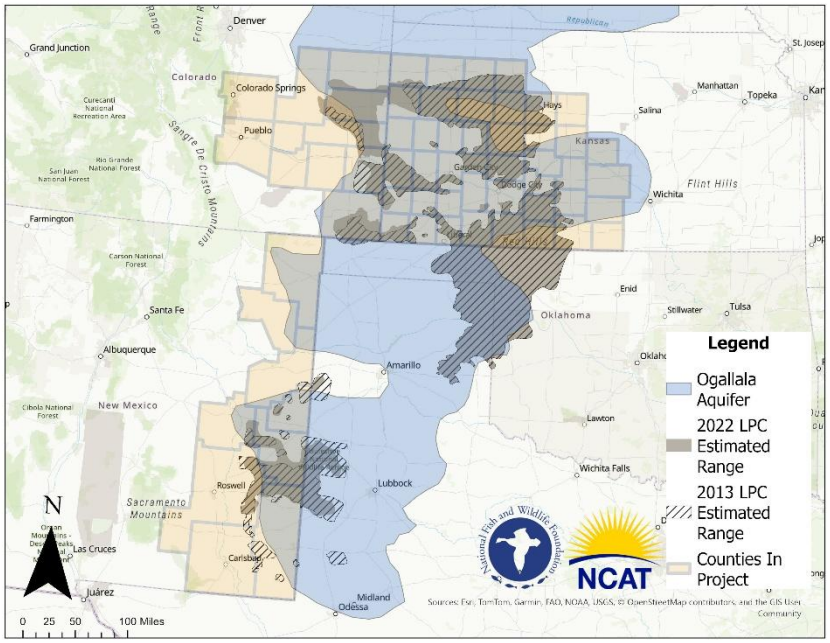
Conservation Planning in the Southern High Plains – Project Framework and Planning Workbook

Abundant Ogallala: Regenerative Agriculture for a Water-Scarce Future in the Southern High Plains

This is a publication of the Abundant Ogallala: Regenerative Agriculture for a Water-Scarce Future in the Southern High Plains project, supported by The National Fish and Wildlife Foundation under grant number 2004.24.081758. NCAT and NFWF are equal opportunity employers and service providers.

Project Introduction: Purpose and Focus

The Conservation Planning Framework and Planning Workbook is a product of Abundant Ogallala: Regenerative Agriculture for a Water-Scarce Future in the Southern High Plains. This project, funded by the National Fish and Wildlife Foundation and managed by NCAT, a national non-partisan, nonprofit, resource conservation educational organization, helps landowners, farmers, and ranchers in eastern Colorado, western Kansas, and eastern New Mexico identify natural resource concerns. Alongside landowners, NCAT is developing plans and implementing conservation programs to conserve water, improve soil health, and revitalize grasslands, wetlands, and their associated wildlife across a target of 750,000 acres.



When it comes to the Southern Great Plains, conservation needs are diverse, the stakes are huge, and the outcomes will be dire if we fail to meet the challenges ahead. The Ogallala Aquifer supplies nearly all water for municipal, industrial, and agricultural uses in the region. Farming accounts for 94% of groundwater usage. The regional economy hinges on agriculture, yet at current pumping rates, more than a third of the Southern High Plains may be unable to support irrigation within the next 30 years. Playas, wetlands, and grasslands of the region support declining wildlife such as the Lesser Prairie Chicken and Monarch Butterfly.

Rapid, widespread adoption of regenerative agroecological practices is the most promising pathway to simultaneously conserve precious groundwater resources, enhance wildlife habitat, increase soil health, and improve long-term sustainability of ag operations and rural communities for the future. While billions of dollars are now flowing through various USDA conservation programs, progress is impeded by NRCS's need to quickly produce detailed conservation plans with dozens of producers. Through this project, NCAT is providing conservation planning and technical assistance to foster conservation across the Southern Plains region, aimed at achieving key targets of regional land management and wildlife recovery plans.

Use of This Workbook

This manual serves as an adaptable tool for developing a working lands conservation plan, whether a producer is working with a technical assistance provider or is interested in writing a conservation

plan on their own. It begins with a brief description of the ecological context of production agriculture in the Southern High Plains, followed by a conservation plan template. We encourage producers and Technical Assistance Providers to be as specific as possible in describing the farm/ranch production situation, including goals, land and livestock inventory, current practices, and land and water concerns. Producers may complete the plan template (below) prior to contacting NRCS to enroll in conservation programs, or may contact Darron Gaus at darrong@ncat.org or 479-587-3479 for assistance in writing the plan and guidance in selecting conservation practices.

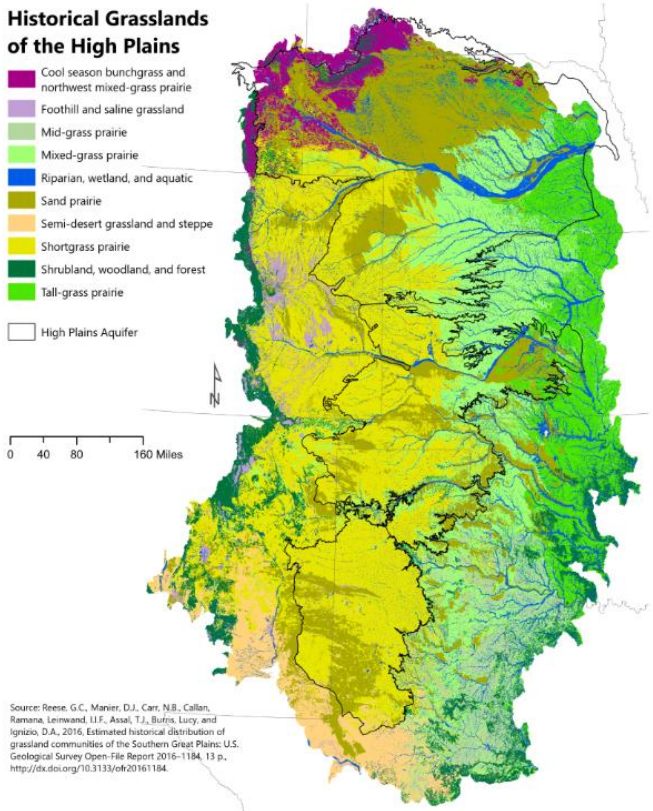
Recommended conservation practices are based on resource concerns and landowner/manager objectives and on the NRCS Conservation Practice Standards as listed in *Conservation Planning Guide for Resource Management Systems* (see Appendix below). Producers will develop a description of practices and an implementation schedule including the practice(s) to be implemented, land use modifiers to the practice (a practice implemented based on how the land is managed, i.e. grazing, organic, hayfields, easement, etc.), a justification for why the practice was selected, implementation guidance (plant materials, seeding rates, etc.), a schedule of implementation, and any supporting practices and associated plans (grazing plan, etc.).

Finally, the workbook includes guidance on developing a monitoring and drought plan, as well as an appendix for soil and practice implementation maps and resources to assist the landowner/manager in the implementation of practices.

Ecological Context

The Southern High Plains

Set between the Rockies on the west and the Tall Grass Prairie to the east lies the Southern High Plains, a semi-arid region encompassing roughly 48,950 square miles. Annual precipitation averages between 10 and 20 inches per year on sandy upland soils formed by river sedimentation from adjacent mountain ranges, which are characterized by native short grasses and shrubs. Evapotranspiration usually exceeds precipitation in this region. Today, the region is grazed by beef cattle and is dryland farmed with winter wheat and sorghum. Approximately 1/5 of the region's farming is on irrigated acres.



Source: Walter, 2023

The annual average temperature is between 45 and 50 degrees F, where summers can reach temperatures in the high 80s and 90s, and the low in the winter reaches between 18 and 25 degrees F. With elevations between 2000 and 5000 feet, this region was historically

dominated by blue grama, buffalograss, and sideoats grama. Taller grasses like sand bluestem, little bluestem, and indiangrass can be found in shinnery oak and sand sagebrush areas. Forbs such as dotted gayfeather, pitchersage, sagewort, bush sunflower, and daleas are also a part of this region's climax vegetation. (USDA, 1981).

The Ogallala Aquifer

Around 10 million years ago, the Ogallala Aquifer was formed by rivers that flowed from the Rocky Mountains. Sand, silt, and clay accumulated in an unconsolidated state and water filled the pore spaces. It is estimated that water percolated into the soil and rock's pore spaces over a period of around six million years (Hennings and Lynch, 2022). Later, the deposits between the mountains and aquifer eroded, cutting off the water source. The area was then "partially covered by Pleistocene fine-grained windblown glacial deposits known as loess" (Hennings and Lynch, 2022). What remains is a 174,000-square-mile unconfined fossil-water aquifer that recharges extremely slowly from the semi-arid region's low rainfall, averaging less than an inch of water gain to the aquifer annually. Recharge is estimated at 0.04 inches per year in Texas and up to 6 inches in Kansas (Hennings and Lynch, 2022).

