

## Part 645 – National Range and Pasture Handbook

### Subpart D – Conservation Planning on Grazing Lands

#### 645.0401 General

A. NRCS utilizes multiple documents to guide conservation planning on agricultural lands. Each document listed here provides specific NRCS guidance for different aspects of planning, policy, methods, and procedures when working on grazing land.

B. General Manual Title 180, Part 409, “Conservation Planning Policy” establishes NRCS policy for providing conservation planning assistance to clients.

C. The NRCS National Planning Procedures Handbook, Title 180, Part 600 (180-NPPH-600) provides guidance on the planning process used by NRCS and many of its partners for developing, implementing, and evaluating individual conservation plans and areawide conservation plans and details the nine steps of conservation planning.

D. The NRCS National Range and Pasture Manual (NRPM) supplements NPPH Title 180, Part 600 to provide additional guidance on rangeland, grazed forestland, pastureland, hayland, and grazed cropland conservation planning.

E. The National Range and Pasture Handbook (NRPH) provides NRCS information and processes for assisting ag producers, organizations, other government agencies and groups in planning and applying conservation planning, specifically on grazing lands. The NRPH provides information on the use of ecological site descriptions (ESD), resource concerns, planning, inventorying, assessment and monitoring methods, adaptive management, livestock nutrition, practices, and other topics to help build conservation plans.

- (1) In cases where the “grazed” land use modifier is used, the conservation plan will include Prescribed Grazing (528) as a primary practice for those Planned Land Units (PLUs) or Common Land Units (CLUs).
- (2) The NRPH also provides the technical guidance for developing state specific resource information for inclusion in the Field Office Technical Guide (FOTG) to support planning on grazing lands.

F. General Manual Title 450, Part 401, “Technical Guides” establishes NRCS FOTG policy. The FOTG contains the technical information needed to assist clients in the development and application of conservation plans. It contains general resource information about the field office area, soil and ecological site information, planning criteria, guidance documents depicting the resource management planning thought process, practice standards and implementation requirements for all practices applicable to the local field office area, and examples of the conservation effects decision making process.

#### 645.0402 Purpose

A. The objectives of conservation planning on grazing lands are to assist clients in:

- (1) Understanding the basic ecological principles associated with managing their land, including soil, water, air, plant, animal, and energy resources.
- (2) Developing an awareness of their socio-economic role in the complex ecosystem and how their management decisions influence the ecological changes that occur.

- (3) Comprehending the importance of protecting the environment and maintaining options for future use of the resources.
- (4) Developing a plan that meets the needs of the soil, water, air, plant, animal, and energy resources and addresses their management goals and objectives.

B. Conservation plans for grazing lands include decisions for managing key resources and ensuring that they are functioning at a sustainable level. Soil, water, air, plant, animal, and energy resources are intricately related and linked to each other and respond as a system. On grazing lands, the plant community directly affects soil, water, air, animal, and energy resources. While animals are one of the primary ecosystem resources, they can also be utilized as management tools for vegetation manipulation. Plant community management impacts soil health, water quality and quantity, and air quality. Grazing is a low energy input form of agriculture. Therefore, proper use of grazing and browsing animals in managing vegetation is a basic requirement for achieving the desired results of an ecologically sustainable grazing lands conservation plan.

C. Well-managed grazing lands, along with the carbon sink they provide, the clean water and air they support, the recreation opportunities they offer, and the plants, livestock, and wildlife they sustain, make a major contribution to the natural beauty of the landscape and to the maintenance of an ecological and economical sound environment. NRCS assists clients to manage their grazing lands to meet their objectives and, at the same time, meet the needs of the soil, water, air, plant, and animal resources. This plan, when coupled with any necessary facilitating and accelerating practices, should meet the planning criteria for resources established in the local FOTG and the objectives of the client. When properly implemented, conservation plans for ranches, dairies, and other livestock farms benefit the client, the local community, and the Nation.

### **645.0403 Developing Conservation Plans**

NRCS conservation planning policy is detailed in 180-GM-409. Conservation Planning procedures are detailed in Title 180, National Planning Procedures Handbook, Part 600.

### **645.0404 Areawide Conservation Planning**

A. Conservation plans are typically developed for an individual client. This client has the authority to make decisions on their property that address their resource problems and achieve their desired objectives. However, clients cannot always solve resource problems or meet the objectives of management on their own. There are times when the resource concerns are larger than their individual operating unit and potentially require working with their neighbors. Working together to develop a conservation plan that will solve their resource problems as a larger group, as well as taking advantage of possible socioeconomic opportunities can be included in a Coordinated Resource Management Plan or in a Watershed Management Plan or an Areawide Conservation Plan.

