PUGET SOUND ENERGY GRAZING REPORT 2017

Tipton D. Hudson, Associate Professor, WSU Kittitas County Extension

TABLE OF CONTENTS

Contents

PSE GRAZING REPORT

Grazing Objectives

GRAZING PLANNING

The 2016 and 2017 CRM grazing plans followed the trajectory of the 2011-15 plan, aiming to maintain or increase rangeland health and riparian function on all lands that are part of the CRM. To accomplish these objectives, the following principles still guide grazing use planning:

1. Defer (avoid) grazing in each grazing unit during the growing season one year out of three;

2. Defer (avoid) grazing in each grazing unit during the critical period (boot through soft dough stage, which usually occurs from late April through most of May, sometimes part of June) two years out of three;

3. Graze no more than half the growing season.

4. Plan for and implement within-grazing-period monitoring to achieve ~35% utilization on key plant species within the zone of accessibility;

5. Maintain at least 15 cm grass/forb height for sage grouse breeding and brood-rearing habitat;

6. Use 60% utilization around water sources as a trigger for moving livestock before the planned move date if necessary;

7. Use 4 inch stubble height on key grasses as a trigger in riparian zones; and

8. Use 35% utilization of browse species (shrubs and trees) in riparian zones

Pasture boundaries were re-drawn after construction of a cross-fence splitting North Wild Horse into what are being called West Wild Horse North and East Wild Horse North.

5-YEAR GRAZING OVERVIEW

Every plan gets changed shortly after it is created, but this does not negate the value of the thinking required in the process of planning. The PSE grazing plan changed nearly every year from what the initial 5-year long-term plan prescribed for grazing use in response to several variables.

Contractual and logistical challenges to grazing on WDFW lands severely limited flexibility in the use of those lands; this reduced flexibility in planning grazing on the other land holdings that are part of the CRM. Limitations on late-season use remain on WDFW lands, since these are mandated by the Final Environmental Impact Statement. Limitations based on inadequate boundary fence have been resolved. The recent history of grazing use prior to 2017 is shown in this table.

PSE GRAZING REPORT

GRAZING UNIT	2011	2012	2013	2014	2015	2016
South Wild Horse	April 19-30	June 11 – July 15	rested	April 16-30	April 1-15	May 7-28; Sep 1-15
North Wild Horse	July 5 – Sep 24	Aug 1 – Sep 31	Aug 1 – Sep 5	NA	NA	NA
West Wild Horse N	NA	NA	NA	June 16-July 21	Jun 21-Jul 21	REST
East Wild Horse N	NA	NA	NA	July 21-Aug 5	July 21-Aug 6	Aug 11-31
Wild Horse Crossing	July 5 - Sep 24	July 6 - July 31	Jun 21 - July 31	Aug 6 - Sep 5	Aug 6-31	

The proposed grazing schedule for the current 5-year period is given here.

2017-2021 PSE GRAZING SCHEDULE

	2017	2018	2019	2020	2021
South WH	Aug16-31	Aug1-20	May1-20	REST	Apr16-30; Aug1-20
West WHN	July21-Aug15	June1-25	July21-Aug15	Aug6-31	June1-25
East WHN	July6-20	June26-July10	June16-30	July21-Aug5	June26-July10
WH Crossing	June16-July5	July11-30	July1-20	July1-20	July11-30

PLANNING CHALLENGES

Water availability can change from year to year. In some locations, such as South Wild Horse, hauling water to tanks is possible. In other grazing units, such as some owned by WDFW, hauling water in a dry year may not be an option due to road quality/terrain.

Grazing Use in 2017

Actual dates livestock were grazing on PSE in 2017 are given below. All dates represent grazing by 200 cow-calf pairs. Note that the stocking rate increased in 2016 and was retained for 2017. Additionally, 2017 exhibited frequent light precipitation through April and May, resulting in forage yield significantly above average. Therefore, we extended the duration of grazing on dormant-grazed units to utilize a portion of this unexpected biomass (and the dates given below are different from the planned dates listed above in Planning). Utilization for the previous five years at 160 cow-calf pairs was consistently and significantly under the target of 35% utilization and the increase was monitored for negative impacts. As shown in the utilization report below, the increased stocking rate did not result in excessive utilization in 2016 and 2017, and the increase actual duration from planned in 2017 proved sustainable as well.

