United States Department of Agriculture

NRCS

Natural Resources Conservation Service
California State Office
430 G Street, Room 4164
Davis, CA 95616
(530) 792-5600

May 6, 2010

SOILS TECHNICAL NOTE NO. CA – 20 revision 1

SUBJECT: Important Farmlands Definitions and Criteria as Applied in California

Purpose: To transmit the above named Technical Note

Effective Date: When contents are received.

Explanation:

This revision of Soils Technical Note CA-20 adds a Background section which provides the history behind the development of Prime Farmland criteria in California. The rest of the Technical Note remains unchanged from the previous version.

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Filing Instructions:

This Technical Note and new Index will be filed electronically in the California eFOTG under the hierarchy: Section I, Technical Notes, Soils http://www.nrcs.usda.gov/technical/efotg

Field Offices may also optionally file hard copies in three-ring binder with other "Subject" Technical Notes. If a hard copy is maintained, update the Index with new entries.

Terryl Kovsis, acting

for
DIANE B. HOLCOMB
State Resource Conservationist

Enclosure: 1

Distribution: 0

TECHNICAL NOTES

U.S. Department of Agriculture **Natural Resources Conservation Service**

TN-SOILS CA-20 April 23, 2007
Revised: May 6, 2010

IMPORTANT FARMLANDS DEFINITIONS AND CRITERIA AS APPLIED IN CALIFORNIA

BACKGROUND

In 1979 the State of California identified a need to accurately define and map Important Farmlands in support of the state's Williamson Act (passed in 1965) which is used to protect prime agricultural lands. In 1980, a State Land Use Task Force of the California Rural Development Committee was formed to develop definitions and criteria for the California version of the national LIM (Land Inventory & Monitoring) program (conducted by the SCS). This task force was chaired by the Soil Conservation Service (SCS) (renamed as the Natural Resources Conservation Service, NRCS), but was also composed of other USDA personnel as well as California Department of Conservation staff.

The definitions and criteria for the Important Farmlands Inventory in California were agreed upon by California Rural Development Committee (CRDC) on May 29, 1980. This decision resulted in the National Conservation Planning Manual (NCPM) II-V (2nd edition) – Supplement CA-4 "Supplemental Material on Important Farmlands Inventory in California" dated February 20, 1981. This is a California version of the national LIM criteria. The SCS National Office approved the additional criteria in order to refine the definition of "Additional Farmlands of Statewide Importance. This revised definition enables a clearer separation of nearly prime farmland producing high value crops originally included under Unique Farmlands.

In addition, after conferring with California users of Prime Farmland lists including state, federal, and local agencies, it was determined that those soil map units containing both Prime Farmland soils and Urban Land components should not be omitted from Prime Farmland lists. The soil components meet the California Prime Farmland criteria as outlined in Supplement CA-4 and state and local agencies have requested that these soil map units be identified in the Important Farmlands Mapping and Monitoring process.

The Urban Land portions of these map units should not be considered Prime Farmland, but when the soil portion of the map unit in question meets the criteria, the map unit should be placed on the Prime farmland list for that soil survey area. If a soil-urban land map unit is placed on the list, the following statement will be included at the top of the page: "Urban or built-up areas within map units listed below are not considered Prime Farmland".

This California supplement to National Soil Survey Handbook (NSSH) guidance is documented with National Soil Survey Handbook (430-VI-NSSH) California Supplement 93-1 dated November 20, 1993 and is filed under NSSH section 622.03- Farmland Classification.

This Soils Technical Note is a re-issue of the original Supplement CA-4 to the National Conservation Planning Manual (NCPM, Second Edition) which is no longer supported.

SUPPORTING DOCUMENTS

The National Soil Survey Handbook Part 622 – Ecological and Interpretive Groups, Section 622.03 Farmland Classification.

FILING INSTRUCTIONS

This technical note should be filed in the Soils Section of the of the Technical Notes binder. Additional copies of this technical note are available at the California Section I of the eFOTG (electronic Field Office Technical Guide) under the folder Technical Notes under the sub-folder Soils. http://www.nrcs.usda.gov/technical/efotg/

PRIME FARMLANDS

Prime Farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land but not urban built-up land or water). It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Prime Farmland meets all the following criteria:

1. The soils have:
    A. Aquic, udic, ustic, or xeric moisture regimes and an available water capacity of at least 4 inches (10 cm) per 40 to 60 inches (1 to 1.52 meters) of soil to produce the commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugar beets, vegetables, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; OR
    B. Xeric, ustic, aridic, or torric moisture regimes in which the available water capacity is at least 4 inches (10 cm) per 40 to 60 inches (1 to 1.52 meters) of soil and the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; AND
2. The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32 degrees F (0 degrees C). In addition, the mean annual summer temperature at this depth in soils with an O horizon is higher than 47 degrees F (8 degrees C); in soils that have no O horizon, the mean annual summer temperature is higher than 59 degrees F (15 degrees C); AND
3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter); AND

4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; AND,
5. The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter), during part of each year the electrical conductivity of the saturation extract is less than 4 deciSiemens/meter (dS/m) and the sodium adsorption ration (SAR) is less than 13; AND,
6. The soils are not flooded frequently during the growing season (less often than once in 2 years); AND,
7. The product of Kf (soil erodibility factor, fine-earth) multiplied by the percent slope is less than 2.0; AND,
8. The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm) is less than 59 degrees F (15 degrees C); the permeability rate is not a limiting factor if the mean annual temperature soil temperature is 59 degrees F (15 degrees C) or higher; AND,
9. Less than 10 percent of the surface layer (upper 6 inches (15 cm)) in these soils consists of rock fragments coarser than 3 inches (7.6 cm); AND,
10. These soils have a minimum rooting depth of 40 inches (1 meter).

ADDITIONAL FARMLANDS OF STATEWIDE IMPORTANCE

Farmland of Statewide Importance is land other than Prime Farmland that has a good combination of physical and chemical characteristics for producing food, feed, forage, and fiber and oilseed crops and is available for these uses (the land could be cropland, pastureland, rangeland, forest land or other land, but not urban built-up land or water).

