

# Bill Plum, Regenerative Agriculture Project

## SARE RGR20-005



### Stevens County Conservation District

Bill Plum owns 86 Acres near Northport Washington. The operation is a beef cow/calf having a history of 20 mother cows, and 2 horses. Renting additional pasture and purchasing hay for winter feeding in addition to the owned property. Area has a frost-free growing period 110-130 days, receiving 18-21 inches precipitation, 80% received during the winter dormant period.

The area is Dry-pine forested with clearings created for farming and forest grazing. The higher productive acres consist of sandy loam soils 0 to 40% slopes covering approximately 75 percent of the property. The remaining property is heavier forested gravely loam soils and steeper slopes. These areas are occasional grazed or too steep to be used for anything other than growing trees.

The pasture ground has been traditionally managed with modern commercial practices, reseeding adding commercial fertilizers when needed and funding is available. Due to increased costs of rented pasture, purchasing hay, a couple of droughty years the herd has been reduced. The farm's goal is to reduce inputs and costs to keep the remaining livestock.

In 2019 the operation was down to 5 mother cows and 2 horses and the pasture less than optimal. After hearing about regenerative agriculture practices improving soil health through the Soil Health Stewards group, he was very interested in trying a couple of regenerative practices and joined the group.

Bill's goal was to improve soil health, increase water holding capacity and improve drought tolerance with the benefit of increase yields, improve forage quality forage for grazing. This will extend grazing season and/or increase animal units.



Above field early summer. Middle aerial shot showing forested and open areas of the property and management units on far left.

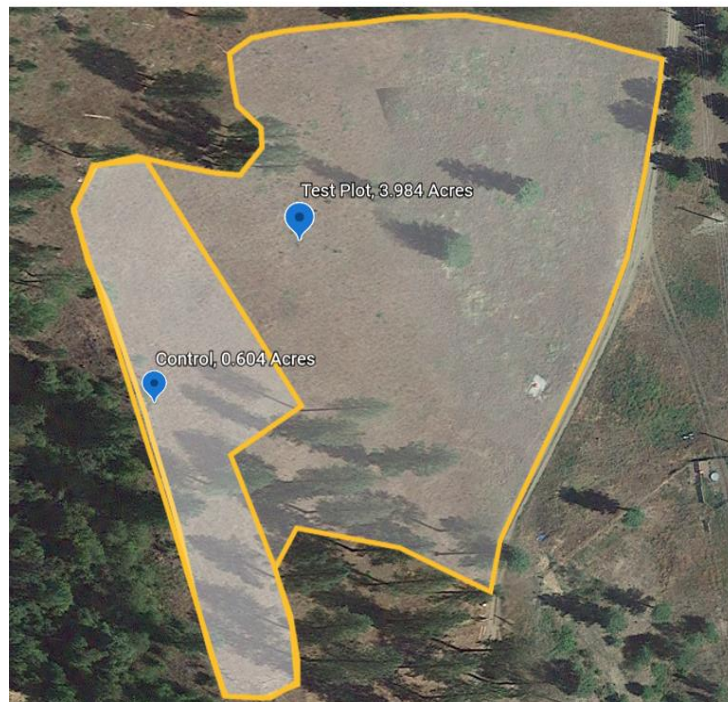


Bill implemented a series of projects over the next couple of years. – Focusing on the middle of the property, Fir Lot, and Snake Bit Flat in picture the pink/light purple areas in the map above. This is the most productive ground of the property.

#### Regenerative Agriculture Soil Health Practices

- 2020 spring/summer cover crop - spring disked and spring-tooth harrowed packed broadcast barley seed 75 lbs per acre and 37-0-0 of granular fertilizer and 25 lbs per acre then packed after seeding. This was a reduction in tillage compared to past practices. A Conservation/Farm plan was developed for the property utilizing Washington State Conservation Commission Technical Assistance Grant.

**2020 Bale Grazing** – The RGR20-005 grant provided cost share funding. The project included 4 acres is the and .6 acres for the control. The entire area was grazed terminating the summer barley crop. Winter feeding was implemented on the 4 acres with no feeding on the .6 acres.



In the fall of 2020 through spring of 2021 cows and horses grazed the field (test plot), then fed on the ground in a different spot in the field each day to spread out the feed waste and manure. Additional feed was provided above the amount required to meet nutritional needs increasing wastage and adding organic matter to the field. Traditionally livestock were feed in lot or small pen with feeders. This created additional labor to clean the pens and apply the manure to fields in the spring. Most consider bale grazing setting out a month or winters worth of feed out in the field and allowing livestock to access a day or two of feed by moving fence etc. Consideration of potential spoilage of hay prevented the hay being set out in the weather for the winter so the landowner was willing to feed daily as that is traditional to filling feeders.

Animals for the project included 1 bull, 5 cows and 4 bred heifers for a total of 12 animal units. Animal unit equal to 1,000 lbs of body weight. Forage provided was alfalfa/grass dry hay forage to meet animal nutritional requirements at 3.5% of body weight. The hay was purchased from a neighboring farm.