Range of the Ogallala Reservoir

Source: Sawatis, 2024

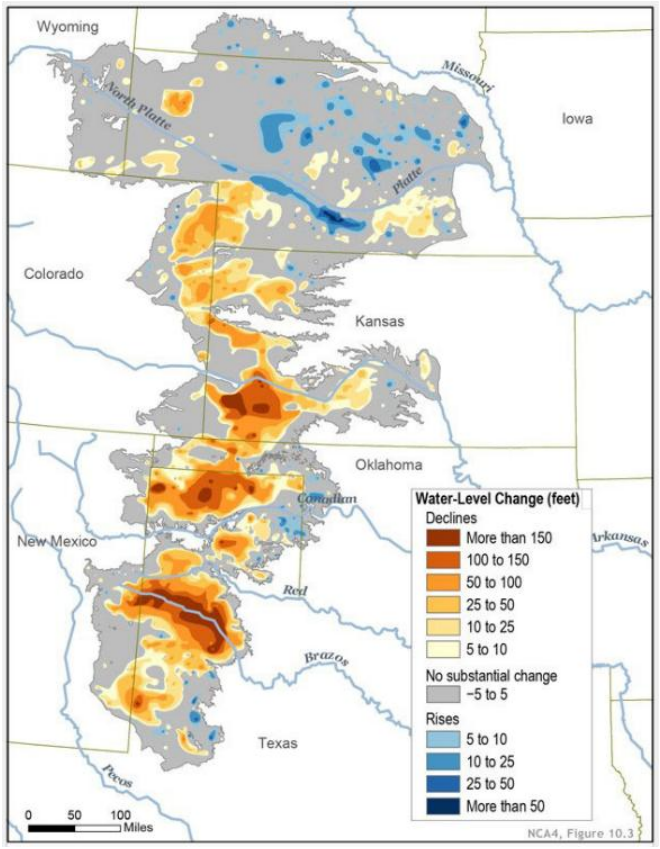
The depth to the aquifer's water table varies from the surface, where water is naturally discharged, to more than 400 feet deep, though most of the aquifer lies between 50 and 300 feet below the surface. The average thickness of the aquifer is around 200 feet and decreases from over 1,000 feet thick in the north to 100 feet in the south (The Gale Group, 2008).

In the mid-1800s the first wind-powered pumps were sunk into the aquifer, but demand was low, and most of the water was first used for livestock watering. Later, beginning around the 1940s, gas-powered pumps took the place of windmills, and the Green Revolution spurred demand for agricultural products. Over the course of the last five decades, the water in the aquifer has been declining in depth and scope due mostly to agricultural and municipal use. Because of water demand for feed grains and other agricultural products, the aquifer is dropping as much as five feet per year, and the water table has declined by 100–200 feet. Some areas, in fact, have been completely drained of water (Hennings and Lynch, 2022).

Complete drainage of the aquifer makes the difficulty of recharge even more severe. When water is removed from the pore spaces underground, it is replaced by air. Since air is compressible and water

is not, compaction can result in a loss of pore space and, thus, the loss of water-holding capacity (Hennings and Lynch, 2022). The water in the Ogallala Aquifer is a finite resource and relying on recharge is not a feasible management option. With more than 200,000 wells pumping water across the eight-state region, we are seeing a withdrawal of three to 50 times the recharge rate (Hennings and Lynch, 2022).

If recharge is not an effective way of managing the sustainability of the aquifer, we should turn to the efficient use of water in agriculture. This is one of the goals of the Abundant Ogallala project. Through conservation planning, land managers can obtain technical and financial assistance to implement projects that help the soil hold more water, especially in the semi-arid region of the Southern Great Plains where drought has become more common than not. Some of the practices producers may use include reduced or no-tillage, using more precise irrigation technology and irrigation monitoring, and using drought-tolerant crop varieties. Some producers have converted some of their irrigated farmland to dryland farming or livestock grazing.



Source: (Hennings and Lynch, 2022)

Lesser Prairie Chicken

The lesser prairie chicken is a grassland-nesting bird whose range is spread over the geographic region of the Southern High Plains where the native grasses interspersed with low-growing shrubby cover comprise optimum habitat (High Plains Partnership, 1999).

Source: High Plains Partnership, 1999

The native shortgrass prairies of Colorado, Kansas, Oklahoma, Texas, and New Mexico are characterized by sandy soils and shinnery oak mottes, sagebrush, skunkbush sumac, and sand plum. These, along with forbs for fodder including berries and seeds (wild buckwheat, dayflower, evening primrose, queens delight wild sweet pea, prairie ragwort, ragweed, beard-tongue, and wild four-o'clock), provide the ground birds with habitat for food, water, and breeding, nesting, and brood-rearing cover (High Plains Partnership, 1999).

Although prairie chickens often feed on waste grain in farm fields, populations tend to disappear where native prairie is converted to cropland. Although habitat loss has occurred because of drought, improper livestock grazing management, and energy and road infrastructure, the conversion of the native prairie to crops is the prairie chicken's greatest threat. Since 1800, the lesser prairie chicken's range on the Southern Great Plains "has been reduced by roughly 85 percent" (High Plains Partnership, 1999).

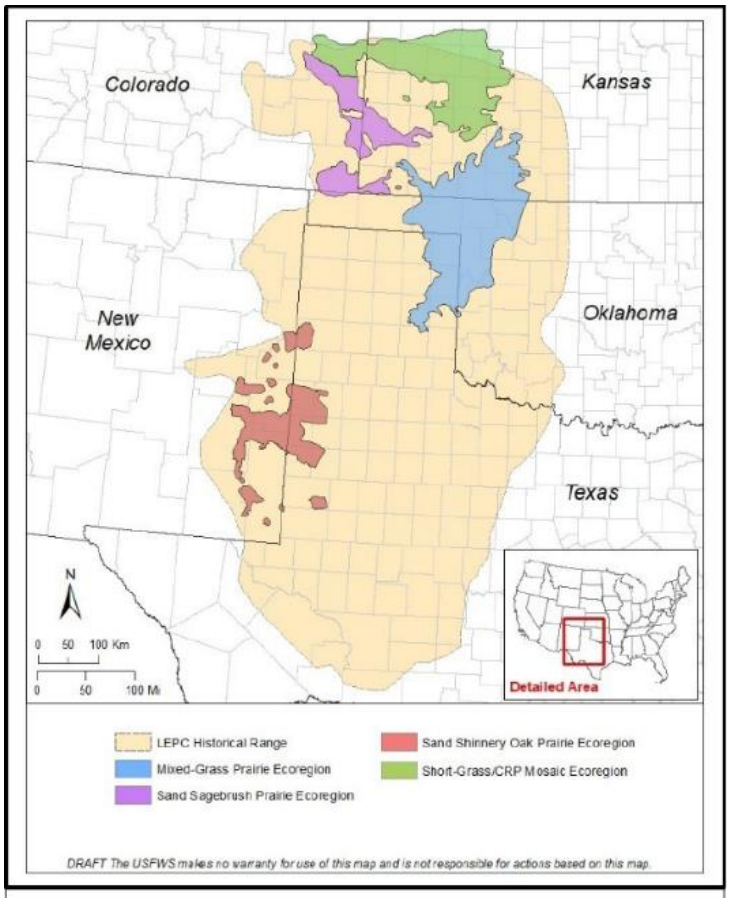


Figure ES.1 The estimated historical range and the analysis areas of the four ecoregions of the LEPC.

Source: USFWS, 2022

An important element of lesser prairie chicken habitat is adequate area for mating grounds, called "leks," where males perform displays and females gather for a mate. Leks are generally established on rises on the prairie with very short vegetation or bare ground and encompass an area of 50 to 100 yards in diameter. The area of land needed to support the birds comprising a lek is quite large. "The home range of the individuals from a single lek can encompass from 12,000 acres to more than 50,000 acres, depending on the quality and intactness of the habitat" (USFWS, 2022).

Most of the lesser prairie chicken's habitat is on privately owned land. This provides an opportunity for farmers and ranchers who wish to implement conservation practices to positively impact the future of this endangered grassland bird. The conservation plans developed through the Abundant Ogallala Project can be prescribed especially toward the improvement of lesser prairie chicken habitat. For example, to encourage nesting areas, practices such as prescribed burning, brush management, and rotational or deferred grazing can maintain sagebrush, sand plum, skunkbush sumac, and shinnery oak mixed grasslands (High Plains Partnership, 1999).