B. Listed below are some ways neighbors can work together to solve resource management problems and meet their socioeconomic and ecological objectives:

- (1) Developing a common wildlife management and recreational hunting enterprise.
- (2) Cooperating to solve water quality problems in a stream or lake.
- (3) Cooperatively managing a riparian area that transverses their lands.
- (4) Collaborate to manage a stream as a fishery and recreational fishing enterprise.
- (5) Developing a hiking, trail riding, canoeing, bird-watching, or similar enterprise that requires cooperation of all the landowners.
- (6) Improving soil health and carbon storage on those suitable soil types that may cross property boundaries.

- (7) Developing a livestock grazing management plan across different ownerships to ensure sustainable plant health and productivity.
- (8) Forming a prescribed burn association.

D. In many instances, landowners not only need to work together, but they also need to consider working with outside stakeholders that may include public land managers, resource management agencies, cities, soil and water conservation districts, counties, parishes, and various organizations. These groups may have a genuine interest in the conservation plan activities that may be occurring on the local area private lands due to the potential for offsite impacts. In these instances, an areawide plan can be considered for development in order to coordinate the activities of all concerned.

E. The National Planning Procedures Handbook (Title 180, Part 600) has a subpart on areawide planning (Subpart F).

### **645.0405 Conservation Planning Process – Preplanning**

A. Typically, when a client contacts NRCS requesting assistance, they have identified an issue they perceive to be a problem and want to solve it. There may be times when the problem they have identified is only a symptom caused by another as-yet unidentified problem or may be a result of a cause they did not understand to be connected.

An example of this might be a client who has recognized streambank erosion occurring, impacting springs and seeps, and decreasing overall forage production. These are definite issues; however, it may be that both are symptoms of repeated grazing and poor grazing distribution. Through continued grazing pressure, the plants in the pasture, particularly along the stream or near a seep/spring, have begun showing signs of reduced vigor and increased mortality. Over time, plants with reduced forage values have invaded into the open spaces left vacant by plants that have died. This created more open ground and a change in composition that has decreased water infiltration, increased runoff, increased erosion, increased sediment yield to the stream, impacted water quality, decreased water quantity in a seep/spring, reduced forage production and quality, reduced food and cover for wildlife, and continued reduction in forage for livestock production. Therefore, the problem was not what the client originally thought, and instead, the lack of Managed Grazing (528) resulted in the problems the client observed.

B. To determine if the problems identified by the client are the problem or a symptom of a larger or different problem, talking to the client and asking questions are key. Preplanning should always involve talking to the client, both about the planning process as well as the concerns they are seeing on their operations with their natural resources. Describing the planning process, ensuring goals and objectives remain forefront, understanding steps required in completing the process, identifying expected benefits, and explaining the roles and responsibilities of the client and NRCS are crucial in a successful plan.

C. Part of the preplanning process is preparation for a visit to the site. Gathering background information on the area should be a key part of the process. Information that may be required and should be considered include:

- (1) Maps (aerial, topographic) for taking notes in the field, including location of infrastructure (fences and water sources, etc.)
  - (i) Property boundaries of the ranch
  - (ii) Land ownership (public land grazing allotments)

- (iii) Prepare for inventory work by stratifying the ranch by Planning Land Units (PLU)<sup>1</sup>, ecological sites, and differing plant communities (using aerial photography and/or remote sensing products.) This will be verified, corrected and refined during the field visit(s).
- (2) Soils information (maps, map unit descriptions, and interpretations).
- (3) ESDs, pasture and hay land interpretations.
- (4) Existing vegetation maps (for example, Rangeland Analysis Platform) to field verify, guide inventory efforts, and assist with extrapolation of evaluation tools.
- (5) Wildlife habitat evaluation guides.
- (6) Grazing lands resource evaluation tools (Similarity Index, Apparent Trend, Rangeland Health Reference Sheets and matrices, Pasture Condition Score, Determining Indicators of Pastureland Health, and forage and livestock inventory).
- (7) Equipment, such as forage clipping equipment, sharpshooter spade, knife, GPS, camera; other equipment needed for collecting data, like measuring tapes, pasture sticks, soil stability kit, soil web app, or other pertinent apps.
- (8) Other informational material used to demonstrate techniques and principles to land managers.

D. Another essential part of the pre-planning process should include anticipating the knowledge you will need during conversations with the client and while on site visits. This can make time in the field and time spent with the client more efficient and successful. Some ways to prepare might include:

- (1) Be knowledgeable about the basic ecological principles of pastureland, hayland, rangeland, grazable forestland, and naturalized pasture in your work area and be prepared to discuss them in a manner that land managers can understand.
- (2) Be able to interpret maps, determine range similarity index, apparent trend, pasture condition score, indicators of rangeland health, indicators of pasture health, wildlife habitat evaluations, forage and animal inventories.
- (3) Understand principal livestock husbandry practices applicable to the area.
- (4) Understand the agency planning criteria for soil, water, air, plants, animals, and energy.
- (5) Be knowledgeable of evaluation and monitoring protocols to determine effectiveness of conservation practices implemented.
- (6) Understand and be proficient in the nine steps of conservation planning.
- (7) Identify the principal client or clients that will participate in the planning process and their respective roles. Update client information. Determine who has decision making authority for the planning area.