Farmland of Statewide Importance meets all the following criteria:

1. The soils have:
    A. Aquic, udic, ustic, or xeric moisture regimes and an available water capacity of at least 3.5 inches (8.8 cm) per 40 to 60 inches (1 to 1.52 meters) of soil to produce the commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugar beets, vegetables, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; OR
    B. Xeric, ustic, aridic, or torric moisture regimes in which the available water capacity is at least 3.5 inches (8.8 cm) per 40 to 60 inches (1 to 1.52 meters) of soil and the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; AND,
2. The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32 degrees F (0 degrees C). In

addition, the mean annual summer temperature at this depth in soils with an O horizon is higher than 47 degrees F (8 degrees C); in soils that have no O horizon, the mean annual summer temperature is higher than 59 degrees F (15 degrees C); AND,

3. The soils have a pH between 4.5 and 9.0 in all horizons within a depth of 40 inches (1 meter) or in the root zone if the root zone is less than 40 inches deep; AND,
4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; AND,
5. The soils can be managed so that, in all horizons within a depth of 40 inches (1meter), during part of each year the electrical conductivity of the saturation extract is less than 16 deciSiemens/meter (dS/m) and the sodium adsorption ratio is less than 25; AND,
6. The soils are not flooded frequently during the growing season (less often than once in two years); AND,
7. The product of Kf (soil erodibility factor, fine-earth) multiplied by the percent slope is less than 2.0; AND,
8. Less than 10 percent of the surface layer (upper 6 inches (15 cm)) in these soils consists of rock fragments coarser than 3 inches (7.6 cm).

UNIQUE FARMLAND

Unique Farmland is land other than Prime and Additional Farmland of Statewide Importance that is currently used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, avocados, fruit and vegetables.

Characteristics of unique farmland:

(a) It is used for a specific high value food or fiber crop;

(b) It has a moisture supply that is adequate for the specific crop; the supply is from stored moisture, precipitation, or a developed irrigation system;

(c) Combines favorable factors of soil quality, growing season, temperature, humidity, air drainage, elevation, aspect, or other conditions, such as nearness to market, that favor the growth of a specific food or fiber crop.

These lands are currently producing the following crops of high economic importance to California as identified in the annual report of the Department of Food and Agriculture:

Fruit Orchard Crops		Tree Nuts	Vineyard and Cane berries
Apples	Olives	Almonds	Bush berries
Apricots	Peaches	Walnuts	Grapes
Avocados	Pears	Pistachio	Kiwi Fruit
Cherries	Persimmons		

Citrus
Dates
Figs
Nectarines
Plums
Pomegranates
Prunes

Vegetable Crops

Artichokes
Asparagus
Beans
(Dry & Snap)
Broccoli
Brussels
Sprouts
Cabbage
Carrots
Cauliflower
Celery
Cucumber
Garlic
Lettuce
Melons
Onions
Peas
Peppers
Potatoes
Spinach
Sweet Potatoes
Tomatoes

Irrigated Field Crops

Alfalfa
Barley
Corn
Cotton
Oats
Rice
Safflower
Sorghum
Sugar beets
Wheat

Specialties (not elsewhere classified)

Cut Flowers
Hops
Ladino Clover Seed
Nursery Products
Strawberries

ADDITIONAL FARMLAND OF LOCAL IMPORTANCE

In some local areas there is concern for certain Additional Farmlands for the production of food, feed, fiber, forage and oilseed crops, even though these lands are not identified as having national or statewide importance. Farmland of Local Importance is land of importance to the local economy, as defined by each county's local advisory committee and adopted by its Board of Supervisors. Farmland of Local Importance is either currently producing, or has the capability of production, but does not meet the criteria of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. Authority to adopt or to recommend changes to the category of Farmland of Local Importance rests with the Board of Supervisors in each county.

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May 28, 2010

SOILS TECHNICAL NOTE NO. CA – 21

SUBJECT: USLE R-factor Digital Geodata Layer for HEL Determinations

Purpose: To transmit the above named Technical Note

Establish official use of a digital R-factor (Rainfall and Runoff factor in the Universal Soil Loss Equation) geodata layer when making Highly Erodible Land (HEL) determinations.

Effective Date: When contents are received.

Explanation:

A California statewide Geodata layer for R-factor for highly erodible land determinations was developed to provide a more automated and precise method to obtain R-factor for HEL determinations. The attached Technical Note provides background and procedures for using the GIS R-factor data with USLE for HEL determinations prescribed by the 1985 Farm Bill.

Filing Instructions:

This Technical Note and new Index will be filed electronically in the California eFOTG under the hierarchy: Section I, Technical Notes, Soils http://www.nrcs.usda.gov/technical/efotg

Field Offices may also optionally file hard copies in three-ring binder with other "Subject" Technical Notes. If a hard copy is maintained, update the Index with new entries.

Terryl Korsis, acting

for
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State Resource Conservationist

Enclosure: 1

Distribution: 0

TECHNICAL NOTES

U.S. Department of Agriculture **Natural Resources Conservation Service**

TN – SOILS - CA - 21 May, 2010
Davis, CA

USLE R-factor Digital Geodata Layer for HEL Determinations

Purpose:

Establish official use of a digital R-factor (Rainfall and Runoff factor in the Universal Soil Loss Equation) geodata layer when making Highly Erodible Land (HEL) determinations. Establish spatial information for soil erosion using USLE factors and a Geographic Information System (GIS).

Background:

A California statewide Geodata layer for R-factor for highly erodible land determinations was developed to provide a more automated and precise method to obtain R-factor values for HEL determinations. The layer was derived from the statewide 2 Year-6 Hour Storm Event geodata raster (NOAA Atlas 2 - Precipitation-Frequency Atlas for the Western United States All-season series) and specific R-factor Value equations developed for each Statewide R-factor Zone depicted from California Major Land Resource Areas (MLRA) layer.

R-factor values are computed as a continuous number across the landscape for any geographic location within the state of California.

The data layer is found at the following location at each Field Office Server:
F:\Geodata\Climate\USLE_Data\ R_Factor_for_HEL.tif

There is also an associated "layer file", ***R_Factor_for_HEL.tif.lyr,*** which can be added to automatically depict a symbology set with 7 pre-set R-factor value class ranges.

ArcGIS procedure to identify R-factor values:

Within ArcMap > Add the ***R_Factor_for_HEL.tif.lyr*** to any ArcMap document.

