



**CONSERVATION ENHANCEMENT ACTIVITY**

**E328H**

**CONSERVATION STEWARDSHIP PROGRAM**

**Conservation crop rotation to reduce the concentration of salts**

**Conservation Practice 328: Conservation Crop Rotation**

**APPLICABLE LAND USE: Crop (Annual & Mixed)**

**RESOURCE CONCERN: Soil**

**ENHANCEMENT LIFE SPAN: 1 Year**

**Enhancement Description**

Implement a crop rotation to reduce the concentration of salts and other chemicals from saline seeps. The rotation should include at least 3 crops and/or cover crops grown in a sequence in the recharge areas of saline seeps that have rooting depths and water requirements adequate to fully utilize all available soil water. Do not use summer fallow. Use an approved water balance procedure to determine crop selection and sequence. Select crops with a tolerance to salinity levels that match the salinity of the discharge area. (See state lists)

**Criteria**

- Crops shall be grown in a planned sequence as outlined in plan. The crop rotation must include a minimum of three different crops. For purposes of these criteria a cover crop is considered a different crop.
- Where applicable, plan suitable crop substitutions when the planned crop cannot be planted due to weather, soil conditions, or other local situations.
- Select crops to be grown in the recharge area of saline seeps that have rooting depths and water requirements adequate to fully utilize all available soil water.

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- Do not use summer fallow.
- Use an approved water balance procedure to determine crop selection and sequence.
- If excess subsoil moisture exists below the rooting depth of crops commonly grown in the recharge area, establish deep-rooted perennial crops for the number of years needed to dry the soil profile.
- Select crops with a tolerance to salinity levels that match the salinity of the discharge area. **(See State list of salt tolerant crops with rooting depths and water requirements adequate to use all available soil water.)**





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## Documentation and Implementation Requirements

### Participant will:

- Prior to implementation, complete the following table and use an approved water balance procedure to determine crop selection and sequence.

### Planned Management Rotation (Do not use summer fallow):

Field	Planned Crops (in sequence)	Planting Date	Harvest or Termination Date	Crop Rooting Depth (inches)	Crop Water Requirements

- During implementation, notify NRCS of any planned changes in crops, crop rotation, or field operations to verify the planned system meets the enhancement criteria.
- After implementation, if changes to the rotation were made, complete the table above to document the applied crop rotation for the contract period and provide to NRCS.

### NRCS will:

- As needed, provide technical assistance using an approved water balance procedure in selecting crop rotations or substitute crops that would meet the criteria of the enhancement.
- Prior to implementation, verify that the crop rotation includes at least three different crops in rotation.
- Prior to implementation, verify the crop rotation has a water balance to verify crops selected and sequence is adequate.
- During implementation, evaluate planned changes to verify the planned system meets the enhancement criteria.
- After implementation, if the applied crop rotation is different than the planned crop rotation, verify the implemented rotation meets the enhancement criteria.



**NRCS Documentation Review:**

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

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Participant Name \_\_\_\_\_ Contract Number \_\_\_\_\_

Total Amount Applied \_\_\_\_\_ Fiscal Year Completed \_\_\_\_\_

\_\_\_\_\_  
NRCS Technical Adequacy Signature

\_\_\_\_\_  
Date





## SOUTH DAKOTA (SD) SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

## CONSERVATION STEWARDSHIP PROGRAM

### E328H

#### Additional Criteria for SD

In addition to the criteria specified in the national job sheet E328H the following additional criteria apply in SD:

- In SD saline acres resulting from high water tables would also be a resource concern.
- Enhancement can be applied on the whole field or a portion of the field providing a large enough area is treated to adequately use excess water and address the resource concern. The crop rotation for the treated area must include at least three different crops. A cover crop is considered a different crop.
- SD does not have an approved water balance procedure. The Natural Resources Conservation Service (NRCS) can assist in selecting an irrigation scheduling program.
- The following reference guides can be used to aid in the selection of crops, cover crops, or perennial vegetation that tolerates salts, and have rooting depths and water requirements adequate to fully utilize all available soil water.
- SD Range Technical Note No. 4, Table 3, Species Characteristics:  
[https://efotg.sc.egov.usda.gov/references/public/SD/Range\\_Tech\\_Note\\_4.pdf](https://efotg.sc.egov.usda.gov/references/public/SD/Range_Tech_Note_4.pdf)
- Salinity and Sodic Soil Management, 610 Specification Guide located in Section IV of the SD Field Office Technical Guide (FTOG) located at:  
[https://efotg.sc.egov.usda.gov/references/public/SD/610SGS\\_Notice426.pdf](https://efotg.sc.egov.usda.gov/references/public/SD/610SGS_Notice426.pdf)
- Additional Information: COOL-SEASON GRASS PERFORMANCE ON SALINE SOILS IN THE NORTHERN GREAT PLAINS  
[https://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/ndpmctn13504.pdf](https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmctn13504.pdf)
- A list of salt tolerant cover crops, along with crop rooting depths, and water requirements are identified in the following Cover Crop Table 1:



**Table 1: Cover Crop - Common Species and Properties**

Cover Crop	Full seeding rate lbs/acre/4	Seeding depth, inches	Reduce erosion	Increase soil organic matter	Scavenge nutrients	Biological N fixation	Suppress weeds	Provide supplemental hay	Provide supplemental grazing	Rooting depth / Plant water use <sup>1</sup>	Minimize / Reduce surface soil compaction	Minimize/ Reduce subsoil compaction	Seed size (Large or Fine)	Crop type and seeding dates <sup>2</sup> / <sub>3</sub>	Winter Survival	Salinity Tolerance	C:N Ratio	Mycorrhizal fungi association	Seeds/lb	Shade Tolerance
Alfalfa	6.5	.25 - .75	G	G	G	Y	G	G	F	DH	G	G	F	CB	Y	P	L	M	210,000	F
Barley	50	.75 - 2.0	G	G	G	N	G	G	G	MM	G	F	L	CG	N	G	M	M	14,000	F
Brassica hybrids	7	.25 - .5	F	F	G	N	G	F	G	MM	G	G	F	CB	N	G	L	N	180,000	P
Buckwheat /5	50	.5 - 1.5	P	P	F	N	F	P	P	SL	F	P	L	WB	N	P	L	N	19,000	G
Cabbage, African	5	.25 - .75	F	F	G	N	F	F	F	MM	G	G	F	CB	N	G	L	N	180,000	F
Camelina, Winter	3	.25 - .5	F	F	F	N	P	P	P	ML	P	F	F	CB	S	P	L	N	400,000	P
Canola	5	.25 - .75	F	F	G	N	G	F	F	MM	G	G	F	CB	S	G	L	N	140,000	F
Clover, Balansa	5	.25 - .75	F	P	F	Y	P	P	F	SL	P	P	F	CB	N	P	L	M	500,000	F
Clover, Crimson	15	.25 - .75	F	F	F	Y	P	F	F	SM	P	P	F	CB	S	P	L	M	150,000	F
Clover, Red	5	.25 - .75	G	F	F	Y	F	F	F	SL	F	F	F	CB	Y	P	L	M	275,000	G
Clover, Sweet	4	.25 - 1.0	G	G	F	Y	G	F	F	MM	G	G	F	CB	Y	F	L	M	260,000	G
Collards or Kale	5	.25 - .5	F	F	G	N	G	F	G	MM	G	G	F	CB	N	G	L	N	175,000	F
Corn	12	1 - 1.5	G	G	G	N	G	F	G	DH	G	G	L	WG	N	P	H	H	2,500	F
Cowpeas or Dry Beans	30	1 - 1.5	P	F	F	Y	P	P	F	SL	F	F	L	WB	N	P	L	M	4,000	F
Fava beans	75	1 - 1.5	F	F	F	Y	F	G	G	DM	F	F	L	CB	N	F	L	P	2,500	P
Flax	30	.25 - .75	F	F	F	N	P	P	P	SM	F	P	F	CB	N	P	H	H	80,000	P
Lentils	30	1 - 1.5	P	P	P	Y	P	P	P	SL	P	P	F	CB	N	P	L	M	20,000	P
Millet, hay	15	.5 - 1.0	G	G	G	N	G	G	G	SL	G	F	F	WG	N	P	M	H	180,000	P
Millet, proso	25	.5 - 1.0	G	G	G	N	G	G	G	SL	G	F	F	WG	N	P	M	H	80,000	P
Mustard	6	.25 - .75	F	F	F	N	G	F	P	MH	G	F	F	CB	N	P	L	N	140,000	P
Oats	70	.5 - 1.5	G	G	G	N	G	G	G	MM	G	F	L	CG	N	F	M	H	16,000	F
Peas	70	1.5 - 3.0	F	P	P	Y	F	G	G	SL	F	F	L	CB	N	P	L	M	3,500	F
Phacelia	4	.25 - .5	F	F	F	N	P	P	P	DH	F	P	F	CB	N	P	L	M	225,000	F
Radishes	8	.25 - .75	F	F	G	N	G	P	G	DH	G	G	F	CB	N	P	L	N	25,000	P
Rapeseed	5	.25 - .75	F	F	G	N	G	F	G	MM	G	G	F	CB	Y	G	L	N	140,000	F
Rye, Cereal	60	.75 - 2.0	G	G	G	N	G	G	G	MH	G	G	L	CG	Y	G	H	M	18,000	G
Ryegrass, Annual	15	.5 - 1.5	G	G	G	N	F	G	G	MM	G	F	F	CG	S	F	M	M	190,000	G
Safflowers	30	.5 - 1.0	F	F	G	N	F	P	P	DM	F	G	L	WB	N	F	M	M	15,000	P
Sorghum, Forage and Sudan Hybrids	15	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	17,000	P
Sorghum, Grain	5	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	17,000	P
Soybeans	35	1 - 1.5	F	P	F	Y	F	F	F	SM	F	F	L	WB	N	P	L	M	3,000	F
Sudangrass	20	.5 - 1.5	G	G	G	N	G	G	G	MM	G	G	L	WG	N	F	M	H	25,000	P
Sugar beets	4	.25 - .5	F	P	G	N	F	P	G	DH	G	G	F	CB	N	G	L	N	22,000	P
Sunflowers	7	.5 - 1.0	F	F	G	N	F	P	G	DM	F	G	L	WB	N	F	M	M	8,000	P
Sunn hemp	15	1.5 - 2.0	F	F	F	Y	F	P	F	DM	F	F	L	WB	N	P	L	M	15,000	P
Teff grass	5	.13 - .25	G	G	F	N	F	G	G	SM	G	F	F	WG	N	P	M	H	1M	N
Triticale	60	.5 - 1.5	G	G	G	N	G	G	G	MH	G	F	L	CG	Y	G	M	M	15,000	F
Turnips	4	.25 - .5	F	P	G	N	G	P	G	DH	G	G	F	CB	S	P	L	N	175,000	P
Vetch, Chickling	50	.5 - 1.5	F	F	F	Y	F	F	P	SL	F	F	L	CB	N	P	L	M	2,500	F
Vetch, Common	25	.5 - 1.5	F	F	F	Y	F	F	G	SM	F	F	L	CB	N	P	L	M	8,000	F
Vetch, Hairy	15	.5 - 1.5	G	F	F	Y	F	F	F	SM	G	F	L	CB	Y	P	L	M	14,000	G
Wheat, Spring	60	.5 - 1.5	G	G	G	N	G	G	G	MH	G	F	L	CG	N	G	M	M	15,000	F
Wheat, Winter	60	.75 - 2.0	G	G	G	N	G	G	G	MH	G	F	L	CG	Y	G	M	M	15,000	F