Grazing Ecology, Water, and the Lesser Prairie Chicken

The vegetational character of the Southern High Plains has been in flux for thousands of years. Fire, periodic drought, and large herbivores have all served to favor grasses that thrive in this often-harsh environment. The grasses, including buffalograss, grama, and bluestem, are adapted through the "presence of basal meristems, small stature, high shoot density, deciduous shoots, belowground

storage of nutrients, and rapid growth," which are all characteristics of plants that are resilient under periodic heavy grazing (Wester, 2007). Since the 1500s, the Southern High Plains have been described as a vast grassland, barely interrupted by trees. Álvar Núñez Cabeza de Vaca described the region (specifically, the Llano Estacado) through observation and discussions with native peoples in the 1530s: "They listened to talk and tales about things of which they had never heard. To the north were endless plains, plains so unchanging, so flat and treeless, that not a mound, not a stick or bush rose to disfigure their smooth flow to the horizons. Where they ended, no one could say. They ended in the sky. On them the herds of cattle [bison] roamed in countless numbers, herds so immense that they took several suns to pass, herds that covered the earth like ragged blankets as far as a man could see and crawled like the shadows of the clouds that journeyed to nowhere" (Wester, 2007).

After the 1700s, the plains succumbed to woody encroachment. Overgrazing (whether bison or domestic cattle), drought, and lack of fire (which is thought to have kept woody shrubs to the periphery in much of the high country) began to change the landscape. Finally, row-crop farming for cotton, corn, wheat, and grain sorghum reduced much of the prairie to monoculture. This historical perspective gives insight into the challenges faced by current land managers in the Southern High Plains, who must produce agricultural products in an environment suited, through geologic, biologic, and cultural evolution, to periodic, but intensive, grazing and frequent burning. Graziers are becoming more interested in developing a grazing system that is economically sustainable and regenerative towards water retention and wildlife habitat. Conservation practices that focus on adaptive livestock grazing and building soil health can be beneficial for sustaining productive use of these sensitive rangelands.

Grazing on dry sites necessitates adaptive management and observation. Native plants are excellent indicators and can tell a grazier a lot about the intensity and timing of use. Some, like little bluestem, are large statured and can handle several bites from an animal in one grazing event. Some, like blue grama, are smaller, and one bite is all it takes to reduce the plant to stubble. Cattle, especially, tend to graze severely, particularly if left on a site for too long. Most research and practical experience of ranchers shows that moderate grazing is often best to preserve key species. Since grazing severity is a function of time, moderate grazing can be achieved even if, at times, the stock density is high. Careful attention to the length of the grazing period and the amount of time allowed for full plant regrowth is crucial to prevent the decline of species like blue grama. In most cases, successful graziers have taken as much as 40% of standing vegetation, followed by a rest period for full recovery. After this level of defoliation, native grasses will have abundant seed stalks, areas more than a mile from water will show little use, and less than one half of the grasses will show defoliation in key areas (Spackman and Ward, 2024). For some sites on dry ranges, this will mean one grazing event per year. For areas with more moisture, you might be able to return for another grazing event during the same year.

Blue Grama. Source: Grace, et al, 2019.

On semi-arid rangelands (less than 13 inches of annual precipitation) light grazing (taking 35 to 40 percent of available forage) and providing rest for full recovery in one out of every four years minimum can maintain good nesting and brood-rearing cover for lesser prairie chickens. If range condition is deteriorated, then stocking levels would need to be substantially lower (High Plains Partnership, 1999). What works for the prairie chicken works well for building soil health and subsequent increased water-holding capacity.

The lesser prairie chicken needs a patchwork landscape of diverse native grasses and forbs interspersed with low shrubs. Plant height is optimally of short stature on level, open ground for display behavior and breeding (leks) (High Plains Partnership, 1999). For nesting, lesser prairie chickens seek dense, tall, clumped grasses, from three to 10 feet in diameter, rather than thick stands of even-growth vegetation (High Plains Partnership, 1999).

For nesting, the birds need about 65% clumped grasses, 20 to 30% shrubs, and 5 to 15% forbs, all averaging at least 20 inches in height. Brood-rearing habitat is ideal at around 40 to 45% sand sagebrush, sand plum, and shinnery oak; 40 to 45% grasses; and 15 to 20% forbs. A patchwork landscape with various plant types is ideal (High Plains Partnership, 1999). A grazing plan developed to provide moderate defoliation, adequate rest, and periodic deferment from grazing can help maintain the kind of patchwork landscape that can sustain a lesser prairie chicken lek.

Winter Wheat Annual Cropping

A vast majority of the crops grown in the Southern High Plains, including cotton and sorghum in addition to winter wheat, are grown on dryland soils without irrigation. In an area historically susceptible to drought (where water-efficient native grasses and shrubs dominated in the presence of fire and grazers), water conservation is critical for sustained agricultural productivity and continued ecosystem functioning. Conservation practices that conserve water include maintaining vegetative cover and reducing tillage in order to reduce evaporation, reduce soil temperature, and increase infiltration. These practices can be adopted to mitigate the effects of increased drought events (Steiner et al., 2015).

Maintaining cover (including using cover crops and allowing crop residues to remain in the field after harvest) and decreasing tillage add soil carbon and increase nutrient cycling by soil microorganisms. Kansas State University conducted research showing that for every one percent increase in organic matter in the soil, the soil's water-holding capacity triples, which equals, on average, an additional 25,000 gallons of available water per acre (Steiner et al., 2015).

Conventional tillage is still common on much of the Southern High Plains, where during a year a field may see four to six passes of the plow, though many farmers have been adopting conservation tillage practices to conserve water. The cropland conservation plans developed through the Abundant Ogallala project may draw on a number of NRCS Practice Standards, including these:

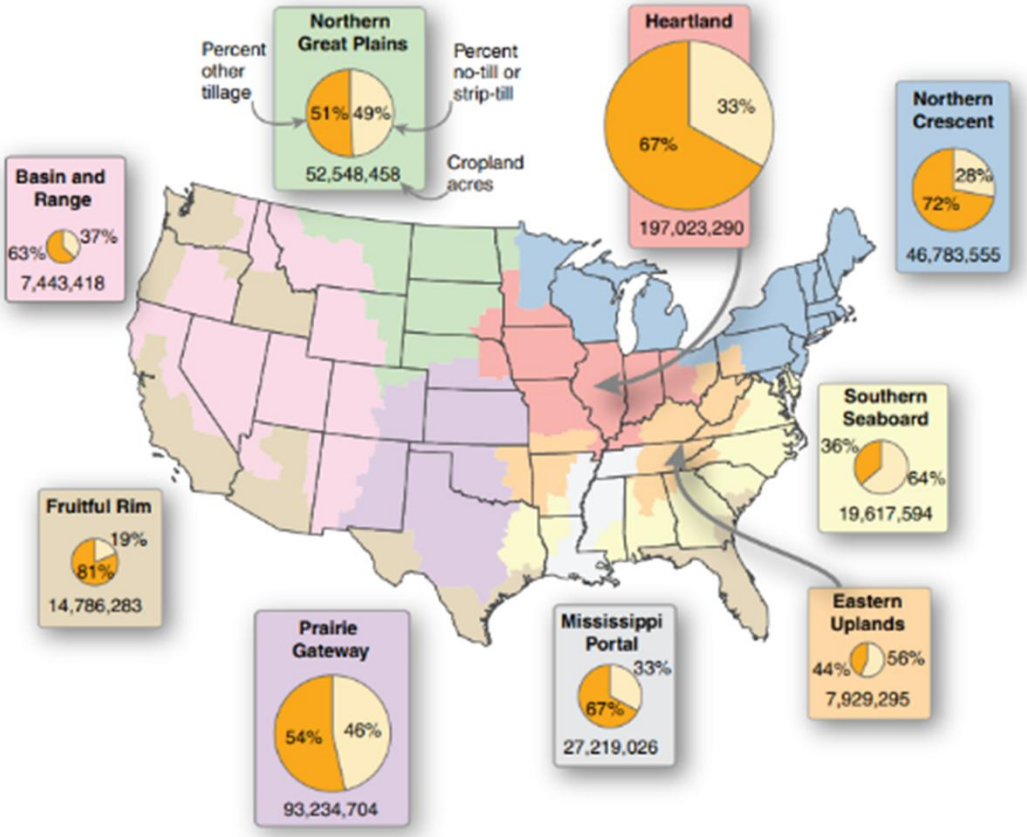
- Residue and Tillage Management, Reduced Till (345)

- Residue and Tillage Management, No Till (329)
- Conservation Crop Rotation (328)
- Irrigation Water Management (449), and
- Cover Crop (340)

In addition, practices that can positively affect lesser prairie chicken habitat include, but are not limited to:

- Riparian Forest Buffer (391)
- Filter Strip (393)
- Upland Wildlife Habitat Management (645)
- Early Successional Habitat Development & Management (647)

No-till or strip-till use on corn, soybeans, wheat, and cotton acres by farm resource region in the continental United States, 2010-11



Note: Cropland acreage is the total acreage in corn, soybeans, wheat, and cotton for 2010 and 2011.
Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service, Agricultural Resource Management Survey, 2010-11.