- Navigate to the specific land unit for which an HEL determination is needed
- Click on the Identify Tool and then click within the land unit
- In the Identify Window, choose the *R_Factor_for_HEL.tif* layer in the "Identify from:" dropdown list
- Click again within the land unit to display R-factor values in the "Identify" window
- Identify Results shows a "Pixel Value"; this is the R-factor value

Prepared by Scott Splean, State GIS Coordinator, NRCS, Davis, CA; and Ken Oster, Soil Technical Specialist, NRCS, Templeton, CA.

Geodata Specifications for *R_Factor_for_HEL.tif* :

Format: ArcGIS raster (TIF image) Rows 2023, Columns 2242
File size: 17.30 MB
Pixel spatial resolution = 463.3 x 463.3 meters.
Pixel Type: Floating Point
Pixel Values = R value to 6th decimal place. Min. 4.773, Max. 546.806
Projected Coordinate System: UTM Zone 10, Datum NAD1983

Technical Contacts:

Scott Splean, State GIS Coordinator: 530-792-5631
Ken Oster, Area Soil Scientist: 805-434-0396 x 111

References:

Guides for Erosion and Sediment Control in California, Appendix A, Issued September 1997; Revised February, 1985; with additions January, 1991.
eFOTG > Section 1 > Erosion Prediction > Erosion Prediction Models > Water Erosion > Erosion Guides for California

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May 28, 2010

AGRONOMY TECHNICAL NOTE NO. CA – 62, rev.1

SUBJECT: ECS-California Phosphorus Index

Purpose: To transmit the above named Technical Note

Effective Date: When contents are received.

Explanation:

The California Phosphorus Index is a required tool for nutrient management planning under certain circumstances in California. The Revision being issued updates the instructions for finding Soils Hydrologic Groups using Web Map Services. Remaining parts of the Technical Note remain unchanged.

This Technical Note also contains a supporting Excel worksheet "Cal P Index Rev1.xls". Install a copy of this supporting Worksheet on appropriate Service Center computers.

Filing Instructions:

This Technical Note and new Index will be filed electronically in the California eFOTG under the hierarchy: Section I, C-Technical Notes, Agronomy, http://www.nrcs.usda.gov/technical/efotg (Click on California in the Map, then on any County).

Field Offices may also optionally file hard copies in three-ring binder with other "Subject" Technical Notes. If a hard copy is maintained, update the Index with new entries.

Terryl Kovesis, acting

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Enclosure: 1

Distribution: 0

TECHNICAL NOTES

U.S. Department of Agriculture **Natural Resources Conservation Service**

TN–AGRONOMY–CA–62, rev.1 September, 2004
Revised May, 2010

California Phosphorus Index

The California Phosphorus Index is a tool designed to evaluate risk of P loss from individual agricultural fields to water bodies of concern for P pollution. The P Index is not designed to estimate the quantity of P lost from the field. The P Index can estimate risk of P loss under current management and management after a conservation plan is implemented. The Index can therefore provide guidance to the producer and planner in the preparation of a conservation plan to limit P loss.

P is not widely recognized as a pollutant in California, though new evidence is showing a broader problem than previously known. The California P Index is to be applied in watersheds known to have P impacts on water quality from agricultural activities. This policy will limit the required use of the tool to priority areas in the state. Voluntary use of the tool is encouraged where the producer and planner feel it would help to protect water not yet impacted by P.

The first step in using the Index is to apply a screening tool that will exclude fields with no risk to impact surface waters with P, or are in watersheds that have no P impacts on water quality. The screening tool is a flow chart found at the end of this Technical Note.

If a field must be further evaluated after applying the screening tool, then a risk assessment must be completed using the detailed P Index. Associated with this Technical Note is an Excel Spreadsheet that should be used to perform and illustrate the analysis required in the Phosphorus Index.

The result of using the P Index is to assign a field specific Risk Rating. The Risk Rating will determine the actions that must be taken on a given field to reduce risk of P loss to surface water. There are four Risk Ratings: Low, Medium, High, and Very High. Risk Ratings are assigned based on a score determined using the P Index.

The California P Index was developed considering the broad circumstances in California, and is not designed for any specific region of the state. Local experts may change scoring break points between Risk Ratings and remove or modify categories of risk assessment. Modification of the Index must be done through the Area and State Field Office Technical Guide committees, and must be approved by the State Conservationist.

Prepared by Bob Fry, State Agronomist, Natural Resources Conservation Service, Davis, California.

The following actions are required for fields with the following Risk Ratings:

Fields rated **very high risk** for P loss must not receive manure or other organic forms of P fertilizer. Commercial P fertilizers may be applied according to University of California guidelines, or guidelines recognized by the University, utilizing soil or tissue sampling procedures and P response thresholds for the crop. Apply no P from any source if the Soil Test P exceeds 80 ppm (Olsen) or 120 PPM (Bray). When seeding winter vegetables into soils below 55 degrees Fahrenheit, 30 lbs./ac or less of P_2O_5 may be injected as a starter fertilizer. A conservation plan must be in place and being applied to address the high risk of P loss. When the plan is implemented adequately to lower the risk rating then actions required for the lower risk level will apply.

Fields at **high risk** for P loss may receive manure at rates to meet crop P requirements based on the P content of the manure and anticipated crop yield. Commercial P fertilizers or high P content organic fertilizers may be applied according to University of California guidelines, or guidelines recognized by the University, utilizing soil or tissue sampling procedures and the P response threshold of the crop. All fields must have a conservation plan in place that will lower Risk Rating to medium or low.

Fields with **medium risk** for P loss may receive manure at rates based on the N content of the manure and calculated to meet crop nitrogen needs based on a nitrogen budget. Commercial P fertilizers may be applied according to University of California guidelines, or guidelines recognized by the University, utilizing soil or tissue sampling procedures and the P response threshold of the crop. Existing management on these fields will probably lead to higher risk over time. Risk should be monitored periodically using the P Index.

Fields with **low risk** for P loss may receive manure at rates based on the N content of the manure and calculated to meet crop nitrogen needs based on a nitrogen budget. Commercial P fertilizers may be applied according to University of California guidelines, or guidelines recognized by the University, utilizing soil or tissue sampling procedures and the P response threshold of the crop.

Interpretations of P Index Factors:

There are two primary criteria that must be met before a field can be assigned risk for P loss:

1) There must be a means to transport available P offsite. These are collectively called “Transport Factors”.
2) There must be P available for transport offsite in adequate quantities to create risk. These are collectively called “Source Factors”.

