drainage

Forest plan guidelines state that 50 percent bank stability should be maintained; however, more recent literature suggests that considerably higher bank stability may be necessary to maintain stream channel integrity, form and function (see “Forest Plan Concerns” section below). Bank stability monitoring (using multiple indicator monitoring [MIM; Burton et al. 2011] methodology) at 37 sites in summer 2013 showed that average bank stability across all sites was 61 percent. While this is above the current forest plan guideline it is still below what more recent literature would suggest is necessary to maintain stream channel integrity, form and function (see “Forest Plan Concerns” section below). Additionally, bank stability at 27 percent of the sites was below the forest plan guideline of 50 percent.

On the Dixie National Forest, bank alteration was meant to be the annual use indicator proxy for bank stability. As with the long-term riparian vegetation trend data there has not been a large scale evaluation of the relationship between annual use criteria and the results of trend data related to bank stability. Until recently, little information on bank alteration has been collected and bank stability has been evaluated through greenline vegetation composition rather than a direct measurement of the bank. More recent monitoring protocols offer alternatives to vegetation-based methods of determining bank stability (MIM; Burton et. al. 2011). MIM protocol was designed to judge the effectiveness of bank alteration annual use standards. When using the MIM protocol in 2013, Dixie National Forest personnel found several sites where long-term riparian vegetation trend data indicated a site was meeting objectives for bank stability, but physical measurements of the bank indicate otherwise. Conversely, sites not meeting objectives for long-term riparian vegetation trend have also been found to have desired levels of bank stability.

Similar to that of long-term riparian vegetation trend data, without any evaluation of the relationship between annual use indicators and the results of long-term trend data related to bank stability, interpretation of these data can be confounded by permit administration issues. The Dixie forest plan annual use indicators specify that bank alteration should be no more than 20 percent. Data from 15 sites in summer 2013 showed that bank alteration measured during or after the season of use specified in the annual operating instructions averaged 31 percent. Since stubble height is the only indicator measured in most cases, the bank alteration standard is often exceeded even when stubble heights are meeting proper use standards (see Figure 11).



Figure 11. Bank alteration exceeded where stubble height is not, Reed Valley Creek, Sevier River drainage

Resource Concerns

- Compaction and bank instability
- Decreased infiltration rates and bank shearing
- Incision, erosion and sedimentation
- Loss of appropriate channel configuration (i.e., wider and shallower streams)
- Increased erosion, sedimentation and stream channel damage due to inappropriate use of mechanized equipment to maintain stock driveways.

The resource concerns identified can affect water table and thereby productivity of adjacent land as well as Regional Forester-designated sensitive species and management indicator species fish habitat. Resulting impacts can affect the ability of streams to handle flood flows and deliver sediment and nutrients to downstream areas. Woody debris and other physical components will be discussed under the riparian vegetation and channel configuration sections.

Forest Plan Concerns

- Current forest plans lack good desired conditions for watersheds, stream channel function, and floodplains.
- Utilization standards are really a surrogate for compaction and yet many of the publications on which standards are based (University of Idaho 2004, and Clary and Webster 1989) fail to address this purpose for the standard and do not consider the influence of soils or hydrology.
- Bank stability monitoring and visual observations on the Dixie National Forest have shown that streams meeting long-term riparian vegetation monitoring objectives do not necessarily have stable streambanks or stream channels in their expected channel configurations.
- There should be consistency across the national forests for a streambank alteration standard. Currently, the Dixie is the only national forest that has one even though all three national forests are using the multiple indicator methodology (MIM) to some degree or another. In order to validate livestock management issues related to bank stability, some standard or guideline directed at improving trampling and bank damage is needed.

- Bank alteration is a point in time measure by nature, but is often at least perceived to be an end of season measure because the Dixie forest plan has the stubble height indicator as an end of season measure. The Dixie forest plan states that as soon as one indicator is met, livestock must be moved.
- Standards for streambanks should be tiered based on resource needs that would allow management to be more adaptive and flexible. The current standard on the Dixie National Forest is 20 percent alteration for all riparian areas. A one-size-fits-all standard has limitations because higher risk areas may need a more restrictive standard, whereas in low risk areas, the standard may be more restrictive than needed, thus limiting livestock use.
- Forest plans require maintenance of 50 percent or more of total streambank length in a stable condition. As discussed under the resource concerns section above, best available science suggests that a considerably higher level (up to 80 percent) may be needed in order to maintain appropriate channel configuration for the valley setting (Overton 1995, Leffert 2005). Conversely, a 25 percent fine sediment standard may be impossible to achieve in some of the more fine grained geologies of central and southern Utah.
- Forest plans lack direction for maintaining designated or undesignated stock driveways.