E. Lastly, it is important during the preplanning process to make firm dates with the clients and discuss the purpose of the appointment. Ensure that they understand the time requirements needed to complete the visit and always arrive at the agreed upon time, prepared with everything necessary for the day's work.

#### **645.0406 The Nine Steps of Conservation Planning on Grazing Lands (range, pasture, and all hayed or grazed land uses.)**

A. Phase I: Collection and Analysis. Includes the first four steps of the conservation planning process, which are: identify problem(s), determine objectives, inventory resources, and analyze resource data. These four steps are interactive, usually occurring at the same time and not necessarily in the order shown in NPPH. Table D-1 shows the NRCS nine-step conservation planning process.

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<sup>1</sup> PLU is the term used in CD and the NPPH. This is agency jargon and would not typically be used when communicating with landowners. A variety of terms such as field, pasture, or paddock are typically used in common parlance.

B. Phase II: Decision Support. Includes the formulation and evaluation of alternatives and making decisions on which to make the resulting plan. Phase II of the planning process begins with development of alternative strategies to address the identified problems.

C. Phase III: Application and Evaluation. Includes Implementation and Evaluation of the plan.

**Table D-1.** NRCS Conservation Planning Process Steps

| Analytical Phases                     | Conservation Planning Steps             |
|---------------------------------------|---|
| Phase I: Collection and Analysis      | (1) Identify problems and opportunities |
|                                       | (2) Determine objectives                |
|                                       | (3) Inventory resources                 |
|                                       | (4) Analyze resource data               |
| Phase II: Decision Support            | (5) Formulate alternatives              |
|                                       | (6) Evaluate alternatives               |
|                                       | (7) Make decisions                      |
| Phase III: Application and Evaluation | (8) Implement the plan                  |
|                                       | (9) Evaluate the plan                   |

(1) Identify Problems and Opportunities

- (i) Clients generally request NRCS to assist them with particular problems they have identified. If they do not understand the basic ecological principles, they may have recognized a symptom as a problem and not recognized the cause of the symptom. In reality, the cause is the real problem needing treatment. There is a logical sequence of phases that should be followed to ensure that the appropriate problems will be addressed and not just symptoms of a problem as discussed earlier in this subpart. These steps may occur concurrently, or in any order, and may need to be repeated during the planning process.
- (ii) One cardinal rule in working with landowners: Never ask a question to which they might give the wrong answer. If they give the wrong answer, we are faced with telling them they are wrong—and this isn’t good communication (USDA-NRCS, 1969). Talking with the client and asking important questions related to their operation and concerns will provide a good understanding of baseline grazing management and the goals and objectives they have for their property. Some good questions to ask might include:
  - What does the client want from the property (forage production, wildlife habitat, recreation, open space, water quality, etc.)? Specifically:
    - Animal performance (gain, milk, breeding success, etc.)
    - Herd size (desire to change or maintain?)
    - Longer grazing season (reduce feed, supplements, etc.)
    - Marketing preferences (grass fed, organic, etc.)
    - Environmental benefits (wildlife, pollinators, water quality, etc.)
  - What type of livestock enterprise(s) do they have (Cow/calf, stockers, purebred, leased or “custom” grazing, specialty livestock, etc.)?
  - What values do they see as important in managing their land?
  - What do they want to see continue, and what areas do they see are needing improvement?
  - What problems are they having with their operation?

- What problems are they having with their natural resources?
  - Are there areas of the property they cannot use? If so, why?
  - What are the current management practices (prescribed fire, rotational grazing, etc.)?
  - How many herds are there?
  - What is the current (benchmark) stocking rate and grazing cycle for each pasture?  
Specifically:
    - When is it grazed (dates in and out)
    - Herd size
    - Typical residual (stubble height or percent utilization)
  - How does the client determine when to move the animals?
  - What are the needs of the individual herds (special separation needs, nutritional needs, fencing needs, pasture or range condition needs, etc.)?
  - What is the history of the area?
  - Are they familiar with techniques and methods in evaluating and monitoring management practices? (body condition scoring, utilization measurements, etc.)
- (iii) While conducting the inventory, make sure to include the client. Let them participate in the inventory process and explain why each step is necessary. Use the opportunity to discuss other key information about the ecological principles of the area and their landscape, as well as grazing land principles. Some of the essential things that may be important for the client to know and understand include the following, which broadly fit into categories such as soil stability, water infiltration, and plant health and vigor:
- Ability to identify plants on their land
  - Concepts of plant ecology and physiology (how plants grow)
  - What plant vigor means and why it matters
  - Effects of season (timing), duration (time), frequency and intensity of grazing use, frequency of or lack of fire, and other management decisions on the existing or planned reference plant communities or the pastureland plant communities
  - Plant competition and how it applies to their land (how plants compete with each other)
  - Ecological site concepts for their land (explain the soil-plant relationship)
  - Interpreting the results of assessment tools used (i.e., Rangeland Health, Pasture Condition Scoresheet, Similarity Index, etc.)
  - Differences between the use of assessments tools and monitoring tools in evaluating landscapes and management practices
  - How adaptive management decision making is used in conjunction with monitoring to effectively evaluate conservation practices and determine if a management action or conservation practice needs to be adjusted to meet plan objectives
  - What forest ecological and management principles are and how they impact understory reactions and how it relates to grazing management
  - The variety of land uses or plant communities that could exist on their land (interpreting the state-and-transition model in the ESD)
  - Concept of multiple use opportunities on grazing lands
  - Concepts of soil erosion, condition, and contamination
  - Concept of waste management on grazing lands
  - Concept of targeted or managed grazing as a tool for protecting or improving water quality and water yield
  - Principles of water use by plants and effect of grazing management with impacts
  - How grazing management can protect or improve air quality (odors or wind-blown dust)