Wild Horse Crossing	**June 16 – July 4**
West Wild Horse North	**July 21 – September 4**
East Wild Horse North	**July 5-20**
South Wild Horse	**September 5-30**

Planned dates for 2018:

South Wild Horse	**May 1-31**
West Wild Horse	**June 1-25**
East Wild Horse	**June 26 – July 10**
Wild Horse Crossing	**July 11-30**

Annual Grazing Use Measurements

NOTES ABOUT UTILIZATION MEASURES

Utilization monitoring is sometimes called annual use monitoring, compliance monitoring, or grazing monitoring. The intent of utilization monitoring by most public land agencies is to serve as an easily measured guideline for limiting potential negative effects of grazing. This is a good goal; unfortunately, simple indicators often fail to capture the complexity of natural systems with lots of interacting parts. D. Costello, writing in the Journal of Range Management back in 1957, said: "Oversimplification leads to poor interpretation and poor interpretation leads to poor management." In 2012 Ken Sanders and Wayne Burkhardt, well-known rangeland researchers and practicing ecologists now retired, argued in a synthesis journal article against the current West-wide emphasis on utilization as a measure of grazing success. They conclude from an exhaustive review of grazing research conducted specifically in the semi-arid shrub and bunchgrass communities of the West that the measure of success or failure is changes in the plant community over time rather than relative use, and that utilization is not an appropriate measure of success or as a condition of grazing permits. Nevertheless, utilization data remain useful as a means to quantify grazing use in a given year, even if this is not the decisive factor in plant community health.

Utilization monitoring is specifically designed to measure how much of the available forage has been consumed in a given grazing event, permit period, grazing period, or calendar year. Note that these are all different reference points and timeframes. Growing season measurements are complicated by regrowth. End-of-season measurements do not account for timing of grazing, uniformity of grazing impacts, species preferences, etc. These factors all matter to the actual long-term effects of grazing use on a plant community. Further, Nathan Sayre argues in a recent book ("The Politics of Scale: A History of Rangeland Science") that the entire paradigm upon which utilization rates were based was founded upon the political and economic needs of the US Forest Service and a faulty model of ecosystem change. This is not the place for a discussion of these considerations; sufficient for our purposes is a summary of the current widely accepted model, a nonequilibrium model commonly called state-and-transition, which holds that semi-arid plants are characterized more by variability than aridity and that major plant community changes occur in discrete events in response to environmental factors such as precipitation patterns rather than in slow fading over time in response to persistent mild pressure from grazing animals, for example.