An additional 20% was fed and was cost shared in the amount at 50% of costs not to exceed \$1,500 dollars. Actual total costs for the project for the additional feed was 14 ton \$1,700 considering other expenses labor, tractor, fencing the demonstration costs were \$3,325 above normal feeding to meet the nutritional needs of the 12 animal units. Bill received \$1,500 he was very happy with the results. In addition to the visual observation of increased organic matter in the field, the animals came through the winter in better shape and healthier.

The winter-feeding period was 126 days and fed 520 lbs of hay per day. 1 feeding per day in a clean spot in the field each time most of the days were on snow. Over all 32.76 tons of forage was fed on the 4 acres. On May 1, 2021 cattle were moved to the timber pasture, then the field was harrowed to spread out wasted feed and manure. After that the field disked and planted to a small grain (barley) as a cover crop to be grazed later in the summer/fall.

Soil samples were taken of the control and test plots 6 weeks after the cows were moved off the field. Observations of the control and test plots were also recorded. As planned the control plot remained untouched throughout the winter. The test plot showed good distribution with feed waste and manure throughout the plot by controlled feeding. The results from the soil samples show change in both negative and positive directions regarding micro and macro nutrients. Organic matter did not change maintaining a 3.4 percent. The test plot and increased by 31 percent in organic carbon, Nitrate Nitrogen decreased by 69 percent in ammonia nitrogen and increased 37.5 percent in nitrate nitrogen. Plant available phosphorous increase .05 percent and potassium increase 22 percent. An interesting observation was that the weed growing through the wasted feed on top of the ground was lower than the control field.

Cover Cropping for grazing – 2021, 2022 and 2023 Bill continued to plant a crop in the spring and fall graze and winter feed expanding the acreage each year. In 2021 and 2022 Bill added turnups, sugar beets, peas, canola and sunflowers at 5 lbs per acre in addition to the barley at 70 lbs per acre to create diversity to the cover crop to be grazed. 2023 used the same seeding mixture this year he inoculated the seed with vermicompost.

Each year Bill has seen an improvement in production and in his words “hooked on grazing cover crops”.

Other improved practices use on the operation include.

- Increased rotational grazing adding more grazing units and shortening grazing periods increasing plant recovery time.
- Pre-commercial thinning and fuels reduction in the forested ground followed seeding forages and bale grazing, supplemental feeding and seeding forages has also increased carrying capacity of the land. Working with the Small Forest Landowners Program through the Washington State Department of Natural Resources.



*Figure 1 Bill in 2021 barley cover crop*

Results: Mr. Plum is very happy and sold on regenerative agriculture practices. Progress has been slow but there is a noticeable increase in forage with less weeds, still purchasing hay for winter feeding but feeding less days a year. Was able to increase to 8 cow calf pairs over the 3 years.

2021 was an extreme drought year and Bill felt was not impacted to the level of his neighbors.

He has been a member of growers panels talking about his experiences and research at 3 of the Soil Health Workshops hosted by the RGR20-005 grant.

In 2023 soil health samples of the test and control field were taken through the Washington State Soil Health Initiative statewide sampling project. W2 is the test field which has had 3 years of bale grazing/ winter feeding and annual cropping which the livestock grazed off in the fall. W1 is the edge of the field where no cropping or feeding took place.

Field or Average	Texture	Sand	Silt	Clay	Bulk Density g/cm <sup>3</sup>	Agg. Stability %	WHC in/ft
		%					
<b>W1</b>	Loamy Sand	80	16	4	1.44	86.9	0.84
<b>W2</b>	Loamy Sand	82	14	4	1.53	87.5	0.79

Field or Average	Organic Matter	Min C	POXC	PMN	ACE Protein
	%	mg/kg/day	ppm	lbs/ac	g/kg
<b>W1</b>	27.0	30.6	501	-77.90	7.73
<b>W2</b>	53.4	23.9	640	-81.03	9.13

Organic Matter decimal mistake should be 2.7 and 5.3

Field or Average	pH	EC	CEC	Total C	TOC	Inorganic C
		mmhos/cm	cmolc/kg	%		
<b>W1</b>	5.5	0.55	12.9	2.25	2.25	
<b>W2</b>	7.4	1.59	12.7	2.95	2.93	0.020

Field or Average	Total N	NO <sub>3</sub>	NH <sub>4</sub> -N	P	K	Ca	Mg	S
	%	ppm						
<b>W1</b>	0.15	21.5	2.4	27	289	1,140	133.1	9.13
<b>W2</b>	0.17	36.9	2.3	53	492	1,220	169.4	10.73

Field or Average	B	Fe	Mn	Cu	Zn	Na
	ppm					
<b>W1</b>	0.12	44	4.4	0.50	34.0	23.0
<b>W2</b>	0.46	151	12.3	0.80	56.6	236.9

Almost all parameters have improved on the test field most notable is the Organic Matter. Also pH is notably different.