Transport Factors

Soil Erosion – Sheet and Rill Erosion: P loss from agricultural fields is strongly related to sediment loss. To assign points for this category calculate the sheet and rill erosion using RUSLE2 procedures and apply the criteria on the Index. Until further field testing is complete the RUSLE2 erosion estimates should not be used on fields that are ridged or furrowed during the winter rainy season. Record zero points in this category for those conditions. This category is needed in regions where erosion from rainfall is a consideration. Where erosion from rainfall is not a factor it may be removed from the Index.

Ephemeral Gully Erosion: Assign points based on the frequency of ephemeral gully erosion occurring in the field. Include erosion of this type occurring on fields that are ridged or furrowed during the rainy season. This category is needed in regions where erosion from rainfall is a consideration. Where erosion from rainfall is not a factor it may be removed from the Index.

Irrigation Tailwater: If irrigation tailwater from this field is allowed to leave the farm points will be assigned. This category considers the effect of runoff from irrigation tailwater that may carry suspended or dissolved P into water bodies. Suspended P is usually associated with organic material that floats, such as manure. If tailwater is lost offsite infrequently (once annually or less), assign four points. If the loss is more frequent assign eight points. If all tailwater from this field is captured and reused on the farm assign zero points. This category is needed in irrigated regions. Where irrigation is not used it may be removed.

Hydrologic Soil Group: This risk factor is based on the Hydrologic Soil Group assigned to the predominant soil in the field. Refer to the soil survey or Web Soil Survey Hydrologic Soil Group report. This category considers the effect of runoff from rainfall that may carry suspended or dissolved P into water bodies. Suspended P is usually associated with organic material that floats, such as manure. Soils with higher runoff will shed a higher portion of rainfall, and are more likely to shed P as well. If the runoff from rainfall is held on site, or is insignificant, assign zero points.

Below are instructions for obtaining the Hydrologic Soil group on Web Soil Survey:

1) Go to the Web Soil Survey Website at http://websoilsurvey.nrcs.usda.gov/app/ and click on “Start WSS”
2) In the opening screen, select “Soil Survey Area” in the Quick Navigation menu. After selecting a survey, select “Set AOI”.
3) After the data loads select “Soil Data Explorer” at the top of the map area.
4) Select “Soil Properties and Qualities”
5) Select “Soil Qualities and Features”
6) Select “Hydrologic Soil Group”
7) At a minimum, select “Table”, then “View Rating”
8) At the top of the screen, select “Printable Version” to print a table of values for the soil survey area.

Sediment from Irrigation Induced Erosion: Risk in this category is based on the level of conservation being used to reduce irrigation induced erosion. Table 2 is provided to estimate the percent reduction of irrigation induced erosion from applying specific conservation practices. These reductions are based on conditions typical to west Stanislaus County. For areas in the state with similar furrow irrigation practices the relative reductions are probably similar. For significantly different circumstances reduction values can be estimated using the FUSED and FURROW4 irrigation induced erosion prediction models. If no sediment loss is observed during the first irrigation of the season, and no significant system or management changes are expected for future irrigations, then zero points can be assigned at the discretion of the planner.

Tailwater Tarps have the effect of grade stabilization in the tailwater ditch. They reduce the erosive force of the water by allowing it to lose elevation at controlled and protected points along the ditch. They are commonly constructed when 2” x 4” wood beams are place in the ditch and a tarpaulin is placed over them to form a dam. Water is allowed to go over the structure at a certain elevation and through a notch in the dam wide enough to allow the desired flow, but narrow enough to protect the ditch banks from turbulence.

Table 2 assumes well managed and maintained practices. This category is needed in regions where erosion from irrigation is a consideration. In regions or watersheds with no irrigation it may be removed.

Subsurface Drainage: Current studies suggest that P dissolved in subsurface water is unlikely to move further than 500 feet from the source. For the purpose of the P Index, assume that in order for dissolved P from the subject field to be released to surface water there must be an outlet within 500 feet of the field being assessed. Outlets for dissolved P may be direct seepage into a drainage ditch; tile drains; or groundwater extraction form a depth of less than 50' that is discharged to surface waters. The well must have a perforated screen at a depth of 50’ or less regardless of the depth of the well. The water drawn from the well must be discharged to a collection system and not used onsite for irrigation or domestic consumption. When considering tile drains, the drained field must be within 500 feet of the field being assessed. Seepage or groundwater extraction from < 50 feet deep must occur within 500 feet of the field being assessed. When such an outlet for groundwater transfer to surface water exists within 500 feet of the field assign eight points. If not, assign zero points.

Discharge Rating: This factor is used to identify highly efficient routes for the transport of P to impacted water bodies. If the field will outlet to a drainage system that provides little or no filtering, nor impediment, to flow to the impacted water body, assign a factor of 1.5. Examples of conduits with this property are a pipeline, free flowing ditch, or direct sheet or concentrated flow into the tributary from the field. These conduits might drain a tailwater ditch, tile drain, seepage site, shallow groundwater extraction well, field drain ditch, etc. If the outlet for the field has no access to an efficient drainage path then use a discharge rating of 1. This factor should be considered in all regions of California.

Source Factors

Soil Test P: This factor is based on the concentration of available P in the top 12 inches of the soil profile. In most cases the Olsen test will be used in California. When soil pH is 6 or less the Bray method should be used. Points are assigned in proportion to the Soil Test P (STP). As STP goes higher than the threshold the points increase according the formula shown on the P Index Worksheet. For the Olsen method a threshold of 20 ppm is used. One point is assigned for each 10 ppm the soil test P exceeds 20 ppm. For the Bray method the threshold is 40 ppm in 12 inches, so one point is assigned per 10 PPM above that level. This factor should be considered in all regions of California.

Commercial P fertilizer application rate: One point is assigned per 50 pounds/acre of P_2O_5 applied. This factor should be included in the P Index for all regions.

Commercial P fertilizer application method: Risk is assigned in this category based on how P fertilizer is incorporated into the soil. If the fertilizer is banded, injected, applied as a liquid, or broadcast and then incorporated greater than 2" before irrigation or onset of the rainy season then assign zero points. If surface applied fertilizer is incorporated less than 2" prior to irrigation or onset of the rainy season assign two points. Broadcast fertilizer that is not incorporated prior to the rainy season or irrigation should be assigned 8 points. This factor should be included in the P Index for all regions.