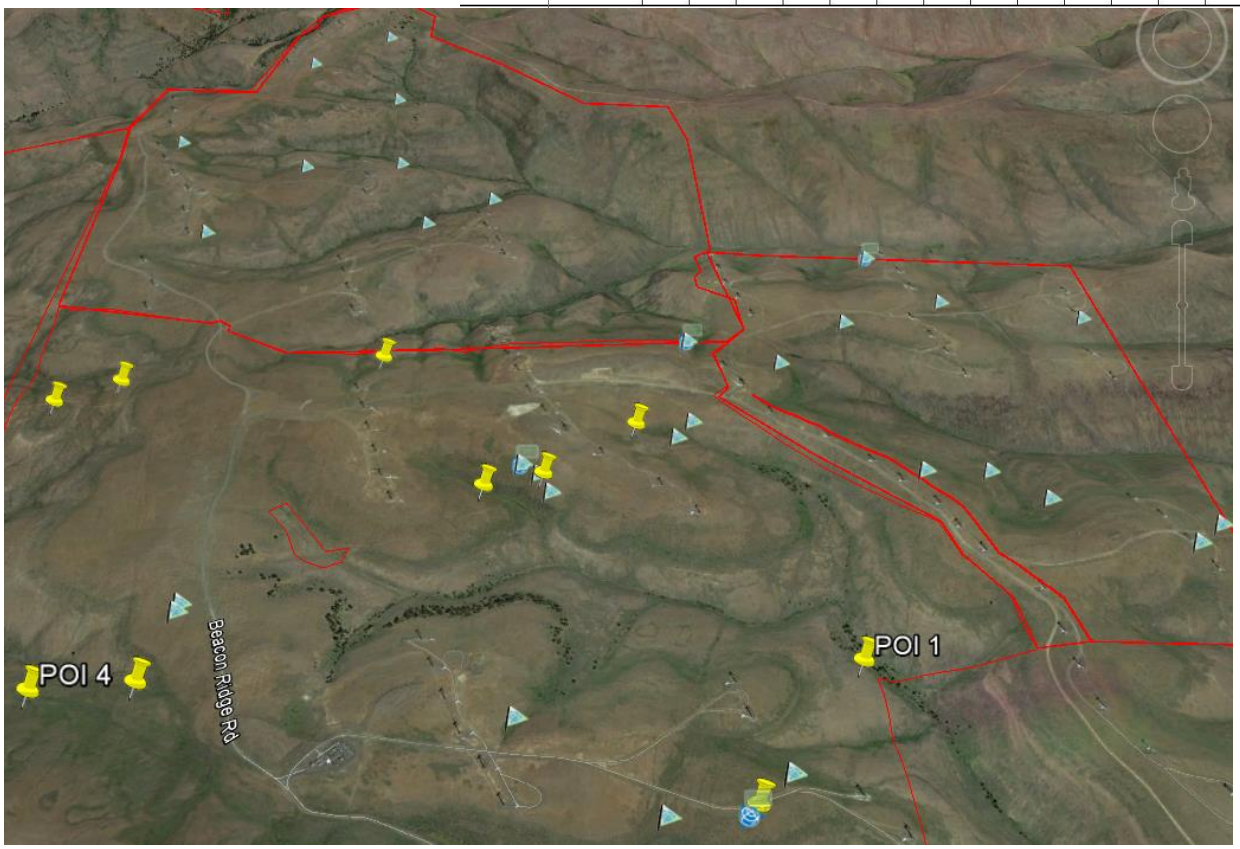
METHODOLOGY

Consistent with the methods used by WDFW, I measured utilization by comparing grazing grazed and ungrazed heights of *Pseudoroegneria spicata* (bluebunch wheatgrass) plants within the "zone of accessibility" (places where cows are predicted to graze). I randomly selected approximately 10 points within each grazing unit inside of a predicted accessible zone and located the first patch of bluebunch wheatgrass moving out from that point. I then would walk a straight line, measuring the grazed and ungrazed tillers of a PSSP plant at each third step, or the next plant that presented itself if there were none after three steps. Where it was obvious that the PSSP patch could not be sampled continuing on my initial bearing, I would change directions to follow the distribution of the species. 25 plants were sampled from each starting point. I used the Utilization Gauge: An Instrument for Measuring the Utilization of Grasses developed by the Pacific Northwest Forest and Range Experiment Station and produced by the U.S. Forest Service to assign utilization rates based on grazed an ungrazed tiller height. These figures match closely height-weight curves developed for local subspecies of PSSP. Those values are represented in the figure show below.

PSE GRAZING REPORT

Sampling locations for utilization data collection for all grazing units on PSE except Wild Horse South are shown here on Google Earth. The different icons represent different methods used to collect the GPS coordinates and import them into Google Earth.

Bluebunch Wheatgrass Utilization Table																	Grazed height
x, grazed; y, ungrazed	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20
12	58	38	25	15	8	6	4	2	0	0	0	0	0	0	0	0	0
13	60	42	27	15	10	8	6	3	1	0	0	0	0	0	0	0	0
14	65	44	30	20	14	9	7	4	2	0	0	0	0	0	0	0	0
15	67	50	35	25	15	10	8	5	3	2	1	1	0	0	0	0	0
16	69	53	38	27	18	13	9	6	5	4	2	1	1	1	0	0	0
17	72	55	42	30	20	15	10	8	5	4	2	1	1	1	1	0	0
18	73	57	43	35	25	17	12	9	7	5	4	3	3	2	2	1	1
19	75	59	46	36	26	19	14	11	8	6	5	4	3	3	2	1	1
20	76	61	50	38	27	20	16	12	9	8	6	5	4	4	3	2	2
21	79	64	53	40	31	23	17	14	10	9	7	6	5	4	3	2	2
22	81	67	56	43	35	26	19	15	11	9	8	7	6	5	4	3	2
23	82	68	57	45	37	28	22	16	13	10	9	8	7	5	4	3	2
24	83	69	58	48	40	30	25	17	15	11	9	8	7	6	5	4	3
25	85	70	60	50	42	33	26	19	15	13	10	9	8	6	5	4	3
26	87	72	61	52	43	35	27	21	15	15	10	9	8	7	5	4	3
27	87	74	63	53	44	37	29	23	18	17	13	10	9	7	5	4	3
28	87	75	65	54	45	40	30	25	21	18	15	10	9	8	6	4	3
29	89	76	66	56	47	41	33	27	22	19	15	11	10	8	6	5	4
30	90	77	67	58	50	42	36	28	24	19	15	12	11	8	7	5	4
32	91	79	68	60	52	45	38	32	25	22	17	14	13	10	9	6	5
34	92	81	70	62	54	48	40	35	27	25	20	17	15	12	10	8	6
36	93	82	73	64	56	50	43	37	31	28	23	20	16	14	12	9	7
38	93	84	75	67	58	53	45	40	35	30	25	22	18	15	14	10	7
40	93	87	77	68	63	55	50	43	38	35	30	23	20	18	15	10	8
Ungrazed seed culm height																	



UTILIZATION DATA FROM 2017

Utilization (percent weight of most preferred species removed by grazing animals at the end of the growing or grazing period) was as follows:

GRAZING UNIT	GRAZED DATES	UTILIZATION
Wild Horse Crossing	June 16 – July 4	26.4%
West Wild Horse North	July 21 – September 4	19.1%
East Wild Horse North	July 5-20	17.0%
South Wild Horse	September 5-30	14.4%

Utilization could be measured more finely if necessary. For example, in most areas cattle have not defoliated all tillers (stems) on an individual bunchgrass plant. It is very common to have half or less of the tillers clipped (see photo). If utilization rates were approaching the 35% target "ceiling" for grazing use, it would be appropriate to include percent plant removal in the calculations such that a plant which is listed as having 50% biomass removed based on the height/weight curve but only has 33% of tillers removed would have actual utilization of 16.5%. The incorporation of percent tiller removal would decrease the utilization rate compared to the current methodology.

Here is a summary of utilization on PSE grazing units over the previous five years. Entries with "--" indicate years during which that unit was rested, i.e., no grazing use by cattle.