Conservation Planning Workbook

Date _____

Name of producer/landowner

Farm/ranch name

FSA Farm Number(s)

Mailing address

Physical location

Phone

Email

Farm Ownership and Description

History of Land Use and Community Dynamics
Lesser Prairie Chicken Habitat Information and History (numbers, presence of optimum contiguous habitat – diversity of native, short to mid-height grasses and forbs interspersed with low-growing shrubby cover)

Landowner/manager soil, water, and landscape concerns (soil, water, crops, livestock, wildlife)

Inventory of Land

Location	FSA Farm No	Tract	Field	Acreage	Land Use	Type of Management

Inventory of Livestock

Species/Type *(bulls, brood cows, calves, yearlings, ewes, lambs, etc)*						
Number						
Average Weight						
Dry Matter Forage Demand/Day						

Description of Grazing System (AUDs, rest periods, number of paddocks/pastures, forage/animal balance, water system, feed supplementation, fencing, etc.)

Description of Current Practices (acres, crops grown, tillage, cultivation, cover crops, fertility, nutrient management, pest and weed management, harvest and storage, yield, livestock concentration areas, range and pasture plant community data, forestry management and harvest, etc.)

Description of Marketing Plan

Site Visit – Land and Water Concerns (erosion, soil health, soil compaction, organic matter and aggregate stability, salt accumulation, ponding and flooding, water depletion, irrigation water, water quality, nutrient and chemical runoff and leaching, streambank degradation, plant productivity and community structure, wildlife (lesser prairie chicken) habitat, pollination, invasive species, cultural resources, pasture and rangeland condition, grazing system and forage balance, livestock distribution and shelter, etc.)

Recommended Practices (based on resource concerns and landowner/manager objectives – see Conservation Planning Guide for Resource Management Systems in Appendix.)

Practice	Tract Field ID	Acreage	Implementation Date	Cost Share	Notes

Practice Justification and Implementation Notes

Description of practices and an implementation schedule should be developed including the practice(s) to be implemented, land use modifiers to the practice (a practice implemented based on how the land is managed, i.e. grazing, organic, hayfields, easement, etc.), a justification for why the practice was selected, implementation guidance (plant materials, seeding rates, etc), a schedule of implementation, and any supporting practices and associated plans (grazing plan, etc.). Or cut and paste seeding rates, species tables, implementation guidance, practice standard language, etc. Provide maintenance suggestions and links to specific production or conservation practice implementation information.

Practice #1:

Practice #2:

Practice #3:

Monitoring Plan

Obtain baseline information, monitor to evaluate conservation practices, evaluate compliance with contract requirements.

Expected contract outcomes (to maintain compliance with funder requirements)

Indicators (soil, plant community, animal performance, lesser prairie chicken habitat and bird counts, water quality, etc.)

Methodology (soil samples, soil health tests, range and pasture composition and trend, surveys, transects, etc.)

Adaptation (making decisions based on observation of monitoring data)

Drought Plan (Kachergis, et al, 2014)

Preparation: (1) incorporate yearling livestock; (2) stockpile forage; (3) stock conservatively; (4) rest pastures; (5) use 1–3-month weather predictions to adjust stocking rate.

Response: (1) purchase feed; (2) reduce herd size; (3) earn off-farm income; (4) rent additional pasture; (5) apply for government assistance; (6) sell retained yearling livestock; (7) move livestock to another location; (8) wean calves early; (9) place livestock in a feedlot.

Other options: Hunting, fishing, birding, etc.

Supplemental Documents

Attach the following documents to this plan. When complete, the entire plan can be taken to your local NRCS/FSA office to begin the process of applying for technical and financial assistance in implementing conservation practices on your land. You may contact the Abundant Ogallala team at NCAT to obtain assistance with writing a conservation plan and get help with the application process. Contact Darron Gaus at darrong@ncat.org or 479-587-3479.

- Web Soil Survey soil map
- Map of land with tracts and field numbers
- Map of land, water, and lesser prairie chicken habitat concerns
- Map of land with practice implementation
- Conservation practice implementation schedule table
    - Tract, field, practice, acreage, implementation date, completion date, cost share
- Grazing plan (if applicable)

Resources

- **Kansas**

  Information on enrolling in Kansas NRCS programs can be found at the NRCS website here: https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives/kansas/environmental-quality-incentives

  Kansas USDA NRCS Office
  760 S Broadway Blvd
  Salina, KS 67401-4604
  785-823-4500
  Website and county locator – https://www.nrcs.usda.gov/state-offices/kansas

  Kansas State Research and Extension
  123 Umberger Hall
  1612 Claflin Road, Manhattan, KS 66506-0121
  785-532-5820
  Website and county locator – https://www.ksre.k-state.edu/

- **New Mexico**

  Information on how to enroll in NRCS programs in NM is covered extensively in NM Healthy Soil Working Group's *Intro to NRCS – Environmental Quality Incentives Program* which can be downloaded from https://www.nmhealthysoil.org/wp-content/uploads/2024/03/IntroToNRCS_EnvironmentalQualityIncentivesProgram_Booklet.pdf

New Mexico USDA NRCS
100 Sun Avenue Ne, Suite 602
Albuquerque, NM 87109-3434
Website and county locator – https://www.nrcs.usda.gov/state-offices/new-mexico

NM Tribal Extension
Website – https://tribalextension.nmsu.edu/
505-863-3432

New Mexico State University Cooperative Extension
County Directory – https://extension.nmsu.edu/county.html

- **Colorado**

  Information on Colorado programs can be found on their website at https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives/colorado/environmental-quality

  Colorado USDA NRCS
  Denver Federal Center, West 6th Ave.
  and Kipling St., Bldg. 56, Rm. 2400
  Denver, CO 80225-0426
  Website and county locator – https://www.nrcs.usda.gov/state-offices/colorado

  Colorado State University Extension
  1311 S College Ave.
  Fort Collins, CO
  County locator – https://extension.colostate.edu/staff-directory/

- NOTE: NRCS ranks applications during specific times during the year. Access https://www.nrcs.usda.gov/ranking-dates to view the ranking dates in your state.

- The ATTRA publication *Federal Working Lands Conservation: Resources for Sustainable Farming and Ranching* introduces and explains federal working-lands conservation programs administered by the Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA). The Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP) are discussed in detail, with attention to understanding the application and implementation processes for these programs. Examples of how these programs can benefit farmers and ranchers are included. Download the publication at https://attra.ncat.org/publication/federal-working-lands-conservation-resources/

- You may contact the **Abundant Ogallala** team at NCAT obtain assistance with writing a conservation plan and get help with the application process. Contact Darron Gaus at darrong@ncat.org or 479-587-3479.

References

Grace, Joshua, Andrew Brischke, Ashley Hall, and Kim McReynolds. 2019. Utilizing Blue Grama Rangelands in Arizona. The University of Arizona Cooperative Extension.

Hennings, Juli and Harry Lynch. 2022. Depleting the Ogallala Aquifer. EarthDate. Bureau of Economic Geology, University of Texas.

High Plains Partnership. 1999. Lesser Prairie-Chicken (Tympanuchus pallidicinctus). Fish and Wildlife Habitat Management Leaflet Number 6.

Kachergis, E., J. D. Derner, B. B. Cutts, L. M. Roche, V. T. Eviner, M. N. Lubell, and K. W. Tate. 2014. Increasing flexibility in rangeland management during drought. Ecosphere 5(6):77.

Sawatis, Iawentanawen Kasey. 2024. The Vanishing Water: Ogallala Water Depletion: Great Plains facing Great Depletion. ArcGIS Story Maps.

Spackman, Casey and Marcy Ward. 2024. Grazing Management Considerations on New Mexico Rangelands, CR-709. New Mexico State University.

Steiner, J.L., J.M. Schneider, C. Pope, S. Pope, P. Ford, and R.F. Steele. 2015. Southern Plains Assessment of Vulnerability and Preliminary Adaptation and Mitigation Strategies for Farmers, Ranchers, and Forest Land Owners, T. Anderson, Ed., United States Department of Agriculture.

The Gale Group. 2008. Science and Issues: Water Encyclopedia.

USDA. 2022. Conservation Planning Workbook. Montana Natural Resources Conservation Service.

USDA. 2022. Conservation Planning Guide for Resource Management Systems. Field Office Technical Guide, Section III. Natural Resources Conservation Service.

USFWS. 2022. Species status assessment report for the lesser prairie-chicken (Tympanuchus pallidicinctus), Version 2.3.

USDA. 1981. Land Resource Regions and Major Land Resource Areas of the United States. United States Department of Agriculture Soil Conservation Service Handbook 296.

Walter, Susan. 2023. Irrigated Crops on the US High Plains: Drought, aquifer use, and the future of agriculture. ArcGIS Story Maps.

Wester, Davis B. 2007. The Southern High Plains: A History of Vegetation, 1540 to Present, in Sosebee, R.E.; Wester, D.B.; Britton, C.M.; McArthur, E.D.; Kitchen, S.G. Proceedings: Shrubland dynamics—fire and water; 2004 August 10-12; Lubbock, TX. Proceedings RMRS-P-47. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 173 p.