Organic P source application rate: Risk is assigned in this category based on the level of management used while determining the amount of organic P fertilizer to be applied to the field. Producers using laboratory sampling, actual yield data, soil or tissue testing, recordkeeping, and consideration of all nutrient sources to determine the rate of manure application will be assigned Low Risk. As the management system drifts below this level higher risk categories will be assigned. *The producer must actively use these decision making tools when applying manure or other organic forms of fertilizer. Records need to be gathered and maintained for each field showing the data used, the recommended rate, and the amounts and dates of application.* Risk due to application of organic solids from storage ponds and solids from separators or settling basins should be evaluated using the same criteria as used for liquid manure or scraped solids.

Organic P source application method for solids: The method of solid manure application effects the risk of P loss during irrigation or rainfall runoff, and soil erosion. If solids are injected or incorporated to a depth of 3" or more before runoff from irrigation or rainfall is likely to occur then risk of loss is reduced. The producer, as a part of the routine management of the farm, must incorporate solids prior to the beginning of the rainy season or prior to irrigation to be low risk. Lowest risk occurs when solids are applied using a calibrated system as well. Solids refer to corral scrapings, material

removed from separators, organic solids from ponds, or fresh stacked manure from freestalls, lanes, etc.

Organic P source application method for liquids: Risk in this category is assigned based on the amount and frequency of organic solids applied with pond water. If organic solids are applied consistently and at low rates, then the risk is low. If organic solids are applied infrequently and at high rates, then the risk is high. A separation system effective enough that the pond does not require an agitator pump or other means to remove solids suggests low risk. Medium risk would be associated with a moderately effective separation system that requires use of an agitator pump and very infrequent use of other methods to remove solids from the pond. Organic solids applied consistently while using an agitator pump without a settling system is high risk. Very high risk occurs when organic solids are applied with irrigation water and an agitator pump while cleaning the pond at a yearly or less frequent interval, usually when none or a poor separation system is in place. Organic solids removed from the pond should be applied at agronomic rates.

Categories of Risk from P Loss

There are three categories of risk from P loss. They are: P loss associated with soil erosion, P loss when dissolved or suspended in surface runoff, and P lost by leaching through the soil profile that ultimately enters surface water. Each of these categories is evaluated separately. Each category of loss is evaluated for risk. If a field is rated at a high risk for any of the three categories the actions to be taken should focus on the factors used to evaluate that risk category. The individual categories use the following risk factors to evaluate risk.

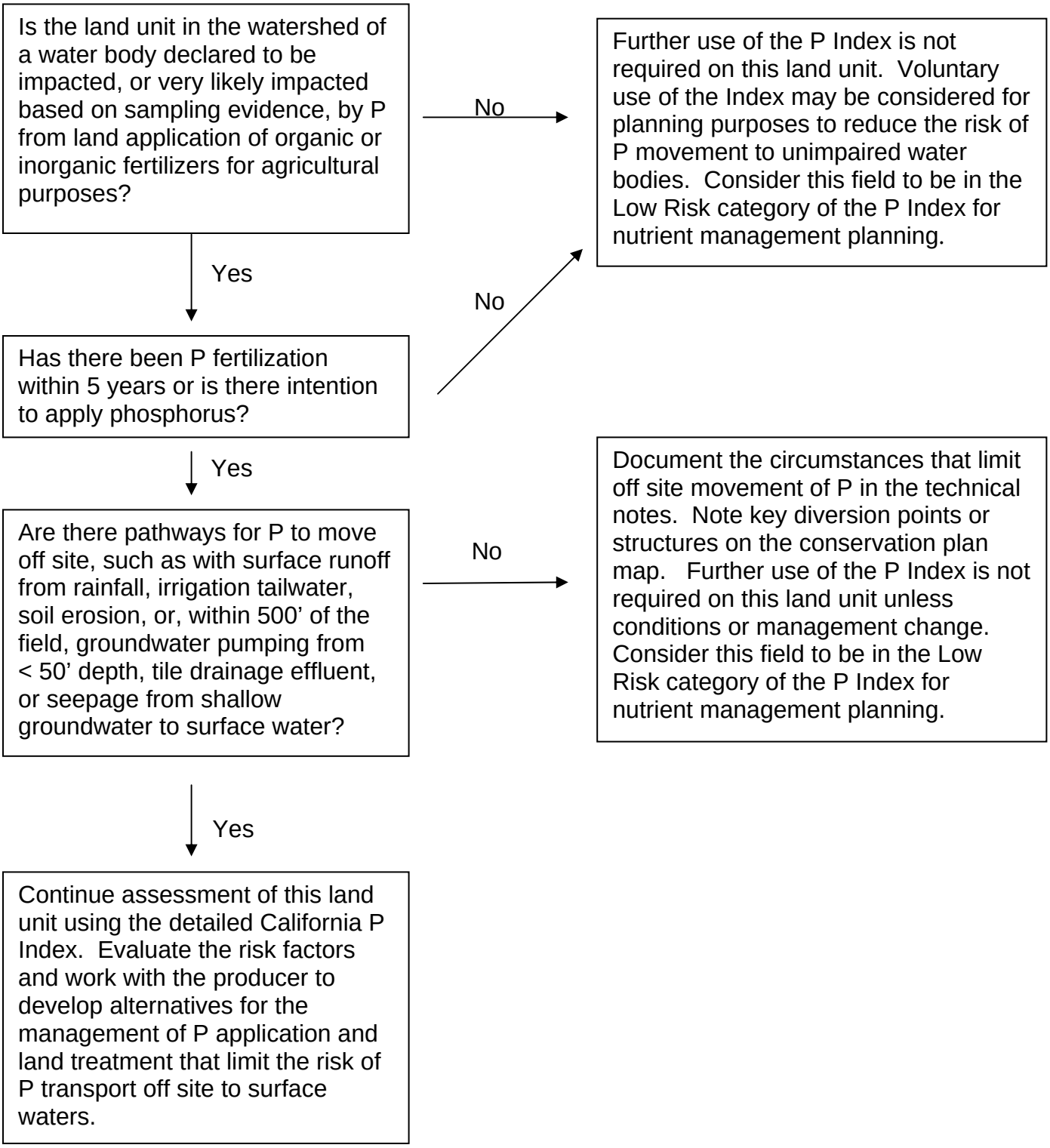
Transport Factors:	Erosion	Runoff	Leachable
Soil Erosion - RUSLE	X		
Irrigation induced erosion	X		
Ephemeral gully erosion	X		
Irrigation Tailwater		X	
Runoff Class		X	
Subsurface Drainage			X
Drainage system type	X	X	X