/1 Rooting Depth/Water Use			/2 Crop types			Ratings		
SL=	Shallow rooted/Low water use	Shallow= 6 - 18 inches	CG =	cool season grass	L=	Low	G=	Good
SM=	Shallow rooted/Medium water use	Medium= 18 - 24 inches	CB =	cool season broadleaf	M=	Medium	F=	Fair
SH=	Shallow rooted/High water use	Deep= 24 + inches	WG =	warm season grass	H=	High	P=	Poor
ML=	Medium rooted/Low water use		WB =	warm season broadleaf	Y=	Yes		
MM=	Medium rooted/Medium water use				N =	No		
MH=	Medium rooted/High water use				S =	Sporadic		
DL=	Deep rooted/Low water use				N/A=	Not Applicable		
DM=	Deep rooted/Medium water use							
DH=	Deep rooted/High water use							
/3 Seeding Dates			/4 Full Seeding rates			/5 Buckwheat contamination		
May 1 through August 5 – warm season winter kill species			Multiply by the percent desired if mixtures are used.			To reduce chances of buckwheat contamination in wheat		
Early spring through August 20 – cool season winter kill species						do not rotate to wheat for grain for 2 years		
August 1 through Winter – species that do not winter kill								
Seeding dates fluctuate annually. Seeding dates may be adjusted up to 15 days by the District Conservationist, based on local weather and site conditions.								