- The food, water, and shelter requirements of domestic animals
  - The food, water, and cover requirements of wildlife
- (iv) Building an understanding of these basic principles with the clients is essential to a quality conservation plan on grazing lands. Without some knowledge related to these topics, it will be difficult for the client to continue the required inventories, analyze their resources, recognize their problems and their causes, develop proper and obtainable objectives, formulate and evaluate treatment alternatives, plan a course of action, implement the plan, continue to evaluate and monitor their results and make adjustments or changes in management as needed.
- (2) Determine the Client's Objectives
- (i) It is the NRCS's role to help landowners and managers begin to understand and recognize the underlying problems, not just symptoms of the problem. If the current grazing management is the problem, the NRCS conservationist should not tell the producer that the problem is inappropriate grazing management. Instead, the conservationist must lead them through discussions to recognize that the type of grazing management may be leading to the resource concerns they are experiencing. This can be accomplished by helping them understand ecosystems and how systems function together. The process of recognizing the problem continues throughout Phase I and into Phase II of planning as monitoring data become available and are analyzed.
- (ii) Prepare to listen. The most important element for working with landowners is to listen to them and be able to determine their goals, motivations, abilities, potential, desire, dedication, and their financial capability. They will usually not come right out and tell you these things directly and you will probably not want to come right out and ask, but your success in working with them will depend on your ability to discern these things (Nelle and Mills, 2011).
- (ii) Objectives should be established by the client after ensuring there is an adequate understanding of their grazing lands ecosystem, after collecting inventory data, and after determining the cause of the resource concern to be addressed. It is often best to suggest that the objectives not be set until after this set of information has been evaluated and accomplished. It can sometimes be difficult to change a person's mind once they have made a firm commitment to a certain objective. Spend the necessary time assisting them through discussions and inventory of their grazing lands resources in order to identify the problems before they express their objectives.
- Objectives should be defined as specific steps to reach a particular goal, including specifics on what is planned, where, and when.
- (iii) Once the client understands the ecological principles of their grazing lands, they will generally ask some follow up questions. For example:
- "Is my land in good or poor condition?"
  - "Is the condition of my land changing? Is it getting better or worse?"
  - "How does my land compare to its potential?"
  - "What kind of evaluation and monitoring tools are available to me to assess if my objectives are being met?"
- (iv) At this point the client is beginning to understand the dynamics of the grazing lands ecology and how their land is a part of that ecosystem and how they can effectively and efficiently evaluate their objectives through monitoring activities.
- Evaluation of progress towards objectives is critical to the success of the management plan. Integral to this is a monitoring plan that is clearly understood and do-able by the client.