Potential Sources of Additional Information That May be Used for the Assessment

- Forest Service personnel observations and photos (see existing conditions above).
- Comparisons of current conditions with Riparian Level II inventories.
- Multiple Indicator Monitoring (MIM; Burton et al. 2011), Proper Functioning Condition (PFC; Prichard et al. 1998) PFC and EPA Wadeable stream assessment (Barbour et al. 1999)
- Additional data collected by Forest Service watershed and fisheries programs.
- Wolman pebble counts conducted on national forests.
- Channel cross section information collected on the national forests.

Aspen

Existing Condition

Due to its high productivity and structural diversity, aspen is capable of supporting the broadest array of plant and animal species of any forest type in the West, and is considered second only to riparian areas in its support of biodiversity (Chong et al. 2001).³ Aspen can support diverse grass, forb, and shrub species and, therefore, provides forage for grazing and habitat for a wide variety of bird, mammal, and arthropod species (Mueggler 1985).

Extensive studies of aspen in southern Utah have concluded that there has been at least a 50 percent decline in aspen as the dominant species since the late 1840s.⁴ Aspen decline may be related to disruption of natural fire cycles, livestock grazing, increases in native ungulates, and conifer invasion (Kay and Bartos 2000). Current conditions show that the majority of historically dominant aspen acres now exist as later successional stages where conifer species are in the process of replacing aspen.

³ As cited in "Utah Forest Restoration Working Group, Guidelines for Aspen Restoration on the National Forests in Utah" 2010.

⁴ Comprehensive Evaluation Report Summary for the Fishlake and Dixie National Forests, 2006.

At the stand level, some aspen are self-perpetuating, which means they are stable without major disturbance. In these stands, a minimum of 500 sprouts/shoots per acre is used as a benchmark for self-maintenance. A problem may exist when an aspen stand does not have clones developing into the overstory for long-term maintenance of the stand, because an aspen stem generally does not live more than 150 years. Very low or nonexistent recruitment and regeneration is nearly always a cause for further investigation. Some aspen stands (seral) require disturbance to regenerate. Most late seral aspen across the three national forests is decadent and not regenerating due to a lack of disturbance and encroachment of conifers which shade out potential regeneration.

Vegetation Dynamics Development Tool modeling indicates that at current management and disturbance levels, aspen will continue to decline over the long-term. Lack of disturbance, ecological succession, and persistent browsing by livestock and wild ungulates are the major factors contributing to the long-term aspen decline.⁵ While aspen tend to sprout prolifically after overstory aspen trees die, ungulates have the potential to browse or trample sprouting aspen clones, possibly reducing chances of successful regeneration, especially when combined with other factors. Conifers are the primary species replacing aspen.

Through 2013, long-term vegetation trend data has been collected at 63 locations across the Dixie and FishLake National Forests. The majority of these sites are on the Dixie National Forest. Emphasis of these study sites is condition and trend of understory vegetation. Of the 63 sites, 50 (79%) are meeting site-specific desired conditions related to percent ground cover, presence of invasive species and species composition. Trend information, meaning two or more sample events, is available at 57 of the sites (90%) with the majority of the sites being stable.

Resource Concerns

- Forest Plan Concerns Many sites lack regeneration or recruitment component.
- Some stands have poor herbaceous layer (variable by location).
- Encroachment of conifers leads to loss of aspen over the long term and can lead to a loss of available forage.

The Utah Northern Goshawk Project Decision Notice (Goshawk Amendment to the Forest Plans in Utah, 2000) provides guidance for managing livestock grazing in those areas where landscape assessments determine grazing is a factor in putting a landscape “at risk” relative to habitat needs for goshawk. The Goshawk Amendment provides direction for managing vegetation structural stages (VSS) within goshawk habitat, and it includes aspen among other forest types. The amendment describes desired structural composition for aspen at the landscape level which is currently based on the best available science. What varies among the three forests and may need additional clarification is direction for browse annual use criteria in aspen stands.

Potential Sources of Additional Information That May be Used for the Assessment:

- Long-term monitoring plots conducted by the Dixie National Forest botanist
- Data submitted from a non-government organization regarding aspen conditions
- Utah Division of Wildlife long-term monitoring sites in some aspen stands

⁵ Comprehensive Evaluation Report Summary for the Fishlake and Dixie National Forests, 2006.