	2011	2012	2013	2014	2015	2016
SWH	20	15	0	9	0	17
SWH (LATE)	--	--	--	--	--	33
EWHN	--	--	--	12	21	20
WWHN	21	28	22	13	12	6
WHC	14	22	32	13	27	25
Average	**18.33**	**21.67**	**18.00**	**11.75**	**15.00**	**20.52**

The utilization level, averaged across all units, in 2016 is approximately 21% higher than the 5-year average of 17%. This seems to match the 25% increase in stocking rate applied in 2016.

Future reports will include an analysis of grazed height and evenness of use, since total utilization could be under our target value with half of a pasture overgrazed and half undergrazed. This has not been the case, but that fact is not transparent in the way the data are finally reported, i.e., in the percent utilization.

GRAZING RESPONSE INDEX

We have also used the Grazing Response Index to gauge the big-picture effects of grazing in a given year. This index incorporates utilization rates, along with growing season precipitation, season of grazing use, and duration of regrowth opportunity into a score from -5 to +5 which indicates, roughly, whether that year's grazing would have a positive or negative long-term influence on the grazed site and to what degree. We are using the Land EKG version of the GRI, which differs slightly from the original GRI developed by Colorado State University and used by the USFS in the Rocky Mountain region. The Land EKG GRI adds the factor of growing precipitation, since this is a major known driver, even though it's not one man can control.

A review of the GRI scores for the entire history of grazing on the Wild Horse CRM is illuminating. Because of the emphasis on changing timing of use, the relatively short duration grazing periods, and the frequency of dormant-season use, average scores are very high. This is consistent with monitoring data showing that range condition is improving or stable from the initiation of grazing to the present.

Grazing Response Index (Land EKG version)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	10-yr average
South WH	4	4		0	2	3	5	1	3	2	5	2.9
West WHN	4	2	4	2	4	2	4	2	1	5	3	3.0
East WHN	4	2	4	2	4	4	4	4	2	4	4	3.5
WH Crossing				4	3	3	1	3	3	3	1	2.6

Where there is a blank, I am missing at least one key piece of data required for an accurate GRI score.

One of the purposes of the GRI is to help land managers interpret monitoring data and translate them into actionable information. For example, if monitoring data showed a consistent increase in invasive species and a decrease in canopy cover of desirable species, one could look at the 3 GRI factors which we can manipulate:

1. Amount of residual at the end of the grazing season
2. Recovery time (during the growing season) before next grazing event
3. Season of grazing use

And choose one of them to change so as to generate a positive score or more positive score than previous years using one or a combination of variable changes.

For comparison, the GRI score for overgrazed range across the West might have looked like this, on average:

Factor	Description	Value
A, utilization	>50%	-1
B, rest and opportunity	Part season	-1
C, season of grazing	Critical period	-1
D, precipitation	Variable	0
	GRI Score	**-3**

Grazing every year in May and June, consuming half or more of the annual forage yield, and allowing a small portion of the growing season, if any, for recovery before the next year's grazing, results in a score of -3. This severity of grazing would tend to cause range condition to decline, not necessarily because that level of grazing use is unsustainable in a given year, but because it would decrease resiliency to any other kind of disturbance, like a drought year or herbivorous insects, which could cause a precipitous change in species composition when those factors come together. This transition to a new, less productive and less diverse stable state cannot be reversed easily.

ANALYSIS AND COMMENTS

Grazing use remains predictably light – predictable because of the highly conservative harvest coefficient applied in planning grazing use for this project. Results of grazing have consistently yielded lower utilization rates than what the stocking rate calculations were based on. This should be regarded as successful planning, particularly since the goal here is to demonstrate sustainable grazing that maintains habitat values for a variety of species.

Observations & Monitoring

Grazing across the entire PSE ownership is relatively light. Lighter utilization is usually also patchy, i.e., not very uniform. At low animal densities, natural grazing behavior is to graze the tops of plants in a "patch", walk a short distance leaving a number of plants ungrazed, then graze another patch. This light grazing is usually characterized by partial defoliation of an individual plant. Not only are half or less of the tillers (stems) grazed, but they are clipped relatively high on the plant. At this density, a predictable sequence of utilization patterns unfolds, depending on how