- (3) Inventory the Resources
- (i) The process for resource inventory includes collecting data from the current condition of the natural resources found in the planning area. Some key observations should be made during the first field visit. Ideally, the landowner would come along during the first visit to the field. A drive-through reconnaissance of as much of the ranch as possible should be the first step taken. Walk the full extent of the property, if possible, and locate (GPS) all existing structures related to the operation. Identify existing resource conditions and concerns, which may include the following:
    - Waterbodies, riparian areas, seeps and springs, and other sensitive areas
    - Noxious, invasive, or poisonous species locations, density, and extent
    - Areas of cultural significance
    - Special wildlife habitat or areas of concern (i.e., wetland or riparian areas)
    - Obvious concerns such as gullies, large bare ground patches, etc.
  - (ii) Field-verify that the ecological site and soil boundaries match mapped descriptions and evaluate the land to determine which states and plant community phases are present, as described in the state-and-transition model (STM) of the ESD. Take note of the plant community composition and compare to the communities described in the ESD. Are any of the plant communities at risk of crossing an ecological threshold? Have they already crossed a threshold? Note the vigor of the plants. Are they able to reproduce? Have the plants been grazed, and to what extent? Does litter remain from the previous year, and is the litter amount within the expected range described in the ESD? Is there evidence of new growth? What seedlings are establishing? Are they species that are expected? Are they species of specific concern? How does the plant community composition and vigor appear to be impacting soil, air, animal, and water resources?
  - (iii) When digging the hole to confirm the soils and ecological site (or potential), also pay attention to the soil moisture, soil fauna, plant roots and other signs of soil health. Look for signs of compaction. Does the soil structure match the soil description? Are they granular soils when they should be blocky? What might this mean? Is there evidence of adequate soil organic matter in the topsoil? What color is in the description, and what color is it currently? Consider the type of plants present. Do their rooting structures look as you might expect in the soil, or are they inconsistent with what is expected? Are they supposed to be deep and extensive roots that go many inches into the soil profile but are only an inch deep? Do they seem to be growing laterally along a boundary instead of down into the soil? What might this mean about how water is flowing through the soils and back into the plants?
  - (iv) Make note of animal trailing, pedestalling, water flow patterns on the soil surface, concentration areas, and note the presence and extent of bare ground. Is it more than expected, based on what's been described in the ESD, FSG, or experience? Are there signs of accelerated erosion? To what extent is erosion typical for this site? Locate (GPS) or draw out the extent of such areas.
  - (v) Note the infrastructure of the operation
    - Where are the fences, corrals, water, buildings, or barns?
    - Are they sited well?
    - Are any changed needed concerning the structures?
    - What equipment does the operation have or lack?
  - (vi) Where on the property is the livestock water and other physical facilities such as fence, handling facilities, roads, trails, and gates? Is it properly distributed across the property for better utilization and adequate to support wildlife needs? Do they provide supplements and where do they locate them? How does that appear to be impacting the resources? What is the condition of any associated natural water bodies, such as riparian

areas along stream banks and in spring and seep areas. Is water quantity, quality, and availability adequate when livestock are present? Are water developments well maintained and constructed in a manner that conserves water when livestock are not present? Are float valves on troughs and tanks functional and wildlife escape ramps present?

- (vii) Consider wildlife in the area. Could existing fences be made more wildlife friendly? Are there any traps for wildlife that should be considered for improvement? Are there opportunities to remove or relocate fences to improve grazing management or wildlife habitat? When are grazing wildlife present? Does the current grazing management support critical wildlife need, such as fawning and nesting periods? Are riparian areas along stream providing adequate cover and stable banks for fish habitat? Are seeps and springs being conserved to support diverse wildlife species?
- (viii) Plant community inventory
  - Part of collecting resource data includes conducting an inventory of total production, including forage. It should be stratified by Planning Land Unit (PLU), ecological site or soil, and state or plant community when possible, and then evaluated and aggregated for the entire operation during the data analysis process. Forage inventories will provide information on the species, current condition, and productivity, and can help develop key details on the goals for each management unit. Information should include:
    - Forage species
    - Forage quantity
    - Forage quality (i.e., growth stage when grazed)
    - History of the site
    - Utilization patterns (predicted, modeled, or observed)
    - Current stocking rates
  - Determine current utilization levels and proceed to the more in-depth assessments if conditions require them, including Determining Indicators of Pasture Health and the Rangeland Hydrology Erosion Model (RHEM).
- (ix) Animal Inventory
  - Livestock
    - An inventory of the domestic animals occupying or planned to occupy the operating unit must also be developed. This inventory should be separated into the necessary herds to allow the desired husbandry to be practiced. Information to be inventoried should include:
      - --Numbers, kinds, and classes of animals
      - --Average weights in the herds
      - --Type of enterprise (cow-calf, stocker, dairy, etc.)
      - --Any special management needs or considerations
  - Wildlife
    - Wild ungulates should also be accounted for by management unit, with inventory and forage requirements expressed in the same manner as livestock. If they are migratory, such as elk, the time they are expected in the management unit must be determined. Unique riparian habitats, including springs and seeps, deserve special management considerations for wildlife.
- (4) Analyze Resource Data
  - (i) After the inventory process is complete, an analysis of the data is necessary to assist the client to identify and quantify problems. Again, it is imperative for clients to understand the grazing lands ecosystem and ecological concepts before they can analyze the resource data. Show them how you work through the calculations for forage supply and demand.

Talk to them about why you include some information and not other information. These discussions will assist in improving their understanding of the complex inter-relationships of the soil, water, air, plant, and animal resources in their ecosystems. By doing this, it creates more transparency, provides a better understanding of the information for them to describe on their own, and builds trust between the client and NRCS conservationist.