- Stand exam data and photos for all wildfires, prescribed burns, and harvest units recorded in FSVeg database
- Regeneration and recruitment plots (1/10 acre) in an access database

Sagebrush Grasslands

Existing Conditions

Vegetation communities dominated by big sagebrush and black sagebrush (*Artemisia nova*) account for roughly 540,000 acres (11 percent) of the lands administered by the Dixie, Fishlake, and Manti-La Sal National Forests. On a regional scale these communities are in decline, and the loss of sagebrush habitat across the western United States has put stress on several species that depend on this cover type, particularly the greater sage-grouse which was once abundant but has declined to the point that it is now a candidate for Federal listing.

Roughly 464,000 acres (9 percent) of lands administered by the Dixie, Fishlake and Manti-La Sal is designated as “occupied” sage-grouse habitat by the Utah Division of Wildlife Resources. An additional 276,000 acres (5 percent) is classified as “opportunity” habitat where current occupied habitat could be expanded or former habitat could be reclaimed. Four population centers extend onto National Forest System lands: Parker Mountain (Fishlake and Dixie), Panguitch (Dixie), Carbon (Manti-La Sal) and Emery (Manti-La Sal). Sage-grouse numbers on the Parker Mountain and Panguitch population centers are somewhat reduced from historic levels, but are assumed to be stable, with relatively “low risk” of extinction if current conditions are maintained (USFWS 2013). Populations in the Carbon and Emery centers are generally stable but some segments of these greater populations are considered “at risk” due to a combinations of low population size, habitat loss and fragmentation, isolation, and limited genetic flow (USFWS 2013).

Through 2013, long-term vegetation trend data has been collected at 326 locations across the three national forests. The majority of these sites are on the Dixie National Forest. Studies are found across the various sagebrush types: basin big sagebrush (22 sites), black sagebrush (119 sites), mountain big sagebrush (61 sites), silver sagebrush (52 sites) and Wyoming big sagebrush (72 sites). Of the 326 sites, 196 (60%) are meeting site specific desired conditions related to percent ground cover, presence of invasive species, and species composition. Specifically related to effective ground cover, 204 (63%) are meeting minimum ground cover values. Trend information, meaning two or more sample events, is available at 266 (82%) of the sites with the 66% of those showing a stable or upward trend.

Yet current standards and guidelines may not be adequate in maintaining effective sage-grouse habitat. The Utah Division of Wildlife Resources maintains 18 long-term monitoring sites in sage-grouse brood-rearing habitat across the three national forests. Currently, only one (6 percent) would meet all the minimum guidelines developed by Connelly et al. (2000) that are often used to characterize effective sage-grouse habitat. Grass stubble height during nesting and brood-rearing, while meeting current standards, is often too short to effectively hide nests and chicks based upon current habitat guidelines (Connelly 2000, Hagen et al. 2007). Research suggests that managing livestock grazing to maintain residual cover of herbaceous vegetation so as to reduce predation during nesting may be the most beneficial short-term action for sage-grouse populations (Beck and Mitchell 2000, Aldridge and Brigham 2003). A residual stubble height of 19 cm (about 7.5 inches) is recommended for nesting and brood-rearing habitat (Connelly 2000, Hagen et al. 2007). Implementing this option would be difficult at best using current annual use guidelines.

Sagebrush grass communities also show a general lack of diversity and cover of perennial plant species, particularly perennial forbs that are a necessary component of greater sage-grouse brood-rearing habitat. Of particular concern is the lack of forbs during July and August when they are crucial to chick survival. Utah Division of Wildlife Resources trend studies in sagebrush communities on the national forests average less than 4 percent perennial forb cover and just fewer than two species of native perennial forbs per site. Figure 12 (Cedarless Flat Study Site) illustrates an extreme example of many of the resource concerns associated with sagebrush communities. This stand is far below its potential for providing habitat for sage-grouse and other sagebrush oriented species.



Figure 12. Sage-grouse habitat on Cedarless Flat, east of Fish Lake (2009)

While the sagebrush grass type appears to be an instance where the current standards and guidelines are not adequate in achieving desired conditions, it may not be appropriate for carrying forward in this analysis.