Source Factors:	Erosion	Runoff	Leachable
Soil Test P	X	X	X
Commercial P Rate	X	X	X
Commercial P Method	X	X	
Organic P Rate	X	X	X
Organic P Method - Solids	X	X	
Organic P Method - Liquids	X	X	

Table 2: Estimated reduction in irrigation induced erosion from selected conservation practices:

Practices used with furrow irrigation on field crops or orchards	Percent Reduction
Tailwater tarps	45
Cutback stream	60
Filter strips	45
Sediment basin	95
Conservation tillage w/ low residue crop	5
Conservation tillage w/ high residue crop	40
Surge Irrigation	80
Tailwater return system	95
Tailwater tarps and cutback stream	80
Tailwater tarps, cutback stream and sediment basin	95
Tailwater tarps and sediment basin	95
Surge Irrigation and sediment basin	95
Polyacrylamide addition to irrigation stream	95
Other practices:	
Permanent cover crop with surface irrigation in orchards	60
Temporary cover crop with furrow irrigation	20
Sprinkler irrigation w/ low runoff	60
Drip irrigation	90

California P Index – Initial Risk Assessment



United States Department of Agriculture

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May 28, 2010

RANGE TECHNICAL NOTE NO. CA – 54

SUBJECT: Prescribed Grazing (528) Practice Requirement Sheet and Specification Development Support Tool (528_spec_tool_R5a.xls)

Purpose: To transmit the above named Technical Note

Effective Date: When contents are received.

Background:

The national conservation practice standard for Prescribed Grazing (528) has been modified a number of times since 1997, which has led to more extensive planning requirements on the part of the planner. With the increased details or specifications of the practice, it became clear that a more systematic and organized method of capturing and processing information would be essential in meeting agency planning requirements. An Excel File, 528_spec_tool_R5a.xls, or "spec tool" has been developed to serve as a planning tool to capture and process data related to Grazing Lands. This Technical Note issues this planning tool along with instructions for use.

Filing Instructions:

This Technical Note and new Index will be filed electronically in the California eFOTG under the hierarchy: Section I, Technical Notes, Range http://www.nrcs.usda.gov/technical/efotg

Field Offices may also optionally file hard copies in three-ring binder with other "Subject" Technical Notes. If a hard copy is maintained, update the Index with new entries.

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for
DIANE B. HOLCOMB
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Enclosure: 2

Distribution: 0

TECHNICAL NOTES

U.S. Department of Agriculture **Natural Resources Conservation Service**

TN – Range – CA-54 December 2009

Prescribed Grazing (528) Practice Requirement Sheet and Specification Development Support Tool (528_spec_tool_R5a.xls)

This tool was developed by California State Rangeland Management Specialist, Jon Gustafson in conjunction with Dr. Marc Horney, CA Area I Rangeland Management Specialist with essential support and feedback from California field Rangeland Management Specialists and Jeff Repp, Rangeland Management Specialist, West National Technology Support Center, Portland Oregon. Supporting references are noted in the California Prescribed Grazing (528) conservation practice standard.

Summary

The 528_spec_tool_R5a.xls allows planners to improve consistency in their work products while allowing for flexibility of data capture and processing. A standard Microsoft Excel® 2003 workbook, the tool allows users to update data as needed as the planning environment changes. Components of the workbook support the development of Prescribed Grazing practice requirement sheets based on the Prescribed Grazing (528) conservation practice standard.

This version of 528_spec_tool_R5a.xls replaces previous versions having a release date earlier than November 30, 2009. The recent version of this tool will be stored in electronic format available for downloading in Section I of the eFOTG in the Technical Notes section under Range-TechNote-54 Prescribed Grazing Spec Tool.

Background

The national conservation practice standard for Prescribed Grazing (528) has been modified a number of times since 1997, which has led to more extensive planning requirements on the part of the planner. Prior to 1997, the 528 conservation practice was known as Proper Grazing Use, and the practice standard provided little guidance regarding what types of information needed to be gathered in order to adequately implement the practice. With clarifications in the practice standard and the updating of the Statement of Work for the practice, it became clear that a more systematic and organized method of capturing and processing information would be essential in meeting agency planning requirements.

NRCS responded at the national level to the need for planning support via the release of Grazing Lands Analysis (GLA) and later, the more advanced Grazing Lands Spatial Analysis Tool (GSAT). During testing of early releases of GSAT in the State of California, it was determined that limitations in baseline data reduced the immediate usefulness of GSAT in many areas of the state; it was also found that GSAT, while providing excellent data output, required large amounts of data input across a wide range of categories. In addition, the aforementioned analysis tools did not account for the unique planning needs of California's annual grasslands, which require consideration of residual dry matter (RDM) as a key calculation component.

Introduction

This Tech Note is not a user's manual. Those not familiar with how to use Microsoft Excel® software will likely be challenged. It is highly recommended that a Microsoft Excel® tutorial be taken on how to use the software program prior to attempting to process data or modify the spreadsheet.

As with all programs which process data input, good data quality is critical in arriving at the best output. Unfortunately, under rangeland conditions, annual variability in forage production as a result of weather conditions alone adds a substantial amount of ongoing uncertainty. Consequently, this tool and more advanced tools, while providing for operation-wide organization and processing of data, are not superior to on-site monitoring by the operator.

528_spec_tool_R5a.xls (hereafter referred to as "the spec tool") is intended as an early and intermediate planning tool leading to data processing and analysis at a far more detailed level using GSAT and similar software packages. Although lacking the data-mining and geo-referencing power of GSAT, the spec tool affords the user comparatively rapid calculations in a mostly compartmentalized fashion; this provides critical planning information on demand (forage requirements, forage production, supplemental feed conversions) as the planning environment and customer needs change.

Use of the spec tool is not a substitute for technical knowledge of the planning environment. Planners of all skill levels are strongly encouraged to use this tool to communicate with the customer and other planners regarding site conditions, constraints, monitoring methods and existing management. By working together as a team, a better product for the customer can be developed.

The spec tool is designed to allow the planner to capture and process data as needed considering the planning environment. It is intended that site-specific copies are to be maintained in digital format in conjunction with the customer's folder within Customer Service Toolkit (CST); it is advised that customer-specific files be stored under the Resource Inventory folder in CST.