- (ii) Typically, analyses include the results of assessment and monitoring tools, maps, tables of plant production, forage availability, and plant vigor and utilization. Planning criteria are used to determine which resource concerns are present. At this point in the planning process, there must be agreement on which of the identified resource concerns will be addressed during the remainder of the planning process. Upon completion of this planning step, the planning process moves into phase II. If other issues are identified or the client decides to address additional resource concerns, the planner may need to return to previous planning steps.
- (5) Formulate Alternatives
- (i) Managed Grazing (528) is a primary practice on grazing lands and should always be included in each alternative developed. Monitoring plans should also be prepared to evaluate applied grazing management, including a discussion of the predicted ecological or vegetation responses for each alternative.
  - (ii) Develop alternatives that treat the resource concerns the client chooses to address. Supporting practices, such as fences and water development, are planned when needed to enable the application of the primary vegetative and management practices.
  - (iii) NRCS employees will assist the client by developing treatment alternatives that meet planning criteria in the FOTG for resource problems chosen for treatment and that accomplish objectives of the client. A sufficient number of alternatives should be presented to the client to ensure that they are selecting alternatives that meet their needs. Revised treatment alternative(s) may be adopted and implemented if evaluation and monitoring show that the originally selected alternative(s) are not meeting management objectives.
- (6) Evaluate Alternatives
- Evaluate the alternatives to determine their effectiveness in addressing the client's identified resource concerns, opportunities, and objectives. Attention must be given to those ecological values protected by law or Executive order.
- (7) Make Decisions
- (i) After all the alternatives have been evaluated, the client makes a decision on which alternative(s) meets their objectives. The client considers the following when selecting alternatives: Will they be effective to alleviate the resource problems identified in an acceptable time frame? Are the alternatives economically feasible? Can the client carry them out (do they have the willingness, values, skills, and commitment)?  
The success of a conservation plan is totally dependent upon the client's capabilities to make sound ecologically and economically feasible decisions on a daily basis. NRCS must provide and ensure the technical assistance needed so that clients obtain this type of information and understanding as it relates to the management and profitability of their operations.
  - (ii) The client will make the decision on which alternative is selected. Other alternatives that are considered, but not selected, maybe adopted through adaptive management decision support, if monitoring shows the selected alternative is not meeting plan objectives.
  - (iii) Practices should follow a logical sequence and be recorded in the conservation plan's schedule of operations. The following logic provides ideas for scheduling application.
    - If livestock are on the operating unit, then Managed Grazing (528) should be scheduled and applied as soon as practical. If fencing and water development must be installed before applying the Managed Grazing (528) plan, then they would normally be installed first. Water developments generally are installed before fences because of risk and

because the specific locations of planned ponds, wells, and pipelines may need to be moved to a new location, which may affect the location of the planned fence. Once the water developments are applied, then the fencing can be designed without worry that the pond can be built or the planned well will yield a sufficient water supply.

- After the fences and water distribution are installed, the Managed Grazing (528) plan can be initiated. Supporting practices such as brush management, herbaceous weed control, range planting, prescribed burning, grazing land mechanical treatment and critical area treatment, can now be performed because fencing and water development will allow the needed grazing management to successfully complete those practice requirements, such as deferment or rest periods. Each operating unit will have its unique set of circumstances that dictate the schedule of application. A major point to remember is that Managed Grazing (528) is the primary practice on grazed lands.
  - Identify and consider activities affecting the Managed Grazing (528) schedule:
    - Husbandry practices
    - Nutrient and social requirements of animals
    - Forage quality requirements
    - Practice application requirements
    - Hunting season needs
    - Recreation Activities
    - Endangered plant and animal species
    - Watershed water quality and quantity needs
    - Riparian needs
    - Predator problems
    - Insect problems
    - Parasite problems
    - Poisonous plants
    - Animal shelter needs
    - Wildlife habitat needs
    - Aesthetic and social considerations
    - Cultural resources
    - Critical areas needing special treatment
    - Soil Health concerns
    - Ranch logistics and limits on labor and equipment
    - Specific requirements of varying livestock enterprises
- (iv) Scheduling Grazing
- After the forage and animal inventory is done and other factors have been considered, calculate the estimated forage available in each management unit. Calculate the daily forage needs of each herd, in preparation for scheduling Managed Grazing (528). Have this available to assist the client as the client schedules livestock movement through the management units in a way that will:
    - Balance forage requirements with forage supply
    - Meet the growth needs of the plants
    - Meet the nutritional needs of the animals
    - Meet the husbandry needs of the livestock
    - Meet the needs of the wildlife of concern
    - Meet the needs of all other activities in the management unit and operating unit
    - Meet the client's objectives

- Include any supplemental or substitutional feed requirements needed to meet the desired nutritional demand for the kind and class of livestock and browsing and grazing of wildlife. See Subpart H for guidance on animal nutrition.
- Many methods could be used to determine the appropriate stocking rate within a grazing unit. Often the past stocking history (producer records) and the trend of the plant community are the best indicators of a proper stocking rate.
  - Three techniques for forage inventory and stocking rates are described in Examples D-1, D-2, and D-3. Using different techniques and comparing the results will help refine the numbers used for planning.
  - NRCS does not establish grazing capacities. Neither does it require an agreed upon stocking rate in conservation plans. NRCS assists land users in making their own decisions concerning the number and kinds of animals to ensure economic and ecological sustainability. A beginning stocking rate is normally suggested, based on inventories.