On Friday, November 1, 2013, the Ashley, Manti LaSal, Uinta Wasatch Cache, Fishlake, Dixie National Forests and the Bureau of Land Management (BLM) released the “Utah Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement” for a 90-day public comment period. The proposal in that draft environmental impact statement (EIS) is to amend 6 Forest Service and 14 BLM land use plans to incorporate greater sage grouse conservation measures into land use plans. The interagency team tasked with this effort has made a thorough analysis of grazing standards and guidelines and their adequacy in protecting sage-grouse habitat. The conservation measures incorporated by the amendment will focus on sagebrush habitats and be based on best available scientific information about their conservation. As such, no additional needs to change forest plans for those sagebrush habitats would be anticipated.

Resource Concerns

- Sagebrush communities are generally low or lacking in diversity and cover of perennial plant species, especially perennial forbs.
- Residual cover of herbaceous vegetation during nesting and brood-rearing not adequate for reducing predation.
- Presence of undesirable or invasive vegetation such as cheatgrass.

- Lack a diversity of sagebrush age-classes (including cliff rose, mahogany and serviceberry).
- Sagebrush decadence and poor recruitment are also problems on many sites.
- Excessive bare ground between plants that is large and generally connected (includes a lack of litter).
- Loss of sagebrush grasslands from pinyon-juniper encroachment leads to less available forage.

Forest Plan Concerns

A clear and measurable desired condition needs to be written that can be monitored for progress.

Priority sage grouse areas have been identified in the Greater Sage Grouse Amendment draft EIS and one concern would be the 5 percent disturbance maximum, which could dictate desired conditions in these areas, meaning it may limit treatment regimes. Changing late-seral communities to early, improving species diversity (created wheat, brome).

Potential Data Sources That May be Used for the Assessment:

- The BLM, with the Forest Service as a cooperating agency, is preparing environmental impact statements to address the effects of implementing proposed Greater Sage-Grouse conservation measures on the lands they manage. The Dixie, Fishlake, and Manti-LaSal National Forests are included in the effort. Because of a court-ordered settlement, the U.S. Fish and Wildlife Service have until 2015 to make a final determination on listing the greater sage-grouse under the Endangered Species Act.
- The Regional Vegetation Classification, Mapping, and Quantitative Inventory mid-scale map is currently being generated.
- Work done by Nature Conservancy on vegetation mapping, re-gap map.
- Nearly 1,300 long-term monitoring studies are maintained across the three southern Utah forests by Mark Madsen (Dixie National Forest botanist) covering all functional vegetation groups.
- About 3,000 long-term monitoring studies are being maintained across the Manti-La Sal and also using similar site from the Ashley National Forest.

What comes next? An Assessment

The forest supervisors have chosen to use an assessment to identify preliminary needs to change the plan. The subsequent assessment will be more in-depth than this review and will include opportunities for the public to provide input related to its content. For efficiency and effectiveness, the assessment will be conducted for all three national forests because of similarities in their resources as well as the probability of a cross-forest interdisciplinary team.

Based on the team's initial review, the forest supervisors have determined the scope of the assessment to provide a more detailed look at of the relationship of livestock grazing on the following specific resource characteristics for the focus ecosystems:

- ◆ Riparian and aquatic ecosystems: riparian vegetation; lakes, ponds, springs, wetlands ecosystems; physical stream channel habitat
- ◆ Sagebrush-grassland ecosystems.

The forest supervisors have chosen not to include aspen as part of this assessment because the great acreage of aspen ecosystems on the three southern Utah national forests is affected predominately through successional change and lack of disturbance. Aspen age class, structure and distribution will be more efficiently assessed through project-specific landscape level analysis and assessments. In addition the desired conditions for aspen stands have been adequately described in existing forest plans' direction, via the goshawk amendments. The aspen restoration guidelines,⁶ while not forest plan direction, do provide useful advice on project implementation. Based on the mix of existing direction and existing advice on project scale projects from the aspen guidelines, the forest supervisors have decided to not carry forward the aspen community type in the assessment.

The assessment will incorporate the concerns captured in the initial review. It will be more in depth and with consideration of information provided by the public about these resources and concerns. The purpose of the assessment is to rapidly evaluate the existing information relevant to the area covered by each plan and build common understanding of that information to identify preliminary needs for changing the forest plans.