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Appendix

The following document is included as an additional planning resource. It was produced by USDA NRCS in Raleigh, NC, and is available online at https://efotg.sc.egov.usda.gov/references/public/NC/RMSConservationPlanningGuide_June2022.pdf.

Conservation Planning Guide for Resource Management Systems

Conservation planning is recognized as the cornerstone of the NRCS conservation delivery system and serves as the basic tool for clients to manage their natural resources. A *Conservation Plan* is defined by the National Planning Procedures Handbook (NPPH) as "*A record of the client's decisions and supporting information for the treatment of a unit of land for one or more identified natural resource concerns as a result of the planning process. The plan describes the schedule of implementation for practices and activities needed to address identified natural resource concerns and takes advantage of opportunities. The needs of the client, the resources, and Federal, State, Tribal, and local requirements will be met.*" A conservation plan that meets NRCS policies and planning procedures, and considers reasonably foreseeable impacts on the environment, including but not limited to Special Environmental Concerns (SECs), must be developed to document the provision of technical assistance and to support all financial assistance program agreements. Through this process, NRCS reassures their clients, that in order to effectively protect, conserve, and enhance natural resources on private lands, a *conservation plan* is fundamental to the long-term success in achieving sustainable use and sound management of ***S**oil, **W**ater, **A**ir, **P**lants, **A**nimals, **E**nergy and **H**uman* (SWAPAE+H) resources.

The NRCS objective in conservation planning is to:

1. Help each client attain sustainable use and sound management of SWAPAE+H, based on related human considerations.

The NRCS purpose in conservation planning is to:

1. Prevent the degradation of resources,
2. Ensure their sustained use and productivity,
3. Considering economic and social needs (+H) relative to the resource.

The NRCS planning standard in conservation planning is to:

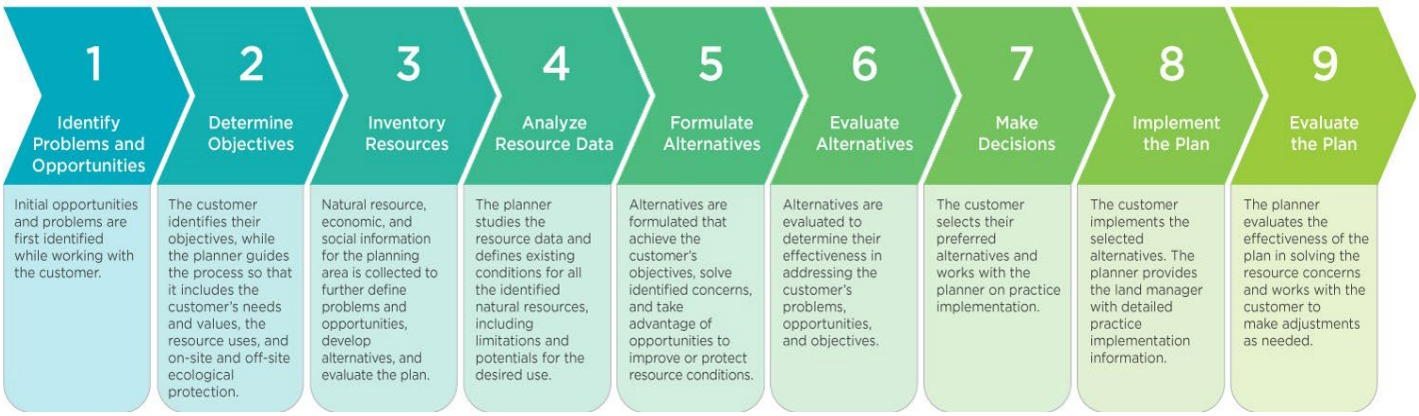
1. Develop alternative treatments to meet the resource needs, objectives of the client, and adequately treats the identified resource concerns the client chooses to address
2. One or more action alternatives will be developed, included in the case file, and presented to the client.
3. Conservation planning is conducted with the client, working progressively towards an RMS level of management.

Successful conservation planning on any land use is achieved through the 3-Phase, 9- Step Planning Process. The three-phase, nine-step process is used by NRCS to help clients plan and apply conservation treatments or make land use and treatment decisions.

Phase I – Collection and Analysis (Understanding the Problems and Opportunities)
Step 1 – Identify problems and opportunities
Step 2 – Determine objectives
Step 3 – Inventory resources
Step 4 – Analyze resource data

Phase II – Decision Support (Understanding the Solutions)
Step 5 – Formulate alternatives
Step 6 – Evaluate alternatives
Step 7 – Make decisions

Phase III – Application and Evaluation (Understanding the Results)
Step 8 – Implement the plan
Step 9 – Evaluate the plan



Successful conservation planning also requires the correct application of conservation practices and management activities for which standards and practice specifications have been developed and offered in the state's Field Office Technical Guide (eFOTG). A specific treatment, such as a structural or vegetative measure, or management technique, commonly used to meet specific needs in planning and implementing conservation, is needed to maintain, treat, or improve SWAPAE+H resource concerns to sustainable levels and meet client objectives.

Planning by its nature is both progressive and adaptive. A first-time client may only be interested in a single practice to meet one of their resource concerns. By introducing the planning process, the client may be presented a range of alternatives to address multiple resource concerns and ideally, to develop and implement a full Resource Management System (RMS). Whether delivering progressive or RMS planning assistance, planners and clients work closely together throughout each step of the planning process, learning from each other and further refining short-term and long-term objectives. It is important to continue assisting clients in addressing resource concerns by increasing the level of planning and implementation over time and ultimately achieving the client's planned goals and sustainable management of the natural resources.

RMS vs. PPS

A **Resource Management System (RMS)** is "*a combination of conservation practices and resource management activities that treats all identified resource concerns for soil, water, air, plants, animals and energy to a level that meets or exceeds the planning criteria in the FOTG*". All conservation planning activities are conducted with the client, working progressively towards an RMS level of management. Conservation planning assistance is provided to land-users to progressively plan as much treatment needed towards an RMS as decision-makers are willing and able to adopt or implement at any point in time. The progressive planning approach is the incremental process of building a conservation plan consistent with land-user's ability to make decisions over a period of time, but still striving, progressively, towards an RMS level of management. The rate of progress in moving to an RMS level will depend on the client's desires and constraint. When all SWAPAE+H resources for a planning land unit (PLU) are treated, improved, or maintained to a level that meets or exceeds planning criteria, the plan is considered to have achieved a Resource Management System (RMS).

A **Progressive Planning System (PPS)** is "*a conservation plan that addresses a limited number of resource concerns, or even a single resource concern, and consequently does not achieve an RMS level of treatment for all SWAPAE+H resources in a PLU*." A PPS may move to the RMS level depending on the client's desires and constraints and planner ability to cultivate and maintain a relationship with the client. All PPS should move towards an RMS level as the client and the planner develop a trusting relationship and, both understand existing problems, resource concerns, and opportunities.

All conservation plans, regardless of the level of management (RMS or PPS), must document a summary of the client's decisions and describe the planned conservation system (planned practices AND existing functional practices), amounts, and schedule for implementation. Conservation plans may also include "*component plans*" to provide greater detail in addressing resource concerns.

Resource Management System (RMS)	↔	**Progressive Planning System (PPS)**
RMS planning outlines conservation practices and resource management activities that treat ALL identified resource concerns for a planning area or land unit to a level that meets or exceeds planning criteria. Over time, all conservation PPS should move toward an RMS level as the client and the planner develop a trusting relationship and both understand existing problems/resource concerns. An RMS is developed by selecting the conservation practices and management activities required to meet or exceed planning criteria for all existing resource concerns, including describing and documenting existing functional practices that are part of the system. All resource concerns and Special Environmental Concerns (SECs) identified for the planning unit during Phase I - Collection and Analysis, must be evaluated and documented using the NRCS-CPA-52 and/or CD-EE, and alternative actions recommended under the Alternatives 1 and 2. An RMS is considered fully applied when all the conservation practices that make up the system have been implemented/ adopted according to the applicable Conservation Practice Standards & Specifications in Section IV of the eFOTG. Refer to Planning Guides below for conservation practices to consider for a particular land use designation.		PPS is when a client addresses a limited number of resource concerns—or even a single resource concern. PPS does not achieve the RMS level of treatment immediately but may move to an RMS level depending on the client's desires and constraints and, planner ability to cultivate and maintain a trusting relationship with the client. Much like in an RMS, a PPS is a system planning approach and must treat resource problems on a land unit. A PPS meets or exceeds eFOTG planning criteria for each of the resource concerns identified by the planner and client. PPS must: 1) Describe and document existing functional practices that are part of the system, 2) NOT have long term negative impacts (*create other persistent resource problems*), and 3) must be able to function and solve identified resource concern(s) with normal operation and maintenance. Like an RMS plan, a PPS identifies conservation practices required to meet a minimum level of resource performance. All resource concerns and Special Environmental Concerns (SECs) identified for the planning unit during Phase I - Collection and Analysis, must be evaluated and documented using the NRCS-CPA-52 and/or CD-EE, and alternative actions recommended under the Alternatives 1 and 2. Refer to Planning Guides below for conservation practices to consider for a particular land use designation.

