

Managing Two Billion Gallons of Water

Lyle Perman, Lowry, SD

Rock Hills Ranch was established in 1976 by Lyle and Garnet Perman. The previous owners had a dairy and became accustomed to overgrazing. The process of restoration is ongoing and will not be complete during my lifetime.

Restoration begins with increasing water infiltration rates. Rolf Derpsch, an internationally known soil scientist, said: "Research has shown the percent of soil covered with plant residue is the most important factor in increasing water infiltration." With this in mind our goal is to increase the residue, and as a result, we will increase the infiltration rate. Increased infiltration results in improved water quality and decreased runoff from the ranch. Increased infiltration also increases the productivity of the various plants on our ranch.

Over three hundred years ago author John Milton said: "Accuse not nature, she has done her part. Do thou but thine." It is up to us as land use managers to manipulate the resources at our disposal to reach the desired outcomes. We know some years will be above normal and others below normal, so man must manage accordingly.

Our ranch consists of about 5,000 acres and is divided into 36 pastures with 65 miles of permanent fences. We have 7 miles of underground water pipeline, 2 developed springs, 2 wells, 4 rural water hookups, 20 water tanks and 27 dugouts and dams. Our cow herd is divided into 4 herds: yearling heifers, 2-year-old cows, 3-year-old-cows; and 4-year-old and older cows. One of our goals with the livestock is to teach them to consume the plants that normally are not part of their diet. We exposed them to western snowberry for the second time this past summer using Kathy Voth's technique.

Increased infiltration rate of water on our ranch will result in healthier native plant population, better water quality, and increased water quantity. Each of these will result in higher profitability of our ranch due to increased stocking rates.

To document how the effects of fair grazing vs. good grazing (as defined by NRCS) impact water, I have attached three pages of data from the 1380 acre watershed that drains through our ranch headquarters. This data was generated by a NRCS computer program titled EFH-2. I have also attached a summary page for the data.

The second part of my presentation is about a problem on our ranch that I spent a number of years trying to determine the cause. The problem is with 200 acres of our hay land which lies in a creek bottom that is part of 150,000 acre drainage. Why were small swells developing, making it difficult to hay, and why was the plant community changing? When I reviewed the NRCS data for our 1380 acre watershed and noticed the increase in runoff due to the grazing management, I questioned what would happen if we converted the land from good grazing to minimum tillage. For that analysis I used a 165 acre watershed. The data and conclusion are attached.

What we as land managers must understand is the decisions about managing our land resources impact more than the land on which they are applied. In our case, over 150,000 acres drain through our 200 acres of hay land. This hay land has become a filter strip for the sediment the water carries. When the sediment settles out, swells are created. The plant community has changed due to the increased amount of water in the drainage

from converting grassland to farmland. It is not just a water issue we need to consider from the conversions. The loss of wildlife and pollinator habitat must also be considered.

Future generations depend on us getting it right, as it takes too long to correct mistakes made in managing the land. Aldo Leopold said it best: “The landscape of any farm is the owner’s portrait of himself.” What does your portrait look like?

Client: Lyle Perman
 County: WALWORTH
 Practice: Good Grazing
 Calculated By: _____
 Checked By: _____

State: SD
 Date: 7/15/2011
 Date: _____

Drainage Area: 380 Acres (provided from RCN Calculator)
 Curve Number: 69 (provided from RCN Calculator)
 Watershed Length: 15500 Feet
 Watershed Slope: 11.5 Percent
 Time of Concentration: 1.92 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.00
Ia/P Ratio	0.50	0.43	0.31	0.26	0.22	0.20	0.18
Used	0.50	0.43	0.31	0.26	0.22	0.20	0.18
Runoff (in)	0.15	0.25	0.62	0.89	1.27	1.53	1.96
(ac-ft)	17.25	28.75	71.30	102.35	146.05	175.95	225.40
Unit Peak Discharge (cfs/acre/in)	0.179	0.224	0.292	0.309	0.322	0.329	0.337
Peak Discharge (cfs)	37	79	249	382	563	696	910

Client: Iyle Perman
 County: WALWORTH State: SD
 Practice: Fair Grazing
 Calculated By: _____ Date: 7/21/2011
 Checked By: _____ Date: _____