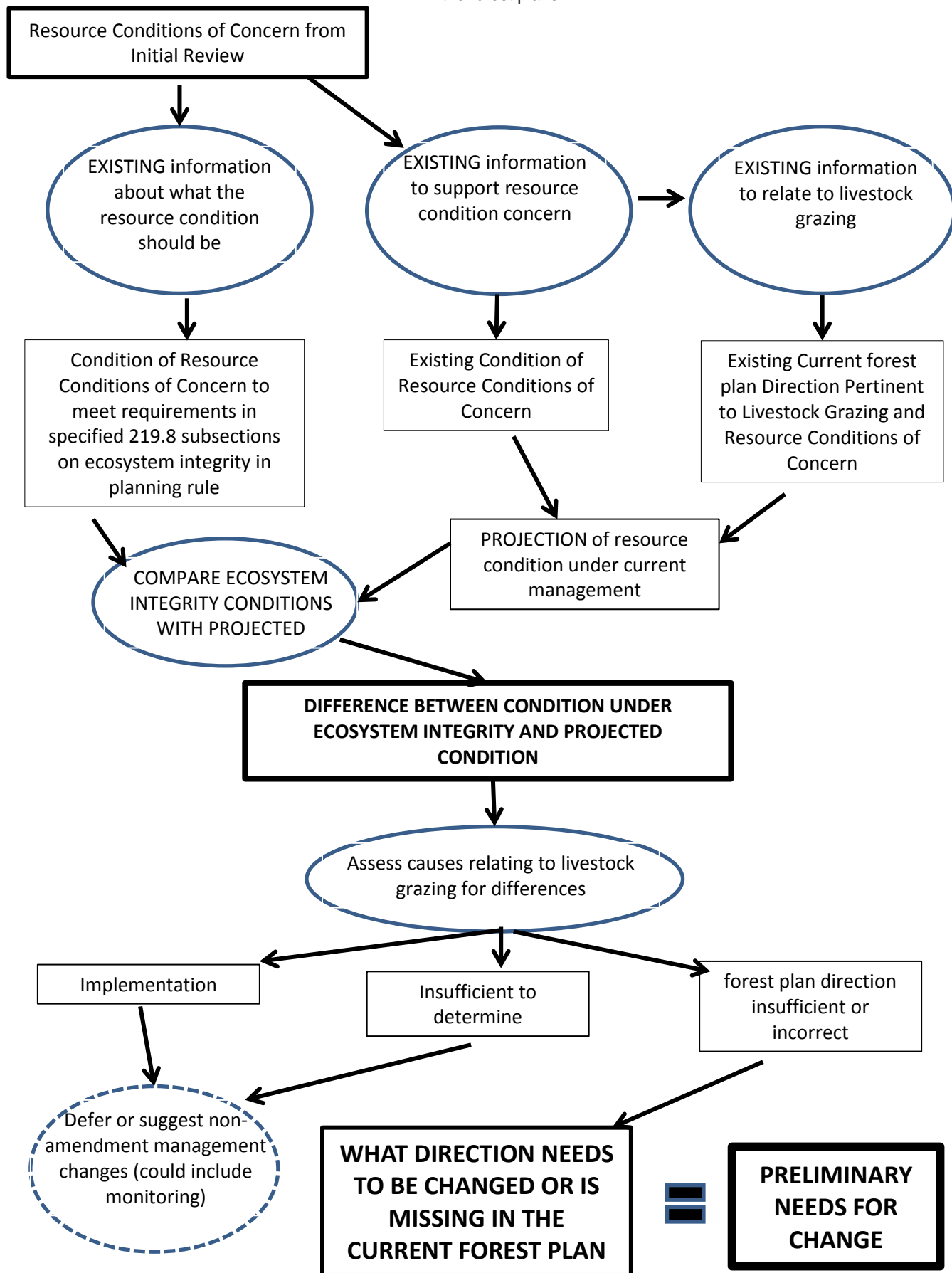
The assessment will identify the nature, extent, and role of existing key conditions; and reasonably foreseeable future trends of those key conditions within the plan area and their influences on or by the landscape conditions outside of the plan area; and identify information gaps.

For the ecosystems addressed by the assessment, existing conditions and trends will be based on key conditions, which include those dominant ecological characteristics ("key ecosystem characteristics") that describe the composition, structure, function, and connectivity of the ecosystems being addressed and which, if maintained or restored, would result in sustaining the integrity of the ecosystem.

If the assessment shows that there is a need to amend the forest plans, the forest supervisors may propose doing so following appropriate plan amendment and National Environmental Policy Act (NEPA) procedures. The flowchart on the following pages shows the assessment process and how it relates to a potential forest plan amendment.

⁶ Utah Forest Restoration Working Group. Guidelines for Aspen Restoration on the National Forests in Utah 2010.

Relationship of the initial review to the assessment process and preliminary identification of needs to change the forest plans



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