Antelope Creek Habitat Development Area 2017

New siding on the barn. Photo by Neal Wilson

Antelope Creek Ranch
2017 Annual Report

What is the Antelope Creek Ranch?

The Antelope Creek Ranch (ACR) was established in 1986 through a multi-agency partnership. Alberta Fish and Wildlife Division, Wildlife Habitat Canada, Ducks Unlimited Canada and the Alberta Fish and Game Association were the purchasing partners of the Antelope Creek Ranch. ACR is located in southern Alberta, west of Brooks. The land base is managed to provide productive plant cover for livestock and wildlife, and adequate nest cover for waterfowl on mixed grass prairie and wetland margins. Crested wheatgrass, irrigated pasture and native rangeland are incorporated into a complementary, deferred-rotation grazing system to achieve the management goals.

The Antelope Creek Ranch serves as a demonstration project for producers and resource managers in the mixed grass prairie region. ACR research focuses on range improvement through specialized grazing systems to benefit both livestock and wildlife. ACR has been a valuable tool in assisting several M.Sc. thesis research projects from the University of Alberta the University of Lethbridge and the University of Regina. In addition, ACR supports independent studies concerning wetlands, industrial reclamation, and tame grass production.

Research at ACR consists of a co-operative, multi-disciplinary monitoring program to document changes in range vegetation and range condition, forage production and utilization, litter reserves, cattle performance, soil chemical and physical characteristics, and changes in relative diversity of wildlife.

Vision

To improve the health of Alberta's prairie ecosystems while maintaining the benefits which society derives from its use of these landscapes.

Mission

Use the ACR as a demonstrative and educational tool to show land users and resource managers how to manage and integrate agricultural, recreational and industrial use of the prairie landscape while maintaining its health and the integrity of its ecosystems.

ACR Management

Antelope Creek Ranch is managed by two very different and distinct committees. They are the management committee and the technical committee. The committees consist of members from Alberta Fish and Game Association (AFGA), Ducks Unlimited Canada (DUC), Alberta Fish and Wildlife (ESRD) and Wildlife Habitat Canada (WHC).

The management committee is responsible for managing the financial aspect of the ranch and setting policy of overall management. The Technical committee is responsible for the management of the habitat and anything that applies to the ground work of the ranch. This is all implemented with the grass roots contribution from the ranch managers.

The ranch managers work closely with the technical committee, and manage the day to day operation of the ranch with consideration for cattle and range management, wildlife, oil and gas development, as well as monitoring recreational activities on the ranch.

The People and Partners of ACR

Management Committee
Travis Ripley – Chairperson, EPA
Duane Radford – AFGA representative
Wayne Lowry – ACR Finance Chair
– Ducks Unlimited representative
Travis Ripley– Wildlife Habitat Canada representative

Technical Committee
Joel Nicholson – Chairperson, EPA, Fish and Wildlife Division
Colin Kure – AFGA representative
Amanda Miller– Public Lands Division representative
Morgan Stromsmoe – Ducks Unlimited Canada

Ranch Managers
Neal Wilson
Shannon Burnard

Summer Range Technician
Ashly Dyck

A Year in Review – 2017 Highlights

Extension and Outreach

The ranch managers attended 2 PCF meetings this past year in order to continue to showcase what we are doing on the ranch. Neal Attended the AIA conference in Banff again this spring as part of his continuing professional development. He attended a tutorial for the pesticide applicators home study course to be used to implement the Invasive Species Management Plan for the ranch. Lethbridge College Wildlife Habitat Management class of 24 students were up for a day to tour the ranch and learn about grazing management and how it affects wildlife.
In the beginning of June the Alberta Energy Regulator had a field day at the ranch to learn a bit about how reclamation practices affect the environment. In August Operation Grasslands held a small Land EKG training day at the ranch to teach a production method of clipping and keeping grass records for your pastures. In September the Foothills Restoration Forum held their Range Health Training Field day on the ranch.

Figure 1 AER Summer tour on the ranch.