Drainage Area: 1380 Acres (provided from RCN Calculator)
 Curve Number: 75 (provided from RCN Calculator)
 Watershed Length: 15500 Feet
 Watershed Slope: 11.5 Percent
 Time of Concentration: 1.62 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.00
Ia/P Ratio	0.37	0.32	0.23	0.20	0.17	0.15	0.13
Used	0.37	0.32	0.23	0.20	0.17	0.15	0.13
Runoff (in)	0.29	0.43	0.90	1.23	1.67	1.97	2.45
(ac-ft)	33.35	49.45	103.50	141.45	192.05	226.55	281.75
Unit Peak Discharge (cfs/acre/in)	0.288	0.322	0.359	0.372	0.383	0.388	0.395
Peak Discharge (cfs)	114	192	444	632	880	1,057	1,335

Client: Lyle Perman
 County: WALWORTH State: SD
 Practice: Minimum Tillage
 Calculated By: Date: 7/15/2011
 Checked By: Date: _____

Drainage Area: 1380 Acres (provided from RCN Calculator)
 Curve Number: 81 (provided from RCN Calculator)
 Watershed Length: 15500 Feet
 Watershed Slope: 11.5 Percent
 Time of Concentration: 1.36 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.00
Ia/P Ratio	0.26	0.22	0.16	0.14	0.12	0.11	0.09
Used	0.26	0.22	0.16	0.14	0.12	0.11	0.10
Runoff (in)	0.48	0.67	1.24	1.63	2.12	2.46	2.99
(ac-ft)	55.20	77.05	142.60	187.45	243.80	282.90	343.85
Unit Peak Discharge (cfs/acre/in)	0.392	0.408	0.434	0.444	0.453	0.457	0.460
Peak Discharge (cfs)	261	377	741	998	1,326	1,554	1,896

RUNOFF/DISCHARGES FROM A 1380 ACRE CONVERSION

2.1 inch rain on 1380 acres equals 78.7
million gallons of water

Good grazing releases 9.4 million gallons of runoff with a peak flow of
591 gallons/sec

Minimum tillage releases 25.1 million gallons of runoff with a peak flow
of 2820 gallons/sec

Conversion would produce 2.7 times the runoff with a peak flow of 4.8
times as much

Client: SW 36 - 122 - 75
 County: WALWORTH State: SD
 Practice: Good Grazing
 Calculated By: _____ Date: 7/18/2011
 Checked By: _____ Date: _____

Drainage Area: 165 Acres (provided from RCN Calculator)
 Curve Number: 61 (provided from RCN Calculator)
 Watershed Length: 2650 Feet
 Watershed Slope: 1.4 Percent
 Time of Concentration: 1.65 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.00
Ia/P Ratio	0.71	0.61	0.44	0.38	0.32	0.29	0.26
Used	0.71	0.61	0.44	0.38	0.32	0.29	0.26
Runoff (in)	0.04	<u>0.09</u>	0.33	0.53	0.81	1.02	1.37
(ac-ft)	0.55	1.24	4.54	7.29	11.14	14.03	18.84
Unit Peak Discharge (cfs/acre/in)	0.273	0.235	0.237	0.282	0.318	0.334	0.346
Peak Discharge (cfs)	2	<u>4</u>	13	25	43	56	78

Client: SW 36 - 122 - 75
 County: WALWORTH
 Practice: Minimum Tillage
 Calculated By: _____ Date: 7/18/2011
 Checked By: _____ Date: _____

Drainage Area: 165 Acres (provided from RCN Calculator)
 Curve Number: 77 (provided from RCN Calculator)
 Watershed Length: 2650 Feet
 Watershed Slope: 1.4 Percent
 Time of Concentration: 1.07 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.00
Ia/P Ratio	0.33	0.28	0.21	0.18	0.15	0.14	0.12
Used	0.33	0.28	0.21	0.18	0.15	0.14	0.12
Runoff (in)	0.35	0.50	1.00	1.36	1.81	2.13	2.62
(ac-ft)	4.81	6.88	13.75	18.70	24.89	29.29	36.03
Unit Peak Discharge (cfs/acre/in)	0.409	0.445	0.484	0.499	0.512	0.518	0.526
Peak Discharge (cfs)	23	37	80	112	153	182	228

RUNOFF/DISCHARGE FROM A 165 ACRE CONVERSION

2.1 INCHES OF RAIN ON 165 ACRES
EQUALS 9.4 MILLION GALLONS

Good grazing releases 403,00 gallons of runoff with a peak flow of 30
gallons/sec

Minimum tillage releases 2.2 million gallons of runoff with a peak flow of
276 gallons/sec

Conversion would result 5.5 times as much runoff with a peak flow of
9.2 times as much