Chapter 5 : Conservation Planning for Wind Erosion Resource Concerns

Introduction to Conservation Planning

Natural Resources Conservation Service (NRCS) has established a process for conservation planning called the "Nine-Step Conservation Planning Process." The process provides a template for conservation planners to follow when working one-on-one with farmers and ranchers, or in a collaborative setting with multiple individuals, units of government and/or other stakeholders. Briefly, the nine steps include:

1. Identify problems and opportunities
2. Determine objectives
3. Inventory the natural resources
4. Analyze the resource data
5. Formulate alternatives to address the resource concerns
6. Evaluate the alternatives
7. Make decisions
8. Implement the plan
9. Evaluate the implemented plan

Further description and discussion of the nine-step process can be found in the NRCS National Planning Procedures Handbook, Subpart C.[46]

These nine steps are further divided into three phases. Steps 1 through 4 are labeled as Phase 1- Collection and Analysis, steps 5 through 7 as Phase 2- Decision Support, and steps 8 and 9 as Phase III- Application and Evaluation. In the Collection and Analysis phase, NRCS has adopted the phrase "natural resource concerns" or simply "resource concerns" to embody the suite of natural resource issues and problems which the agency will address technically and/or financially. The resource concerns are categorized as effects to soil, water, air, plants, animals and energy. Although NRCS will use general terms like "watershed health" in describing broad issues on the landscape, conservation planners are required to narrow their investigations down to these six resource categories. The complete set of defined resource concerns that NRCS addresses can be found in the NRCS's National and State Resource Concerns and Planning Criteria (Appendix B, Exhibit 5-1), including how the concerns are analyzed, a description of the tools used to assess the problems, and any thresholds that clarify the extent of the problem. This list

of resource concerns is modified from time to time to capture new national priorities or to take advantage of new conservation technologies. Ideally, NRCS prefers to assess all resource concerns on a land unit before moving to the Decision Support phase of planning. Treating resource concerns independently has some inherent risks, whereby treatment of one resource concern can aggravate or make more complex the treatment of another resource concern in the future. However, oftentimes programmatic timelines/guidelines, producer time constraints, staffing limitations, etc., will dictate a progressive planning approach be made in assessing resource concerns.

Assessing Wind Erosion and Particulate Emissions

NRCS's National and State Resource Concerns and Planning Criteria document (Appendix B, Exhibit 5-1) displays all the resource concerns that NRCS currently addresses, and wind erosion is categorized as a Soil Erosion resource concern. However, particulate emissions of dust can originate from agricultural sources other than from wind blowing across fields and pastures. In these cases, dust is recognized as an air quality problem, and can be found in the Resource Concern guide under Air Quality Impacts. Emission sources causing air quality concerns include tillage, prescribed burns, combustion engines, feed lots, unpaved traffic areas, and manure transfer. These kinds of air quality issues are typically measured/categorized as particulate matter $(PM)_{10}$ and $PM_{2.5}$. PM_{10} consist mostly of dust, pollen, and other organics such as mold spores, while $PM_{2.5}$ generally concerns particulates produced by combustion sources or formed via chemical reactions of precursor gases in the atmosphere.

As noted in Exhibit 5-1, wind erosion can be screened from assessment during conservation planning activities for cropland if permanent ground cover exceeds 90%. For practicality's sake, most perennial cropping/pasture systems are considered "permanent," even though they may be renovated or replanted every three to five years. In essence, this means NRCS conservation planners need not spend time assessing the extent of wind erosion on these systems because the overwhelming likelihood is that a wind erosion problem does not exist. For forestland, the screening criteria is greater than 80% organic residue cover. For rangeland, each state has the prerogative to establish its own screening criteria; this is due to the variability of range conditions across the country, including vegetation types and ecological sites being grazed, canopy cover, grazing management systems, etc.

Inventory the Resources

The first step in assessing the possibility of a wind erosion resource concern is to consult the appropriate Soil Survey for the area of interest. All NRCS soil survey data can be found online using the Web Soil Survey tool.[32] In Web Soil Survey, after selecting the Area of Interest, select the Soil Data Explorer tab, and then the Soil Properties and Qualities tab, and finally Soil Erosion Factors. The wind erosion factors are made up of the Wind Erodibility Group (WEG) and the Wind Erodibility Index (WEI). Although these factors were originally intended to serve as indices for the Wind Erosion Equation (WEQ) on cultivated land, which NRCS has abandoned for use as a wind erosion model, the values can still be used to gauge the soils' susceptibility to wind erosion for the selected area. WEGs range from 1 through 8, where group 1 is very highly erodible and group 8 is not susceptible to wind erosion. WEG is further explained in the National Soil Survey Handbook,[47] Part 618 (see Appendix B, Exhibit 5-2).

The WEI is the base variable in the WEQ and represents the potential erodibility of a soil, expressed in tons/ac/year before any other variables are applied through the equation. Keep in mind that the WEG and the WEI were intended to be used only on cultivated lands. However, these values can also serve as an indicator where there may be resource concerns on rangeland or other associated agricultural lands. Likewise, the Ecological Site Description (ESD) might provide some insight to the susceptibility of the site to wind erosion in various states. States are currently developing ESDs to a new standard; as ESDs become more robust in their interpretations, they will have increasing value for the inventory stage of conservation planning.