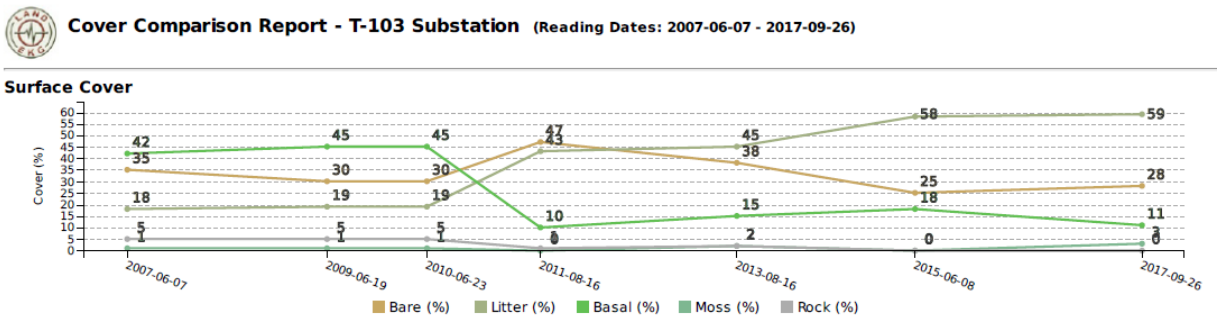
long animals remain in the same area. Following the initial light grazing of plant tops in a patchy manner with large ungrazed areas in between, animals take another pass and graze new patches so that the patch pattern becomes tighter. Once most plants have been topped and there are no ungrazed patches, animals will then take a closer bite, leaving very little area that hasn't been lightly topped. With additional residence time in the same grazing area, animals will now top remaining plants and begin taking a second bite on previously grazed plants. For example, if Bunchgrass 1 was grazed at 12" in the first grazing bout, the second grazing bout will reduce stubble height to 5-7". Depending on feed availability, environmental conditions such as heat and forage moisture content, this second bite may be immediately followed by a third that takes stubble down to 3-5". On bunchgrasses, this is a critical limit that has meaning from an animal husbandry perspective and plant health perspective. Cattle will ordinarily avoid grazing closer than this unless they are out of forage. They prefer to select a bite of plant with their tongue; below about 4"

they are unable to be selective using their tongue. Therefore, continued grazing once stubble heights are this low results in sub-par nutrient value for domestic ruminants and declining body condition will follow if animals are not moved to fresh feed. Close grazing is also observed in the most preferred loafing areas, sometimes in riparian zones – this is not necessarily an indication of forage scarcity but inadequate animal distribution. During the hot season, it is natural behavior for animals to seek thermal relief in areas with shade and water. This applies to wild animals as well and applies across biomes, i.e., this pattern is observed all over the world in ecosystems which support large ungulates. While late (summer, early fall) grazing use is less aesthetically pleasing because regrowth doesn't occur, it is also much more benign to grass plants because they've completed their growth cycle for the year. It is also beneficial in that late-season grazing tends to result in more stem breakage and, therefore, more litter deposition. This looks more severe and is often accompanied by dusty conditions, but is more beneficial to the plant community in several respects than May grazing, for example.

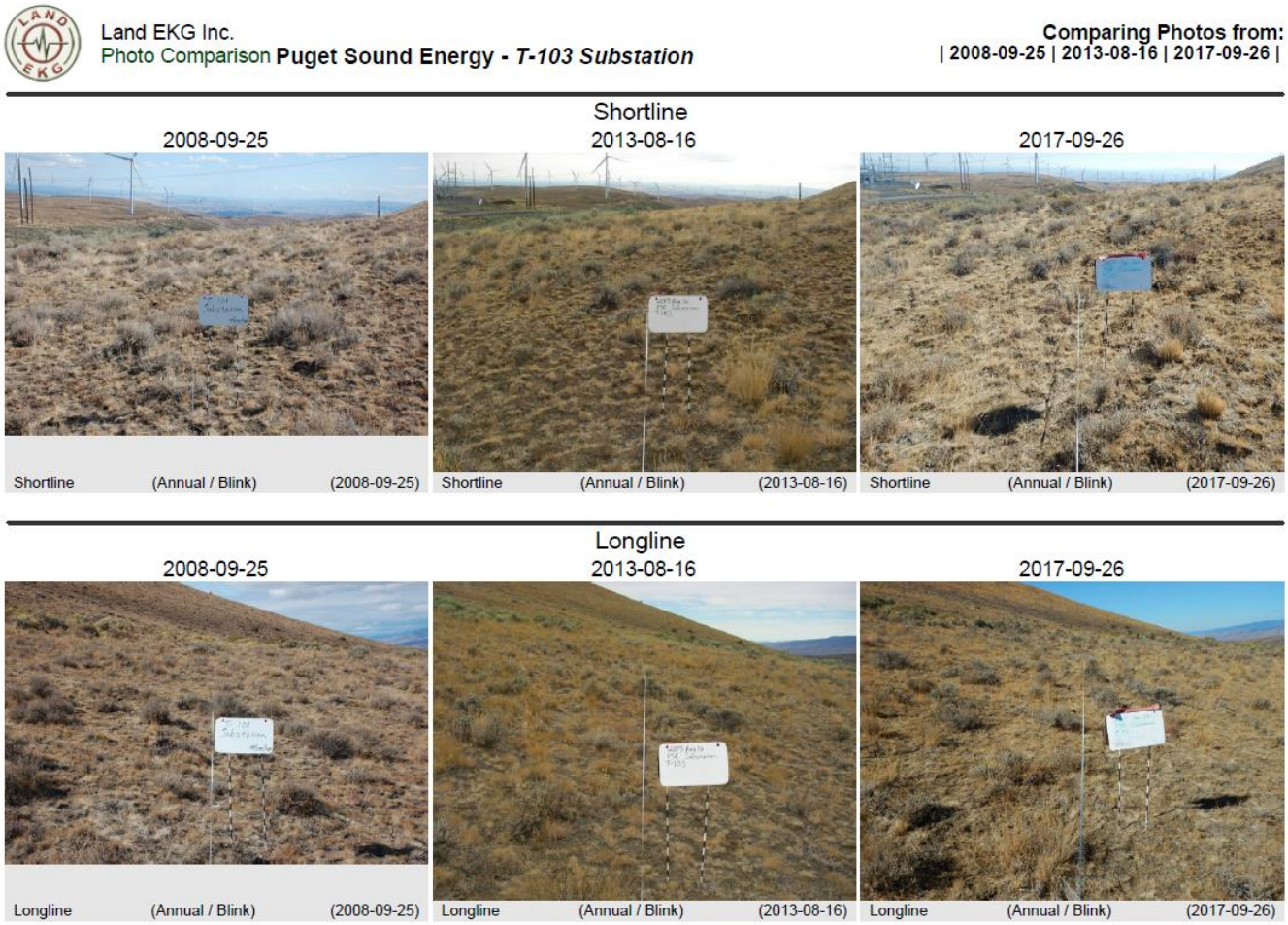
Photos and commentary on utilization is provided in a separate PowerPoint PDF file.