Planning Guides

One of the first and most important steps in formulating an RMS level of treatment, is to complete a comprehensive resource inventory and analysis, including an environmental evaluation (e.g., NRCS-CPA-52 and/or CD-EE) to identify all potential resource concerns in the planning area and determine how they relate to each of the SWAPAE+H resources, including but not limited to Special Environmental Concerns (SECs), and other applicable Federal, State, Local, and Tribal laws and regulations.

This planning guide lists (1) recognized NRCS Natural Resources & Resource Concerns, (2) NRCS Landuse Categories and Definitions, (3) the Primary Conservation Practice(s) associated with each land use and modifier, (4) a selected list of *Supporting Conservation Practice(s)* that may be used as needed to facilitate the implementation of a primary conservation practice, and (5) a list of Component Plans required to provide greater detail in addressing resource concerns for each land use category.

List of Natural Resources & Resource Concerns (SWAPAE)

A resource concern is the resource condition that does not meet minimum acceptable condition levels as established by resource planning criteria shown in the FOTG, Section III. This implies an expected degradation of the soil, water, air, plant, animal or energy resource base to the extent that the sustainability or intended use of the resource is impaired. Refer to the NC eFOTG>Section III>Planning Criteria subfolder for the latest list of NRCS approved resource concerns.

Soil

1. Sheet and rill erosion
2. Wind erosion
3. Ephemeral gully erosion
4. Classic gully erosion
5. Bank erosion from streams, shorelines or water conveyance channels
6. Subsidence
7. Compaction
8. Organic matter depletion
9. Concentration of salts or other chemicals
10. Soil organism habitat loss or degradation
11. Aggregate instability

Water

12. Ponding and flooding
13. Seasonal high water table
14. Seeps
15. Drifted snow
16. Surface water depletion
17. Ground water depletion
18. Naturally available moisture use
19. Inefficient Irrigation water use
20. Nutrients transported to surface water
21. Nutrients transported to groundwater
22. Pesticides transported to surface water
23. Pesticides transported to groundwater Pathogens and chemicals from manure, bio-solids, or compost applications transported to surface water.
24. Pathogens and chemicals from manure, bio-solids, or compost applications transported to groundwater.
25. Salts transported to surface water
26. Salts transported to groundwater
27. Petroleum, heavy metals, and other pollutants transported to surface water
28. Petroleum, heavy metals, and other pollutants transported to ground water
29. Sediment transported to surface water
30. Elevated water temperature

Air

32. Emissions of particulate matter – PM and PM precursors
33. Emissions of greenhouse gases – GHGs
34. Emissions of ozone precursors
35. Objectionable odors
36. Emissions of airborne reactive nitrogen

Plants

37. Plant productivity and health
38. Plant structure and composition
39. Plant pest pressure
40. Wildfire hazard from biomass accumulation

Animals

41. Terrestrial habitat for wildlife and invertebrates
42. Aquatic habitat for fish and other organisms
43. Feed and forage imbalance
44. Inadequate livestock shelter
45. Inadequate livestock water quantity, quality and distribution

Energy

46. Energy efficiency of equipment and facilities
47. Energy efficiency of farming/ranching practices and field operations

Landuse Categories & Definitions

Land Use includes categories of *land cover* and categories of *land use*. *Land cover* is the vegetation or other kind of material that covers the land surface. *Land use* is the purpose of human activity on the land; it is usually, but not always, related to land cover. NRCS has developed the following land use designations to be used by planners and modelers at the field and landscape level. Refer to the NC eFOTG>Section III> Landuse Categories & Definitions subfolder for the latest list of NRCS approved resource concerns.

Crop — Land used primarily for the production and harvest of annual or perennial field, forage, food, fiber, horticultural, orchard, vineyard, or energy crops.

Pasture — Land composed of introduced or domesticated native forage species that is used primarily for the production of livestock. Pastures receive periodic renovation and cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. Pastures are not in rotation with crops.

Farmstead — Land used for facilities and supporting infrastructure where farming, forestry, animal husbandry, and ranching activities are often initiated. This may include dwellings, equipment storage, plus farm input and output storage and handling facilities. Also includes land dedicated to the facilitation and production of high-intensity animal agriculture in a containment facility where daily nutritional requirements are obtained from other lands or feed sources.

Forest — Land on which the historic and/or introduced vegetation is predominantly tree cover managed for the production of wood products or non-timber forest products.

Associated Agriculture Lands — Land associated with farms and ranches that are not purposefully managed for food, forage, or fiber and are typically associated with nearby production or conservation lands. This could include incidental areas, such as idle center pivot corners, odd areas, ditches and watercourses, riparian areas, field edges, seasonal and permanent wetlands, and other similar areas.

Developed Land — Land occupied by buildings and related facilities used for residences, commercial sites, public highways, airports, and open space associated with towns and cities.

Water — Geographic area whose dominant characteristic is open water or permanent ice or snow. May include intermingled land, including tidal-influenced coastal marsh lands.

Other — Land that is barren, sandy, rocky, or that is impacted by the extraction of natural resources, such as minerals, gravel or sand, coal, shale, rock, oil, or natural gas.

Modifiers

The following land use modifiers are used to differentiate level(s) of land use specificity and help describe how land is managed.

Irrigated — Used when an operational system is present and managed to supply water.

Wildlife — Used when the client is actively managing for wildlife.

Grazed — Used when grazing animals impact how land is managed.

Drained — Used when artificial drainage exists that has an impact on how the land is managed

Organic — Used on field which has met the organic or transitioning to organic criteria

Water Feature — Used to identify that the planned land unit contains or is adjacent to a water feature, such as a stream, lake, river, etc.

Protected — The land unit is under a conservation easement or similar protection

Hayed — Used when hay production is the primary activity.

Urban — Used when land is located in a landscape predominated by residential, commercial, industrial, and transportation uses.

Primary and Supporting Conservation Practices

A *primary* conservation practice is a practice that results in the greatest environmental benefit on the resource concern is treating and has been identified as essential to successfully treat a land unit. Primary conservation practices are always planned and must be part of an RMS plan for a particular land use designation. A supporting conservation practice is planned to facilitate management, function, or effectiveness of a *primary conservation practice* but does not achieve the desired effects on its own. Determining if a practice is primary or supporting is a planner decision, based on their knowledge of the local resources and how practices or system of practice are designed and applied to treat resource concerns.

The following land use guides provides a non-exhaustive list of conservation practices and activities to be considered when conducting conservation planning on typical agricultural land uses in North Carolina (NC). This guide is not intended to be used as an all-inclusive list of practices or system of practices typically found in an RMS level of treatment in NC. Planners are expected to acquire the technical and planning knowledge, skills, and abilities (KSAs) to independently conduct thorough and comprehensive resource assessments for common land use designations within their area of responsibly. More importantly, planners must possess the working knowledge of eFOTG conservation practices and system of practices typically planned or applied within a workunit and be competent in formulating RMS alternative systems that address resource concerns, opportunities, and achieve sound management of SWAPAE+H resources to sustainable levels. Use of professional judgment and knowledge, to develop site-specific recommendations to solve identified resource concerns, maintain acceptable levels of resource sustainability, or improve upon them, is applicable to all planning scenarios.

Planned and/or Existing Functional Practices listed in the guides are categorized as follows:

- **Primary** – practices that address essential resource concern elements for the land use designation and/or modified.
- **Supporting** – practices required to support functioning of *primary* practices.
- **Component Plans** – plan(s) required to provide greater detail in addressing resource concerns. The following is a partial list of some examples of component plans, including but not limited to plans addressing Invasive Species and Pollinators:
  1) Comprehensive Nutrient Management Plans (CNMP),
  2) Nutrient Management Plans,
  3) Integrated Pest Management Plans,
  4) Forest Management Plans,
  5) Prescribed Burn Plans,
  6) Irrigation Water Management Plans,
  7) Grazing Management Plans,
  8) Wildlife Management Plans,
  9) Organic System Plans,
  10) Invasive Species within the Conservation Plan
  11) Pollinators within the Conservation Plan
  12) Other

The following virtual training titled "*Guiding Principles & Elements of a Resource Management System (RMS)*" offers Planners additional technical information and RMS-level planning guidance. The training covers NRCS expectations for the development of an RMS-level plan as described in the National Planning Procedures Handbook (NPPH) (*180-VI-NPPH, Amend. 8, Nov. 2020*) and National Conservation Planning Policy ((*180-409-GM, 1st Ed., Amend. 46, July 2021)).* Key topics discussed during this training event are outlined below:

1) Guiding Principles for Conservation Planners
2) Important NPPH Concepts/Definitions
3) Elements of a Sound RMS Plan
4) RMS Planning Scenarios for Crop and Pasture Landuse Types, and
5) Available Panning Aids and Resources.