On cropland, identifying a wind erosion resource concern can be as simple looking for field clues. Wind-blown soil will deposit in field ditches, crop furrows, along fencerows, in low areas, and at the windward base of any wind barrier, including walls or even a sign post. Even the crops themselves or in adjacent fields might show evidence of sandblasting. Oftentimes, sandblasted seedlings will quickly desiccate, wither, and die.

As discussed in Chapter 3, the tool used to evaluate and estimate soil erosion on cropland is the Wind Erosion Prediction System (WEPS), now integrated into the NRCS Integrated Erosion Tool. The tool, developed by USDA Agricultural Research Service, is the model NRCS has determined provides the best estimation of erosion (expressed as tons/ac/year) over the wide range of soil and climatic conditions, agronomic systems, erosion control methods, and tillage equipment used across the Nation. It is important to note that the system provides an estimation of erosion, and it is not an absolute value. By accounting for local climatic conditions, on-site soil conditions, exact crops grown and their planting and harvesting dates, irrigation or lack thereof,

and the tillage and harvesting equipment used, the model is very good at evaluating alternative cropping systems. This allows the planner to easily adjust planting and harvesting dates, alter irrigation scheduling, reorganize tillage patterns, and select different crops to offer the farmer alternatives that would make the least impact on the soil resource.

Formulating and Evaluating Alternatives

Phase II of the NRCS conservation planning process involves the development of alternatives to address the identified resource concerns. The alternatives are typically made up of one or more conservation practices; currently, there are 166 NRCS-recognized conservation practices, and the complete description for each practice is known as the Conservation Practice Standard (CPS). The CPS specifies the definition, purpose, the conditions where the practice applies, the criteria for installation, other considerations in planning, and minimum requirements for plans and specifications.

The complete list of conservation practice standards can be found on the NRCS national website under Conservation Practices.[48] Each state can customize the CPSs used in that state, and those can be found in Section IV of the Field Office Technical Guide (FOTG).[49]

An experienced conservation planner typically will know which conservation practices will best address the wind erosion and air quality resource concerns in a given area. However, reviewing the long list of conservation practices may not be suitable for novice planners or farmers not familiar with the practices or terminology. Additionally, some practices may indirectly benefit wind erosion; such practices are called facilitating practices. For instance, most fences do not directly benefit wind erosion, but they can indirectly benefit wind erosion by providing a means to control grazing needed for a prescribed grazing plan that does directly benefit wind erosion. For this reason, NRCS has developed tools to assist in understanding which practices address which resource concerns. Resource concern planning guides for wind erosion and particulate matter air quality impacts (Appendix B, Exhibit 5-3 and Exhibit 5-4), found in the Arizona FOTG, Section III, under the Resource Concerns Guides folder, display the conservation practices that can be utilized to address these resource concerns.

Analyzing Effects of Conservation Practices and Alternatives

As mentioned previously, NRCS planners typically assess multiple resource concerns during the planning process. Once the assessment is completed, alternatives are developed to address the resource concerns discovered.

A high-order review of analyzing effects can be completed using the Conservation Practice Physical Effects (CPPE) matrix and associated Resource Management Systems (RMS) tool. Both the CPPE matrix and the RMS tool can generally be found in each state's FOTG. The CPPE matrix is a general depiction of all 166 conservation practices' effect on the full list of resource concerns that NRCS evaluates. The CPPE is developed on the national level, but each state has the prerogative to adjust the values in the matrix based on local professional expertise. The rating ranges from -5 to +5 as shown in Figure 5-1. The intent of the CPPE is to enable planners to compare proposed practices effectiveness in treating the resource concern, while considering any potential negative effects.

Effects Quantification	Rating
Substantial Improvement	5
Moderate to Substantial Improvement	4
Moderate Improvement	3
Slight to Moderate Improvement	2
Slight Improvement	1
Not Applicable	0
Neutral	0
Slight Worsening	-1
Slight to Moderate Worsening	-2

Effects Quantification	Rating
Moderate Worsening	-3
Moderate to Substantial Worsening	-4
Substantial Worsening	-5

Figure 5-1. Conservation Practice Physical Effects (CPPE) ratings.[50]

The CPPE is developed by specialists in the fields of agronomy, range science, soil science, wildlife biology, forestry, economics, and engineering, both nationally and at the state level, and is reviewed annually. The complete CPPE matrix, including the tab to examine human considerations, can be downloaded from a locally-stored copy here,[51] or found on the NRCS website[52] as *Conservation Practice Physical Effects on Soil, Water, Air, Plants, Animals, Energy, People (XLSM, 844kb)*. NRCS always welcomes outside review and recommendations from qualified conservationists, natural resource professionals, academics, and researchers in the development of the practice ratings.

Another tool for conservation planners to incorporate into their alternative assessments is the above-mentioned RMS Planning Tool.[50] A current version of this tool can be found on the NRCS website in their Tools[53] section under Technical Resources, Economics.

A final tool that can be used to compare benefits with negative effects is simple T Charts (see Appendix B, Exhibit 5-5).