Long-term monitoring data, including photographs are collected in Land EKG DataStore, a proprietary monitoring system and database where changes over time can be viewed and analyzed online. Report queries from this are available upon request.

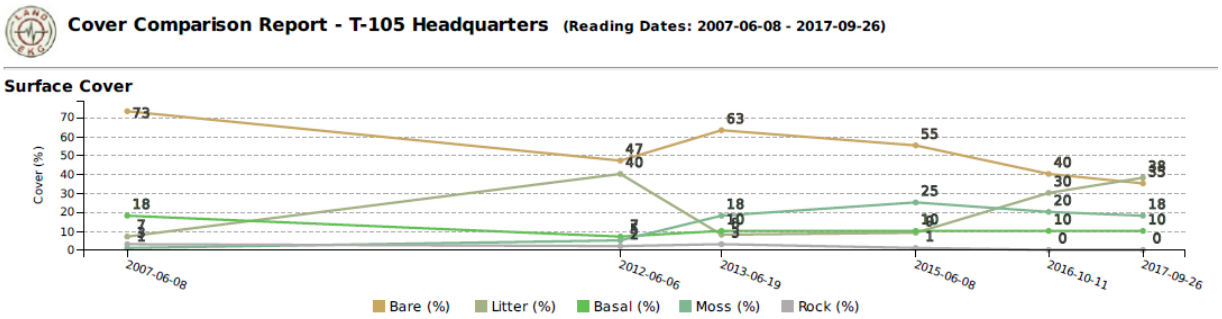
Here is a summary report on cover from the site on the north side of Whiskey Dick mountain, across from the substation. Observers changed in 2011, illustrating an example of observer bias. The data from 2011 forward are mine (Hudson). Cover measurements are sensitive to season and interannual variability in precipitation; however, the general trend toward increased litter, less bare ground, and stable basal area (the rooted portion of the plant) across the site is backed up by line-point intercept data.



Landscape photos from this site look like this:

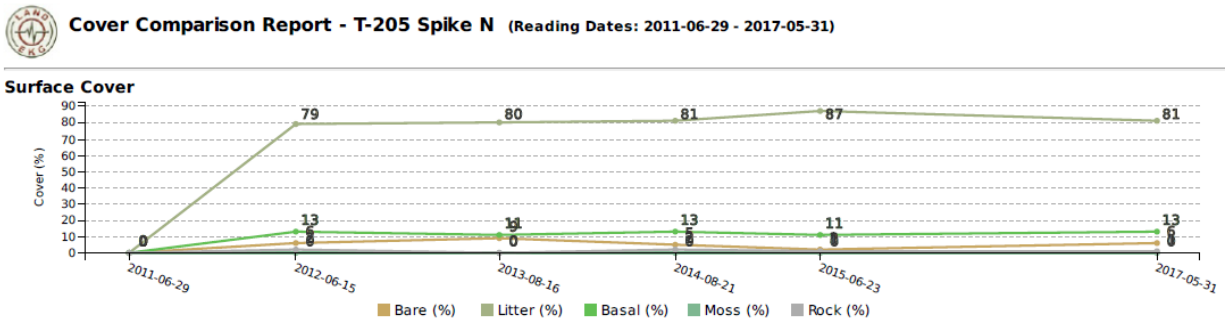


Here is the same report (below) for the "Headquarters" site, in South Wild Horse ½ mile NE from the maintenance shed:



Again, data show slight declines in bare soil, a possible net increase in litter cover, and stable basal area.