Rationale

The California-specific limitations of the mentioned planning tools, plus emerging planning requirements, forced most planners to struggle to independently develop custom spreadsheets and templates for drafting practice requirement sheets. In response to the situation, the Rangeland Management Specialists in California supported the State Rangeland Management Specialist in developing the 528_spec_tool_R5a.xls Excel® workbook through several revisions and updates.

It is appropriate to ask the question, "Why process this information? Why not base practice performance on a blanket RDM or utilization standard and call it good?"

The simple answer is that a one-size-fits all solution is rarely, if ever applicable. All management practices, including Prescribed Grazing (528), are most closely aligned with a cyclical planning process because successful management techniques continually adjust based on the planning environment. The continual shifting of the planning environment demands adherence to common sense principles in management, not the least of which is the flexibility to use the best solutions based on the goals, problems and resources available.

Several requirements expressed in both the state and national conservation practice standards for 528 are implicitly linked to the core ("cardinal") principles of grazing lands management. Those who have taken the three module remote course "Understanding Prescribed Grazing (528)" will recall the linkages between those principles and the conservation practice standard requirements. For those who have not taken the course, let it suffice here list the cardinal principles of grazing lands management:

- Match the proper class (or type) of animal with the grazed landscape
- Implement a proper stocking rate (forage-animal balance)
- Graze during the appropriate season
- Establish appropriate livestock distribution on the operation – both in time and in space

One might consider that the requirements under the national conservation practice standard are intended to provide the planner with the basic foundation of information needed to begin to efficiently and effectively address the cardinal principles of grazing lands management. In other words, those factors required under the standard are those needed in order to identify the best management solutions based on the goals, problems and resources available.

The spec tool itself is arranged in a manner consistent with both the planning requirements of the conservation practice standard as well as the conservation planning process. Certain aspects of planning are not addressed by the spreadsheet such as the identification of resource concerns, development of conservation treatment alternatives and others components which have been addressed by other tools at the national, state and/or local level. It is emphasized that this and the other tools mentioned should be used

as necessary in an iterative or cyclical conservation planning process where the product at the end of each cycle is a flexible conservation plan which better addresses SWAPA+H.

Tool Components

The spreadsheet is organized in a series of tabs each of which contain components which directly address the requirements of the 528 conservation practice standard. Correctly completing each tab allows for the development of a summary sheet which can be used to directly support a practice requirement sheet. That being said, it should be noted that while this spreadsheet will perform this task, as with all conservation practices *it is critical to consider and understand the details contained in the conservation practice standard and to follow the conservation planning process*.

Best results of use of the tool are found by completing each tab from left to right. In particular, the first three tabs should be completed before determining what data is needed in order to implement the 528 practice.

Notes on each tab are described below.

Instructions
Basic instructions for use of the tool are included in the spreadsheet on the tab labeled *Instructions*. Notes are shown throughout the spreadsheet and are displayed in two different ways, either as a text box which is always visible and appears on the printed copy, or as a comment associated with a specific cell as indicated by the colored triangle in the upper right corner of the cell.

Start
This tab helps the planner link the goals of the landowner with the purpose of the practice as well as capture key information needed to complete the practice requirement sheet. Information entered on this tab cascade across several other tabs including the operation name and location.

Contingency & Monitoring Plns
This tab helps the planner to rough out the concepts for the contingency plan and monitoring plan as consistent with the conservation practice standard. Most importantly, it helps the planner examine the goals of the practice in conjunction with the requirements of the practice standard in order to develop a monitoring strategy which conforms to both.

Site Constraint Assessment
One of the most important aspects of developing conservation alternatives is considering the limitations and capabilities of the landscape. This tab helps the planner and the customer consider and document both limitations and, inferentially, the capabilities of the landscape. Additionally, once the *Forage Inventory* is completed, the relative advantage of addressing various limitations (site constraints) on the landscape become more logically described thus setting the stage for subsequent planning cycles.

Forage Requirement
In order to develop a balance between the forage produced and forage demand by livestock and wildlife while protecting the resource base, a herd inventory is entered into this tab. The tab allows for two approaches, the basic approach which utilizes standard animal unit equivalent values from the National Range and Pasture Handbook (NRPH), and a more advanced approach which allows the user to assess the forage demand based on animal body weight. This tab works in conjunction with the *Feed Detail* and *Forage Inventory* tabs to create the site-specific forage to animal balance as required under the conservation practice standard.

Feed Detail
The data from this tab is supplied to the *Forage Requirement* tab in order to consider how much pressure is taken off of the standing forage as a result of feeding roughage. It allows the user to segregate out a portion of the total herd which may be fed instead of basing the calculations as though the entire herd is fed. The output on this page provides clues as to where opportunity for cost savings can occur as well as a better understanding of how the operation is run on an annual basis.

Forage Inventory
This tab processes the vegetation production data for the entire operation. It interacts with the *Forage Requirement* tab and feeds data directly to the *Site Constraint Assessment* tab. Forage production data is entered on a field-by-field basis and is grouped by the user into ecological sites and/or production areas where production varies significantly from what is typical for the ecological site. Within each field the user determines how much of the forage within each ecological site or production area is useable by the livestock as well as how much of the forage is physically accessible. Calculations of available forage are based on either a harvest efficiency approach or a RDM approach as consistent with the vegetation growing within the field and the goals for management of each field.

528 Spec Checklist
This tab is specifically for the organization and tracking of information related to planning on the operation under consideration. In addition to providing a quick reference to the user, it also helps communicate to other planners and reviewers the status of the planning process for the Prescribed Grazing practice. It identifies via color code and font settings the required aspects of the 528 conservation practice standard as well as reminds the user as to next steps needed and where data gaps exist.

Summary
Drawing on the previously mentioned tabs, this tab compiles data into a two page brief which can be attached to the practice requirement sheet as a support document. Room is left for the planner to briefly describe baseline management as well as the agreed upon grazing and monitoring strategies.

ReadMe Grazing Scheds
This tab provides guidance on how to approach developing grazing schedules in general as well as aspects specific to how the two final tabs interface with data from the *Forage Requirement* and *Forage Inventory* tabs. The two final tabs effectively do the same things using the same layout, but at two different temporal resolutions.