A copy of the presentation can be viewed/downloaded from the following weblink:
https://efotg.sc.egov.usda.gov/references/public/NC/GuidingPrinciples&ElementsofRMS_Participant.pdf

CROP

PRIMARY PRACTICE(S)

(Required to manage growing crop plants, their residues, and/or promote a healthy soil environment)

1) Appropriate Residue and Tillage Management. Must include at least one of the following:
   - Residue and Tillage Management, Reduced Till (345),
     or
   - Residue and Tillage Management, No Till (329)).
2) Conservation Crop Rotation (328)
3) Cover Crop (340)

Land Use Modifiers (Primary Practices)

Hayed Forage Harvest Management (511)	***Water Feature*** Riparian Forest Buffer (391) Filter Strip (393)	***Wildlife*** Planned practices and management must achieve a WHEP Score ≥0.75 for upland species/habitat, and SVAP2 >5 for aquatic habitat (*when water feature modifier is present*). Plan must include an appropriate wildlife management practice(s) (see bulleted list below) for the species/habitat type. Aquatic Organism Passage (396) is required where there are barriers to aquatic species movement. Appropriate Wildlife Management Practices •Field Border (386) •Fishpond Management (399) •Stream Habitat Improvement & Management (395) •Wildlife Habitat Planting (420) •Restoration & Management of Rare or Declining Habitat (643) •Wetland Wildlife Habitat Management (644) •Upland Wildlife Habitat Management (645) •Shallow Water Development & Management (646) •Early Successional Habitat Development & Management (647) •Structures for Wildlife (649)
Grazed See Pasture PRIMARY Practices	***Irrigated*** Irrigation Water Management (449)	
Organic Planned system must adhere to the criteria and guidelines outlined in an Organic System Plan (OSP).	***Drained*** Drainage Water Management (554)	
Protected *As determined by the Planner to address the threat of land conversion and loss of wetland, floodplain, and/or forestland functions and values.	***Urban*** *As determined by the Planner to address the resource base. Refer to the Engineering Field Handbook-Chapter 20, for additional planning and technical guidance.	

SUPPORTING PRACTICE(S)

1) Nutrient Management (590) (*if nutrients are applied*)
2) Pest Management Conservation System (595) (*if pesticides are applied*)
3) Other eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

COMPONENT PLAN(S)

1) Nutrient Management Plan (*if nutrients are applied*)
2) Integrated Pest Management Plan (*if pesticides are applied*)
3) Irrigation Water Management Plan (*if Irrigated Modifier is present*)
4) Grazing Management Plan (*if Grazing Modifier is present*)
5) Wildlife Management Plan ((*if Wildlife Modifier is present*)
6) Invasive Species within the Conservation Plan ((*if Invasive Species are present*)
7) Pollinators within the Conservation Plan (*if Wildlife Modifier is present)*
8) Organic System Plan ((*if Organic modifier is present*)

AGROFORESTRY CATEGORY

(Intentional combination of agriculture and forestry to create productive and sustainable land use practices.)

1) Alley Cropping (311)
2) Riparian Forest Buffer (391) *(if water feature is present)*
3) Windbreak/Shelterbelt Establishment (380)

NOTE: When a Planning Land Unit (PLU) is not designated with a *wildlife modifier,* it must include practices and/or wildlife management activities that achieve a WHEP Score of at least ≥0.50 for it to reach an RMS level of planning.

PASTURE

PRIMARY PRACTICE(S)

(Required to manage growing forage plants, manage grazing animals, and/or promote a healthy soil environment)

1) Prescribed Grazing (528)
2) Fence (382)
3) Access Control (472) *(if water feature is present)*

Land Use Modifiers (Primary Practices)

Hayed Forage Harvest Management (511)	***Water Feature*** Access Control (472) Riparian Forest Buffer (391) Filter Strip (393)	***Wildlife*** Planned practices and management must achieve a WHEP Score ≥0.75 for upland species/habitat, and SVAP2 >5 for aquatic habitat (*when water feature modifier is present*). Plan must include an appropriate wildlife management practice(s) (see bulleted list below) for the species/habitat type. Aquatic Organism Passage (396) is required where there are barriers to aquatic species movement. Appropriate Wildlife Management Practices •Field Border (386) •Fishpond Management (399) •Stream Habitat Improvement & Management (395) •Wildlife Habitat Planting (420) •Restoration & Management of Rare or Declining Habitat (643) •Wetland Wildlife Habitat Management (644) •Upland Wildlife Habitat Management (645) •Shallow Water Development & Management (646) •Early Successional Habitat Development & Management (647) •Structures for Wildlife (649)
Grazed *As Noted on this page	***Irrigated*** Irrigation Water Management (449)	
Organic Planned system must adhere to the criteria and guidelines outlined in an Organic System Plan (OSP).	***Drained*** Drainage Water Management (554)	
Protected *As determined by the Planner to address the threat of land conversion and loss of wetland, floodplain, and/or forestland functions and values.	***Urban*** *As determined by the Planner to address the resource base. Refer to the Engineering Field Handbook-Chapter 20, for additional planning and technical guidance.	

SUPPORTING PRACTICE(S)

1) Nutrient Management (590) (*if nutrients are applied*)
2) Pest Management Conservation System (595) (*if pesticides are applied*)
3) Pasture & Hay Planting (512)
4) Watering Facility (614)[1]
5) Water Well (642)
6) Pumping Plant (533)
7) Livestock Pipeline (516)
8) Heavy Use Area Protection (561)
9) Trails and Walkways (575)
10) Stream Crossing (578)
11) Streambank and Shoreline Protection (580)
12) Pasture and Hay Planting (512)
13) Other eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

[1]Livestock watering facilities are comprised of a combination of conservation practices. All potential water sources (well, public water supply, spring, pond, or stream) should be identified. Direct consumption from surface water bodies should be used only after other options to provide livestock watering facilities have been exhausted. If livestock are permitted to drink from streams or ponds, the Prescribed Grazing Plan must specify a frequency of rotation or method of controlled access to prevent degradation of channel banks and water quality. If channel banks and water quality will not be adequately protected through implementation of Prescribed Grazing, Heavy Use Area Protection (561) and Use Exclusion (472) must both be used to control access and prevent degradation.

COMPONENT PLAN(S)

1) Grazing Management Plan
2) Nutrient Management Plan (*if nutrients are applied*)
3) Integrated Pest Management Plan (*if pesticides are applied*)
4) Irrigation Water Management Plan (*if Irrigated Modifier is present*)
5) Wildlife Management Plan ((*if Wildlife Modifier is present*)
6) Invasive Species within the Conservation Plan ((*if Invasive Species are present*)
7) Pollinators within the Conservation Plan (*if Wildlife Modifier is present)*
8) Organic System Plan ((*if Organic modifier is present*)

AGROFORESTRY CATEGORY

(**In**tentional combination of agriculture and forestry to create productive and sustainable land use practices.)

1) Alley Cropping (311)
2) Riparian Forest Buffer (391) *(if water feature is present)*
3) Windbreak/Shelterbelt Establishment (380)
4) Silvopasture (381)

NOTE: When a Planning Land Unit (PLU) is not designated with a *wildlife modifier,* it must include practices and/or wildlife management activities that achieve a WHEP Score of at least ≥0.50 for it to reach an RMS level of planning.

FARMSTEAD

PRIMARY PRACTICE(S)

(Required to manage facilities and infrastructure used for, or in support of, farming operations. Farmsteads can encompass a broad spectrum of farm activities and resource concerns, including dwellings, confined animals, aquaculture, horticulture, storage (crops, feed, fuel, equipment), and farm maintenance/repair.)

1) For planning activities involving Animal Feeding Operations (AFOs) / Confined Animal Feeding Operations (CAFOs):
   - Any eFOTG practice(s) listed in the Comprehensive Nutrient Management Plan (CNMP) that are feasible, suitable, and essential to successfully treat the farmstead and land application areas of an AFO/CAFO.