**Example D-1.** Estimating stocking rate using producer records

Forage supply can be back-calculated from the producer's records. The equation is:

$$\text{Number of AUs} * \text{AUE} * \text{Days Grazed} = \text{AUDs}$$

Example:

$$100 \text{ cow} * 1.1 \text{ AUE} * 45 \text{ days grazed} = 4,950 \text{ AUDs}$$

The utilization rate that resulted from the recorded use should be taken into account by dividing the AUDs by the observed utilization rate then multiplying by the target utilization rate so the equation becomes:

$$\text{Number of AUs} * \text{AUE} * \text{Days Grazed} * \text{Target Utilization rate} / \text{Observed Utilization rate} = \text{AUDs}$$

Example:

$$100 \text{ cows} * 1.1 \text{ AUE} * 45 \text{ days grazed} / 0.65 \text{ observed utilization} * 0.5 \text{ target utilization} = 3,808 \text{ AUDs}$$

This technique provides an accurate estimate of a proper stocking rate, but it is based on the actual production from the recorded year. Further adjustments would need to be made to use it as an estimate of a “representative” year.

**Example D-2.** Estimating stocking rate using field inventory

The results of vegetation measurement techniques used to inventory plant community production (described in 645.40 Subpart E Inventory, Assessment, and Monitoring of Grazing Lands) can be used to set appropriate stocking rates. To calculate stocking rates based on production data gathered in the field, several steps need to take place:

The production value(s) need to be extrapolated across the PLUs varying ESDs, soils, and/or plant communities, then aggregated (using a weighted average) into a total value for the PLU (usually in lbs./acre).

Reconstruction of the production values back to a ‘representative’ year for multi-year planning (or no reconstruction for planning in the current season).

Standard, estimated or modeled values for harvest efficiency and distribution (accounting for topography, distance to water, etc.) should be used to adjust the total forage values.

Convert lbs/ac production values into AU values using a constant for intake (NRCS standard is 2.6% oven dry or 3% air dry forage of body weight per day).

**Example D-3.** Estimating stocking rate using remote sensing products

Continuous coverage of annual production values of herbaceous vegetation is freely available through online tools such as the Rangeland Analysis Platform (RAP) and FuelCast. Past, present, and projected values for production are available. To calculate stocking rates based on remotely sensed production data, several steps need to take place:

Values from remote sensing products should be field verified.

For multi-year planning, the appropriate value can be chosen by analyzing several years of past production values. If planning for the current season, the present or predicted values should be used.

Standard, estimated or modeled values for harvest efficiency and distribution (accounting for topography, distance to water, etc.) should be used to adjust the total forage values.

Convert lbs./ac production values into AU values using a constant for intake (NRCS standard is 2.6% oven dry or 3% air dry forage of body weight per day).

(viii) The planner can then work with the client on the timeframe for implementing the practices and begin developing the Conservation Plan.

(ix) The client’s copy should contain:

- Client Objectives
- Grazing Lands Conservation Plan Maps:
  - Operating boundary (may be different than ownership boundaries)
  - Planned field boundaries, field number, land use, acres
  - Visual display of assessment results
  - Location of current and planned practices
  - Ecological Sites and/or soils

- Key Area locations, photo point monitoring sites
  - Pertinent infrastructure (roads, sensitive areas, pipelines and troughs, etc.)
  - Forage Inventory
  - Livestock Inventory
  - Feed and Forage Balance Worksheet
  - All inventory data sheets
  - Grazing Schedule
  - Monitoring Plan
  - Contingency Plan
  - Practice schedule
  - Practice Implementation Requirements
- (x) The NRCS copy should contain all the above and:
- Directions to the location of the land unit
  - Technical Assistance Notes
  - Applied Practices
- (xi) Contingency Plan
- The plan will include a contingency plan that details potential problems (i.e., wetness, drought, wildfire) and a guide for adjusting the grazing prescription to ensure resource protection and economic feasibility and sustainability. The plan should include what evaluation protocols would be used in order for the client to recognize potential problems in the early phases (drought) and a plan of action that will be taken to offset and minimize the deterioration of the resources, livestock, and wildlife, and the economics of the operation.
- (xii) Monitoring plan
- A monitoring plan will be developed to help assess how the new management is or is not achieving the planned results. Adjustments may need to be made in management to achieve goals. The monitoring plan will be carried out using the established key area in each management unit. Adaptive management decision making should be used if monitoring shows adjustments in management practices and other treatment alternatives are needed to meet plan objectives.
- (8) Implement the Plan
- (i) NRCS employees assist clients in inventorying their grazing land ecosystems and the facilitating practices currently in place, along with current grazing management schemes, current husbandry practices, livestock performance, wildlife habitat and numbers, etc. This information helps complete needed evaluations of current ecological and performance status. During this process, the conservationist should develop an understanding of the client's available resources to implement the conservation plan.
- (ii) The land manager is now ready to implement the plan. NRCS personnel shall provide technical assistance to the client in the application of all practices as needed and requested.
- (iii) Primary Practices for grazed or hayed lands are Forage Harvest Management (511) and Managed Grazing (528). These are the most difficult and complex practices to plan and apply. These practices, respectively, are the proper application of hayland harvest and the proper manipulation of livestock number, kind, and class through pastures or rangeland in a time or manner that causes the plant community composition to move toward or maintain the desired community, while meeting the needs of the livestock and wildlife of concern. Managed Grazing (528) application is an iterative and ongoing process. For many clients, it is a change in lifestyle as it becomes a decision process that may affect their daily routine. For this to be successful, land managers often require close and continuous technical assistance from NRCS personnel as they learn to adapt and adjust