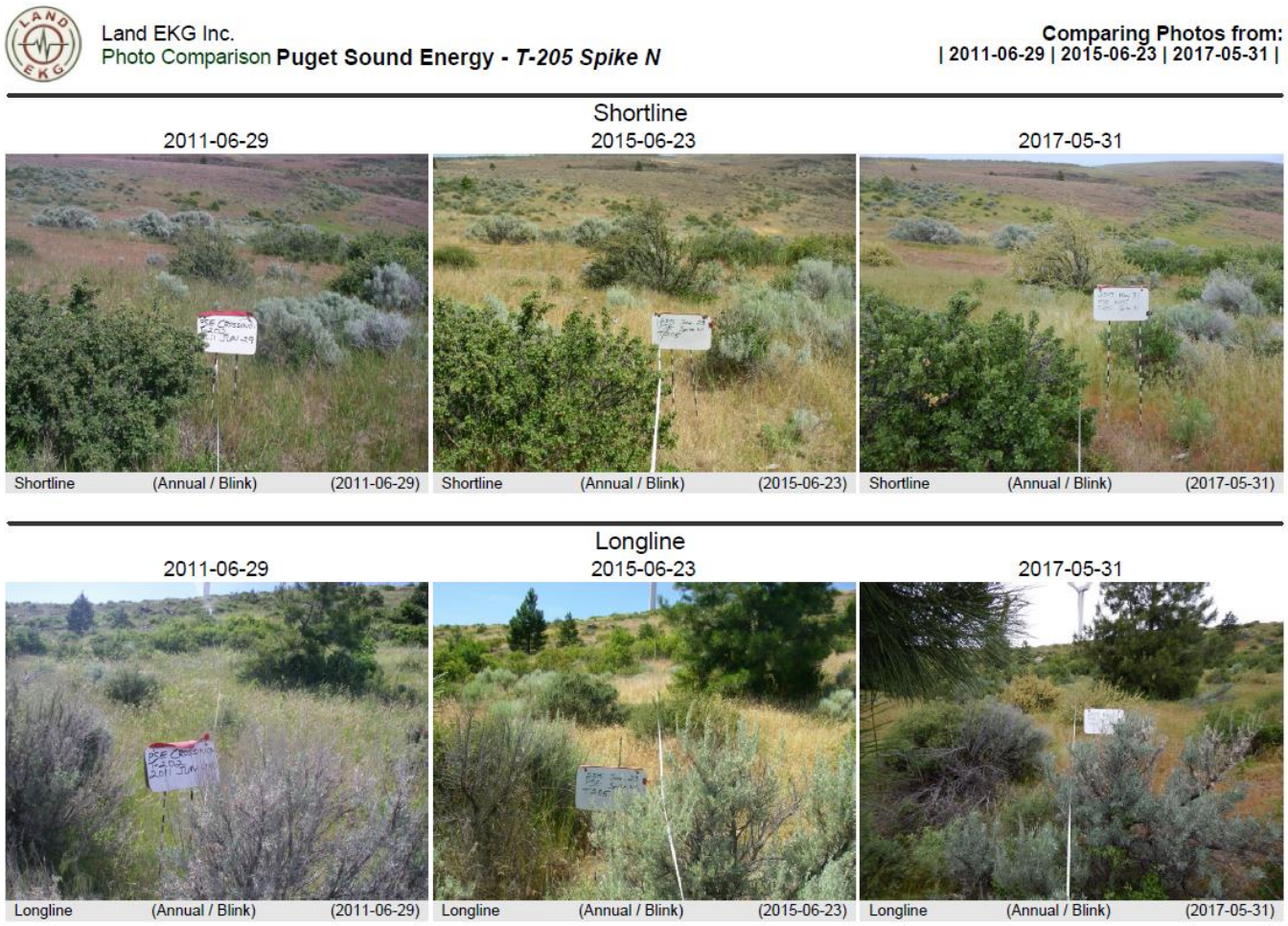
Here is a cover report (below) for Spike North, a monitoring site in the center of the Wild Horse Crossing unit:



Interestingly, as we move into a more mesic site, with higher precipitation (~14-16"), the variables that are telling in a semi-arid site – percent bare soil, litter, basal area – are no longer useful as indicators because they don't vary in response to management or climate. Here is what these monitoring locations actually look like during the growing season:

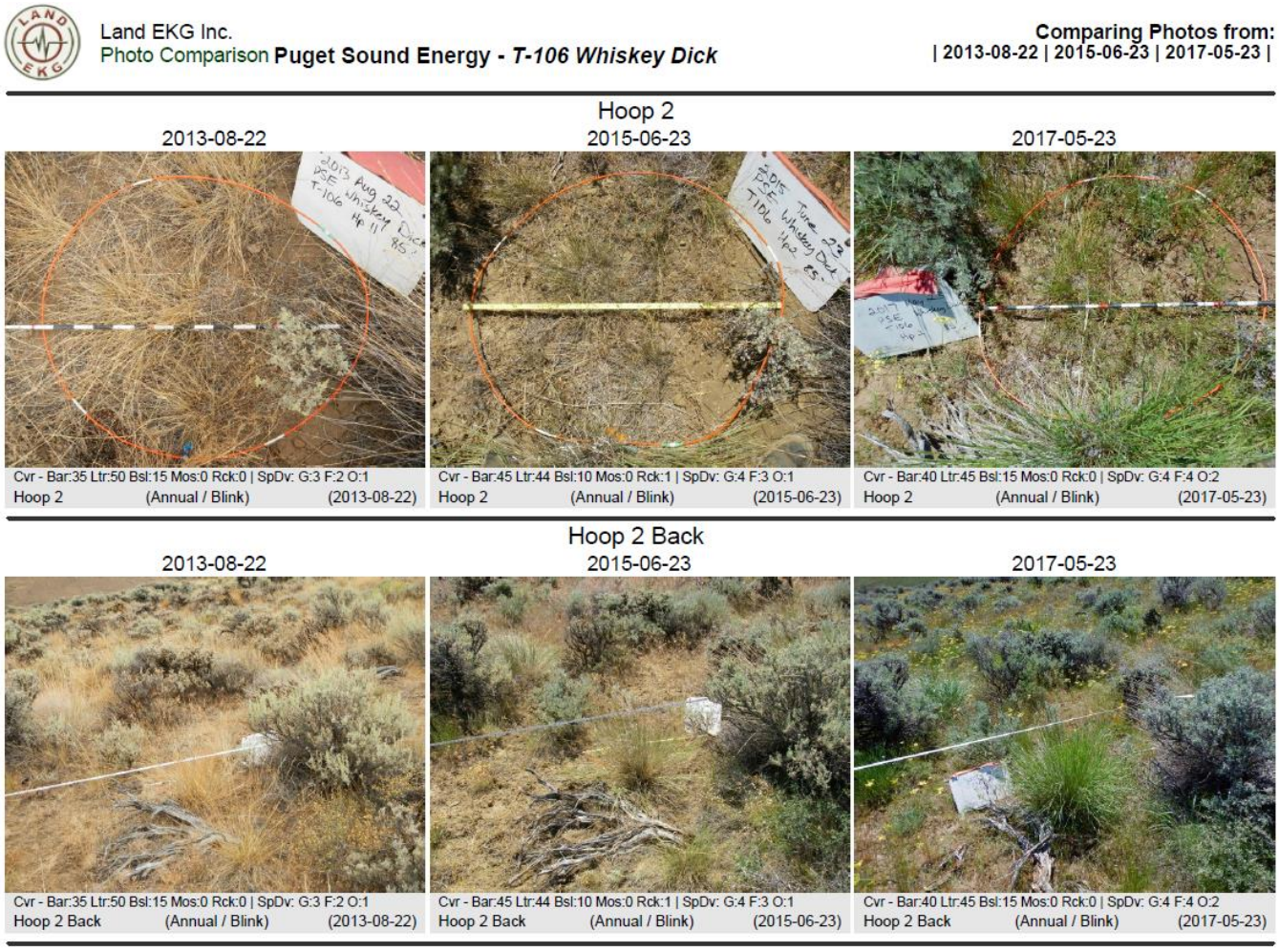
There is enough vegetation that bare soil would be a rarity, probably only happening in response to a fire, which is what happened here 15-20 years ago.

That recovery is evident in the long-term landscape photo series at the same location:



The significant increase in shrubs and trees here is the recovery of historical conditions prior to the fire.

This photo from a site on West Wild Horse North shows the difference in season in analyzing data, particularly with regard to species composition, as the expression of forbs is highly season-dependent:



By the end of the grazing season in 2018, we will have both Land EKG and multiple years of point-intercept data to compare for all sites, making possible a fuller analysis of trend and site health.

Summary & Conclusions

Grazing use on Puget Sound Energy property is designed to be light; the result of the most recent 5-year grazing plan implementation is light grazing that research has shown to result in a neutral or positive trend in rangeland health. Overestimating grazing utilization levels as described earlier utilization levels have never exceeded the 35% utilization target. 35% utilization within a single grazing event represents a harvest coefficient (percent of annual total biomass production removed) of significantly less than 35%, since our utilization measurements focus on the most preferred forage species and not the entire plant community, among other reasons. We are applying light utilization combined with relatively short grazing periods compared to most Western U.S. public land grazing – this is generally considered a very conservative and sustainable plan. Primary concerns are with animal distribution and heavy use areas that tend to concentrate on landscape focal points such as water and shade. Grazing every year in the hot season is good for upland herbaceous species but can result in annual heavy use in areas of 'wetter' vegetation types such as those found in riparian, semi-riparian, or ephemeral riparian zones. Grazing planning for future years will include consideration of strategies to reduce this heavy use in scarce riparian zones; strategies may include permanent fence around sensitive sites, improved temporary/electric fence maintenance, strategic placement of nutritional supplements such as low-moisture energy or protein blocks and/or tubs, increased stock placement by riders, etc.

Contact Information

TIP HUDSON
RANGELAND & LIVESTOCK SPECIALIST

Tel 509-962-7507
Fax 509-962-7574
hudsont@wsu.edu

WSU Administration

WSU Extension
PO Box 646242, Pullman WA 99164-6242
Tel 509-335-2933
Fax 509-335-2926
ext.wsu.edu

Kittitas County
WASHINGTON STATE UNIVERSITY EXTENSION