2) For planning activities involving aquaculture, horticulture, storage (crops, feed, fuel, equipment), and farm maintenance/repair:
   - Any eFOTG practice(s) that is feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

Land Use Modifiers (Primary Practices)

Hayed Forage Harvest Management (511)	***Water Feature*** Riparian Forest Buffer (391) Filter Strip (393)	***Wildlife*** Planned practices and management must achieve a WHEP Score ≥0.75 for upland species/habitat, and SVAP2 >5 for aquatic habitat (*when water feature modifier is present*). Plan must include an appropriate wildlife management practice(s) (see bulleted list below) for the species/habitat type. Aquatic Organism Passage (396) is required where there are barriers to aquatic species movement. Appropriate Wildlife Management Practices •Field Border (386) •Fishpond Management (399) •Stream Habitat Improvement & Management (395) •Wildlife Habitat Planting (420) •Restoration & Management of Rare or Declining Habitat (643) •Wetland Wildlife Habitat Management (644) •Upland Wildlife Habitat Management (645) •Shallow Water Development & Management (646) •Early Successional Habitat Development & Management (647) •Structures for Wildlife (649)
Grazed See Pasture PRIMARY Practices	***Irrigated*** Irrigation Water Management (449)	
Organic Planned system must adhere to the criteria and guidelines outlined in an Organic System Plan (OSP).	***Drained*** Drainage Water Management (554)	
Protected *As determined by the Planner to address the threat of land conversion and loss of wetland, floodplain, and/or forestland functions and values.	***Urban*** *As determined by the Planner to address the resource base. Refer to the Engineering Field Handbook-Chapter 20, for additional planning and technical guidance.	

SUPPORTING PRACTICE(S)

1) Waste Storage Facility (313) (*if manure, animal waste, wastewater, and/or agricultural by-products storage is needed)*
2) Animal Mortality Facility (316) (*if on-farm treatment or disposal of animal carcasses is needed)*
3) Composting Facility (317) (*if on-farm aerobic treatment of animal manure is needed)*
4) Roofs and Covers (367)
5) Roof Runoff Structure (558)
6) Critical Area Planting (342)
7) Mulching (484)
8) Other eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

COMPONENT PLAN(S)

1) Comprehensive Nutrient Management Plan (CNMP) (*if part of an Animal Feeding Operation (AFO) or CAFO*)
2) Nutrient Management Plan (*if nutrients are applied*)
3) Integrated Pest Management Plan (*if pesticides are applied*)
4) Irrigation Water Management Plan (*if Irrigated Modifier is present*)
5) Grazing Management Plan (*if Grazing Modifier is present*)
6) Wildlife Management Plan ((*if Wildlife Modifier is present*)
7) Invasive Species within the Conservation Plan ((*if Invasive Species are present*)
8) Pollinators within the Conservation Plan (*if Wildlife Modifier is present)*
9) Organic System Plan ((*if Organic modifier is present*)

AGROFORESTRY CATEGORY

(Intentional combination of agriculture and forestry to create productive and sustainable land use practices.)

1) Riparian Forest Buffer (391) *(if water feature is present)*
2) Windbreak/Shelterbelt Establishment (380)

NOTE: When a Planning Land Unit (PLU) is not designated with a *wildlife modifier,* it must include practices and/or wildlife management activities that achieve a WHEP Score of at least ≥0.50 for it to reach an RMS level of planning.

FOREST

PRIMARY PRACTICE(S)

(Required to manage stocking and competition on a stand of trees and/or promote a healthy soil environment)

1) Forest Stand Improvement (666)

Land Use Modifiers (Primary Practices)

Grazed See Pasture PRIMARY Practices	***Water Feature*** Riparian Forest Buffer (391) Filter Strip (393)	***Wildlife*** Planned practices and management must achieve a WHEP Score ≥0.75 for upland species/habitat, and SVAP2 >5 for aquatic habitat (*when water feature modifier is present*). Plan must include an appropriate wildlife management practice(s) (see bulleted list below) for the species/habitat type. Aquatic Organism Passage (396) is required where there are barriers to aquatic species movement. Appropriate Wildlife Management Practices •Field Border (386) •Fishpond Management (399) •Stream Habitat Improvement & Management (395) •Wildlife Habitat Planting (420) •Restoration & Management of Rare or Declining Habitat (643) •Wetland Wildlife Habitat Management (644) •Upland Wildlife Habitat Management (645) •Shallow Water Development & Management (646) •Early Successional Habitat Development & Management (647) •Structures for Wildlife (649)
Organic Planned system must adhere to the criteria and guidelines outlined in an Organic System Plan (OSP).	***Drained*** Drainage Water Management (554)	
Protected *As determined by the Planner to address the threat of land conversion and loss of wetland, floodplain, and/or forestland functions and values.	***Urban*** *As determined by the Planner to address the resource base. Refer to the Engineering Field Handbook-Chapter 20, for additional planning and technical guidance.	

SUPPORTING PRACTICE(S)

1) Tree and Shrub Site Preparation (490)
2) Tree and Shrub Establishment (612)
3) Firebreak (394)
4) Prescribed Burning (338)
5) Access Road (560)
6) Forest Trails and Landings (655)
7) Other eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

COMPONENT PLAN(S)

1) Forest Management Plan
2) Prescribed Burn Plan (*if fire is prescribed)*
3) Invasive Species within the Conservation Plan ((*if invasive species are present*)
4) Nutrient Management Plan (*if nutrients are applied*)
5) Integrated Pest Management Plan (*if pesticides are applied*)
6) Irrigation Water Management Plan (*if Irrigated Modifier is present*)
7) Grazing Management Plan (*if Grazing Modifier is present*)
8) Wildlife Management Plan ((*if Wildlife Modifier is present*)
9) Pollinators within the Conservation Plan (*if Wildlife Modifier is present)*
10) Organic System Plan ((*if Organic modifier is present*)

AGROFORESTRY CATEGORY

(Intentional combination of agriculture and forestry to create productive and sustainable land use practices.)

1) Alley Cropping (311)
2) Riparian Forest Buffer (391) *(if water feature is present)*
3) Windbreak/Shelterbelt Establishment (380)
4) Silvopasture (381)

NOTE: When a Planning Land Unit (PLU) is not designated with a *wildlife modifier,* it must include practices and/or wildlife management activities that achieve a WHEP Score of at least ≥0.50 for it to reach an RMS level of planning.

ASSOCIATED AGRICULTURE LANDS

PRIMARY PRACTICE(S)

(Required for land that is not purposefully managed for food, forage, or fiber and is typically associated with nearby production or conservation lands. (e.g., incidental areas, idle center pivot corners, odd areas, ditches and watercourses, riparian areas, field edges, seasonal and permanent wetlands, and other similar areas))

1) Any eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

Land Use Modifiers (Primary Practices)

Hayed Forage Harvest Management (511)	***Water Feature*** Riparian Forest Buffer (391) Filter Strip (393)	***Wildlife*** Planned practices and management must achieve a WHEP Score ≥0.75 for upland species/habitat, and SVAP2 >5 for aquatic habitat (*when water feature modifier is present*). Plan must include an appropriate wildlife management practice(s) (see bulleted list below) for the species/habitat type. Aquatic Organism Passage (396) is required where there are barriers to aquatic species movement. Appropriate Wildlife Management Practices •Field Border (386) •Fishpond Management (399) •Stream Habitat Improvement & Management (395) •Wildlife Habitat Planting (420) •Restoration & Management of Rare or Declining Habitat (643) •Wetland Wildlife Habitat Management (644) •Upland Wildlife Habitat Management (645) •Shallow Water Development & Management (646) •Early Successional Habitat Development & Management (647) •Structures for Wildlife (649)
Grazed See Pasture PRIMARY Practices	***Irrigated*** Irrigation Water Management (449)	
Organic Planned system must adhere to the criteria and guidelines outlined in an Organic System Plan (OSP).	***Drained*** Drainage Water Management (554)	
Protected *As determined by the Planner to address the threat of land conversion and loss of wetland, floodplain, and/or forestland functions and values.	***Urban*** *As determined by the Planner to address the resource base. Refer to the Engineering Field Handbook-Chapter 20, for additional planning and technical guidance.	

SUPPORTING PRACTICE(S)

1) Other eFOTG practices that are feasible and suitable to treat the resource base as determined by the Planner as a result of the NRCS 9-Step planning process.

COMPONENT PLAN(S)

1) Prescribed Burn Plan (*if fire is prescribed*)
2) Nutrient Management Plan (*if nutrients are applied*)
3) Integrated Pest Management Plan (*if pesticides are applied*)
4) Irrigation Water Management Plan (*if Irrigated Modifier is present*)
5) Grazing Management Plan (*if Grazing Modifier is present*)
6) Wildlife Management Plan ((*if Wildlife Modifier is present*)
7) Invasive Species within the Conservation Plan ((*if Invasive Species are present*)
8) Pollinators within the Conservation Plan (*if Wildlife Modifier is present)*
9) Organic System Plan ((*if Organic modifier is present*)

AGROFORESTRY CATEGORY

(Intentional combination of agriculture and forestry to create productive and sustainable land use practices.)

1) Riparian Forest Buffer (391) *(if water feature is present)*
2) Windbreak/Shelterbelt Establishment (380)

NOTE: When a Planning Land Unit (PLU) is not designated with a *wildlife modifier,* it must include practices and/or wildlife management activities that achieve a WHEP Score of at least ≥0.50 for it to reach an RMS level of planning.