management strategies and practices based on monitoring results. NRCS personnel must provide onsite assistance and follow-up in a timely manner to continually teach clients to observe, evaluate, and monitor their grazing lands, livestock, and wildlife to make adaptive grazing management decisions that will be flexible enough to ensure success.

(iv) Supporting Practices

- Supporting practices such as fences, ponds, wells, water storage facilities, pipelines, and troughs all need to be installed according to a technical design to ensure success. NRCS personnel shall provide on-the-ground technical assistance needed for design and installation to ensure technical adequacy and that NRCS standards and specifications are met.
- Practices, such as brush management, weed control, nutrient management, forest improvement, range planting pasture planting, prescribed burning, water spreading, critical area treatment, diversions, streambank and shoreline protection, and structures for water control could be primary or supporting practices depending on how they are addressing the resource concerns. All need to be installed according to a technical design to ensure success. NRCS shall provide the technical assistance needed for design and installation.

(9) Evaluate the plan (Follow up)

- (i) After clients initiate application of their plan, NRCS should provide follow-up assistance. As previously stated, grazing management is an ongoing process. The client may need assistance from NRCS personnel to evaluate results of the applied Managed Grazing (528). It is a continuous learning process for the client and the NRCS personnel who are gaining experience. Grazing management can often be fine-tuned through monitoring and adaptive management actions and practices to accomplish their goals. Many times, clients increase their knowledge in grazing management and may elect to change to more intensive grazing management schemes as a result of monitoring their livestock performance and land resources. This often requires a plan revision to increase fences, water developments, or both, as well as a revision in the grazing schedule.
- (ii) The client's objectives often change, or new technology arrives that the client should consider. New resource problems are often recognized as the technical and management knowledge of the client increases.
- (iii) NRCS continuously gathers data from local grazing management application experiences. This information builds databases of responses to treatment. These response evaluations are necessary to assist future clients in the planning process and assist with adaptive management decisions.
- (viii) The initial planning process is just the beginning of the learning and understanding of grazing management for many clients. Experience has shown that most clients will not and cannot successfully apply their plan without follow-up implementation assistance from trained NRCS personnel. For these reasons, periodic contact needs to be made with the client to ensure the continued success of the conservation plan and to collect response data for future assistance to clients.
- (ix) Activities to Accomplish Follow-up
  - Make a firm date with the client for follow up evaluation assistance. Explain the purpose of the contact so that they may prepare. Review on-the-ground results of the applied grazing management. Use the opportunity to teach and assist clients to recognize trends in plant community response. Assist them to adjust and adapt grazing management practices needed for the plant community to respond as desired, provide quantity and quality forage needed by livestock and wildlife of concern, and meet the needs of the soil, water, air, plant, and animal resources.

- Review the schedule of operations for the implementation of practices. Follow up and monitor those that have been applied to evaluate their continued success. Assist in improving the schedule of application. Assist in recognizing any maintenance need on applied practices. Encourage management flexibility and adopting other practices or treatment alternatives if original planned practices are not being met.
- Gather response data that will improve client's ability to predict future responses to treatment.
- Assist clients to identify new or developing resource concerns that may need attention.
- Provide clients new technical information applicable to their resource problems and invite client to any training that may occur.
- Host or coordinate training if several clients within a geographic area have similar resource concerns or are developing management strategies to address a unique or special resource concern.
- Assist the clients with their monitoring and evaluation efforts and any necessary revisions of alternative actions that maybe necessary to revise their management actions as needed.

#### **645.0407 References**

- A. Nelle, Steve, and Kent Mills. 2011. Personal communication during the Working Effectively with Livestock Producers Course.
- B. USDA-NRCS, 1969. Conservation Planning on Grazing Lands– The Art of Communication