Grazing Sched animal days
This approach breaks down grazing periods into five-day blocks. Using this calendar for documenting baseline or prior year grazing activities and site constraints is recommended even if a monthly grazing schedule is developed. Forage demand by herd is calculated for the user based on a five-day forage demand but only if a detailed herd inventory is completed on the *Forage Requirement* worksheet.

Grazing Sched animal months
This approach breaks down grazing periods into month-long blocks. This calendar may be useful when developing initial "sketches" with the operator of when and where animals are likely to be during the grazing season. In cases where animals are grazing fields for a month or more at a time, this spreadsheet provides a quick and easy way to partition feed across a grazing operation. Like the *Grazing Sched animal days* worksheet, forage demand by herd is calculated for the user based on a five-day forage demand when the detailed herd inventory is completed on the *Forage Requirement* worksheet.

Training and Resources

Training in the use of the spec tool can be obtained through requests submitted through the Area Office. Technical support for the tool is provided by the State Rangeland Management Specialist.

Primary resources which support planners using this tool include the National Range and Pasture Handbook and ANR Publication # 8092 - Guidelines for Residual Dry Matter on Coastal and Foothill Rangelands in California (University of California, Agriculture and Natural Resources, 2002).

Acknowledgements

Many thanks to NRCS Rangeland Management Specialists Dennis Dudley, Kristan Flynn, Nick Gallagher, Todd Golder, Jeff Hansen, Dennis Nay, Mindy Nicoletti, Erik Ross, and Soil Conservationists Morpheus Anima, Gabe Garbarino, Ayn Perry, and Diana Waller for their testing of and contributions to improve the tool.

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May 28, 2010

RANGE TECHNICAL NOTE NO. CA – 55

SUBJECT: Understanding Prescribed Grazing (528) Module I of III

Purpose: To transmit the above named Technical Note

Effective Date: When contents are received.

Background:

This first module of the training series "Understanding Prescribed Grazing (528)" is a self-paced prerequisite to Modules II and III of the course series. The purpose of the module is to help participants become more successful in applying conservation by demystifying conservation practice standards and associated documents as well as becoming more familiar with the basic parameters of Prescribed Grazing. This Technical Note contains the instructions to access and download Module I as a PowerPoint file called "Understanding_528_Module_I.ppt"

Filing Instructions:

This Technical Note and new Index will be filed electronically in the California eFOTG under the hierarchy: Section I, Technical Notes, Range http://www.nrcs.usda.gov/technical/efotg

Field Offices may also optionally file hard copies in three-ring binder with other "Subject" Technical Notes. If a hard copy is maintained, update the Index with new entries.

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Enclosure: 2

Distribution: O

TECHNICAL NOTES

U.S. Department of Agriculture **Natural Resources Conservation Service**

TN – Range – CA-55 May 2010

Understanding Prescribed Grazing (528) – Module I of III

This first module was developed by California State Rangeland Management Specialist, Jon Gustafson in consultation with Staff Forester, Jerry Reioux and assistance from Rangeland Management Specialist Todd Golder.

Summary

This first module of the training series "Understanding Prescribed Grazing (528)" is a self-paced prerequisite to Modules II and III of the course. The purpose of the module is to help participants become more successful in applying conservation by demystifying conservation practice standards and associated documents as well as the basic parameters of Prescribed Grazing (528). Completion of this first module will provide a firm foundation for pursuing Modules II and III. The module is estimated to take about 2 hours and 20 minutes to complete.

The intent of the training series is for field practitioners to become thoroughly aware of the parameters of the Prescribed Grazing (528) conservation practice and thereby increase the likelihood of success when planning in grazed landscapes.

Users will need access to a printer and Microsoft PowerPoint (2003 SP3 or later). Those wishing to complete the first module by taking a post-test evaluation are strongly encouraged to pursue the two subsequent hosted modules which can be requested through the appropriate Area Office. Trainees can request a post-test from the State Rangeland Management Specialist.

Upon completion of this module the trainee will:

- Know the main differences between conservation practice standards and conservation practice specifications and the importance of the practice requirement sheet
- Be familiar with how standards and specifications are developed and revised
- Be able to differentiate between key practices, facilitating practices and accelerating practices and understand how they relate to one another
- Be able to determine if Prescribed Grazing (528) is the best conservation practice based on the land use, goals and objectives of the plan and resource concerns to be addressed
- Be able to select the appropriate Prescribed Grazing (528) specification to fit the planning needs
- Find more details on each of the planning requirements for Prescribed Grazing as described in the conservation practice standard
- Be well prepared to take Module II of "Understanding Prescribed Grazing"

Background

NRCS has provided substantial guidance on the implementation of conservation practices through the development first and foremost of conservation practice. It could be said that Prescribed Grazing (528) as it is now, evolved in response to the agency's reduced capacity to fully apply a traditional apprenticeship approach when training employees; prior to 1996, NRCS was working with a conservation practice called Proper Grazing Use (528A) which provided only general guidance thus demanding a broader awareness of institutional knowledge. Now, several iterations later, Prescribed Grazing (528) spells out specific planning guidance closely tied to the art and science of planning within grazed environments, but still based on the principles implied under the old Proper Grazing Use (528A) conservation practice standard.

The three modules of "Understanding Prescribed Grazing (528)" are organized from general parameters to the most specific:

I. *Basics: Standards and Specifications* – Foundational concepts showing planners how the conservation planning standard framework can support the development of successful conservation plans and explaining the planner's roles and responsibilities in refining state level standards and specifications
II. *Strategic Application* – Conceptual planning parameters related to Prescribed Grazing (528); the links between the conservation planning process and Prescribed Grazing as a key practice; how to assess what planning intensity is needed; the relationship between the planning parameters and grazing lands science; traps to avoid and tricks to consider while seeking best results
III. *Getting it (and Keeping It) Together* – Using a spreadsheet designed to help develop site-specific practice requirements in conjunction with the landowner goals and objectives

Using this Module

Download and save a copy of Understanding_528_Module_I.ppt from Section I of the eFOTG in the Technical Notes section under Range-TechNote-55 Understanding Prescribed Grazing (528) from the California eFOTG, Section I, Technical Notes folder, Range subfolder. After opening, print out a hard copy of the presentation using the Notes Pages option in the print screen. Read the instructions on the first slides and use the printed notes while following the PowerPoint presentation in slide show view.

Following completion of the module, request a copy of a post-test from your State Rangeland Management Specialist.