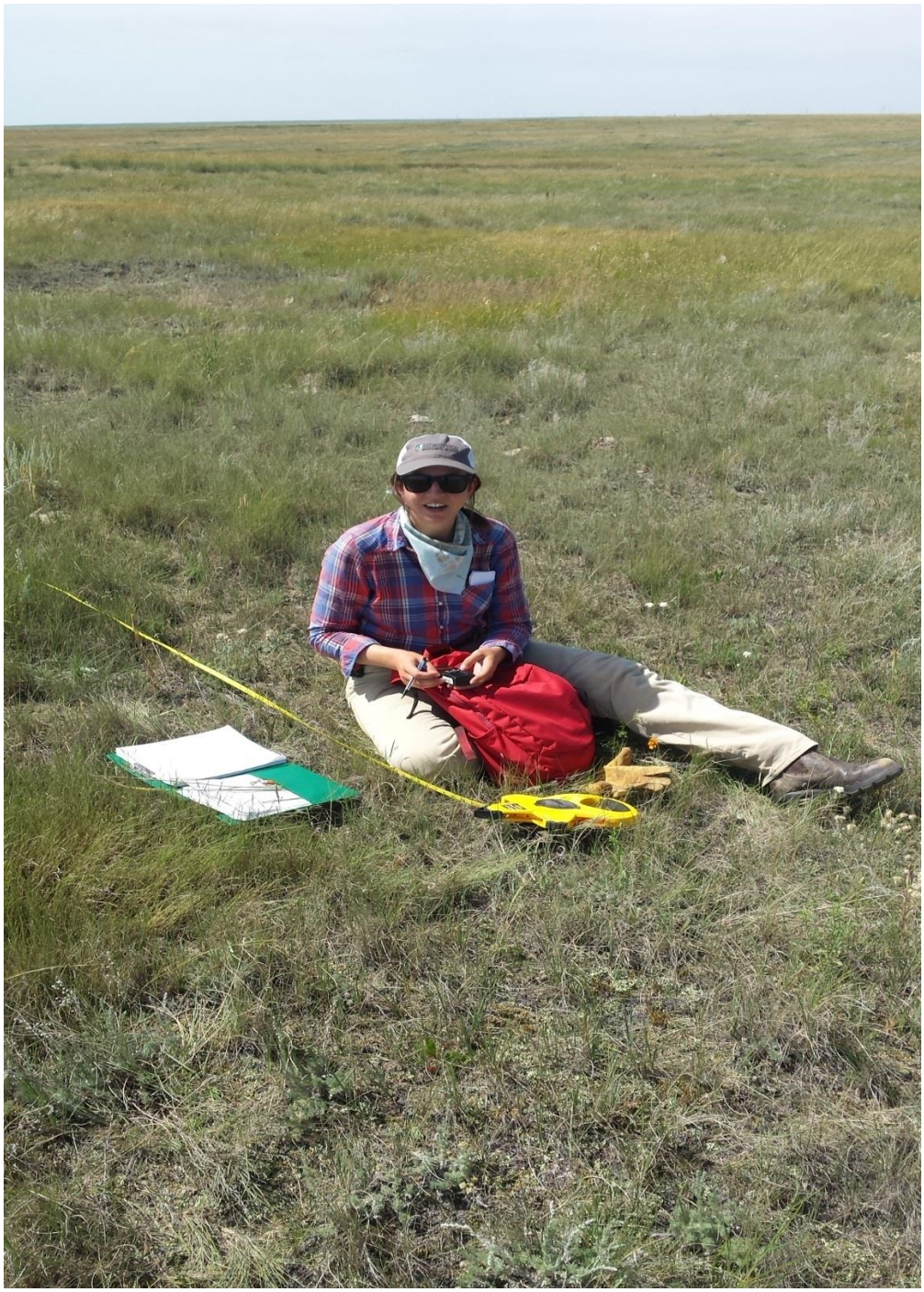

Figure 2 Summer Range Technician Ashly Dyck completing range health evaluations on the ranch. Photo Neal Wilson

Grazing

The spring of 2017 started out with good moisture which provided good grass growth early in the year but by the beginning of June the taps had shut off and we didn't see any moisture until the end of September when we had a snow storm. The summer was very hot which meant the grass stopped growing early and the prairie really dried out. We provided grazing for 285 pairs this year down from the previous years.
In 2017 ACR was able to hire a summer Range Technician by the name of Ashly Dyck. Ashly helped throughout the summer with general ranch duties but the majority of her time was spent doing range evaluations and ground truthing the provincial grassland vegetation inventory that has been done on the ranch. Her full summer report is included at the end of this summary as Appendix 1.

Figure 3. Waiting for things to green up. Photo by Shannon Burnard

Invasive Species Management

With the spring of 2016 being so dry Downy Brome was present but was mostly going to seed at a couple of inches in height. This required a lot of labour to hand pick and bag along these sites.

2017 brought more spring rain but didn't make it any easier to find the Downy Brome. We handpicked on the sites where we found it and continued to see the amounts reduced. Grazing CWG pipelines in the native fields early in the year with the goal of helping the native prairie regain a foothold was continued this year as well and expanded into Field 2.

Figure 4. Reclamation activities on an abandoned lease. Photo Shannon Burnard.

Oil and Gas

There has been a relatively low level of new oil and gas activity since 2009. There were no new wells drilled in 2016. Activity has generally been maintenance traffic to producing wells on the ranch. This past summer there was also some work done on reclaiming a lease site on the west side of the ranch but this activity was halted as Cenovus put all of its properties up for sale in this area.

Recreational Users

2017 started off pretty slow with very few recreational users of the ranch out and about. There were a few trucks that went through during the annual bird count on the May long weekend, but there were not many birders through this year.

The August long weekend changed that when we woke up to find neighbours staying on a lease site south of the yard 2 nights in a row. We would like to point out that camping is not allowed on the ranch.
There were quite a few different hunters out on the potholes in the native fields spread throughout the ranch. All the wetlands were left full this fall except for the Norman project which is leaking so we left it dry so that it could be repaired. The pheasant release occurred on the ranch again this fall with some very good birds that were very active and provided a good hunt for the guys that were out. Some of these roosters survived the hunting season and found their way to the yard where they wintered. Boyd released 15 Pheasant hens on the ranch. Gates off the designated routes are now locked so that cattle can't get into places they are not supposed to be.

Figure 5 Beaver paths in the wetland next to the irrigation canal. Photo by Neal Wilson

Wildlife

In August of 2015 the ranch was lucky to have AFGA volunteers come out for two days of fencing that saw them replace approximately 8 miles of bottom barbwire with smooth wire to provide a wildlife friendly fence. This, along with the previous 5 miles has just about completed all the fence on the ranch to the wildlife fencing. This year we were able to complete the sections left around the irrigation pivots.Wildlife Friendly fence consists of a smooth bottom wire placed at 18 inches off the ground and the top wire is at 42 inches with the remaining wires spaced evenly between. This spacing is optimal for allowing wildlife to crawl under the fence and not pull hair out as well as allowing the larger deer to go over the fence without getting tangled up in it.
No surveys of wildlife were done on the ranch this year. Our personal observations saw a rise in the numbers of coyotes on the ranch. There were 4 encounters with porcupines and cattle, horses this year and one with the dog so we got a lot of practise this year pulling quills. We had a sheep attacked by more than 1 coyote and somehow survived which is very surprising. We also found an owl caught in a barbwire fence which was turned into an avian rescue to hopefully be rehabilitated.

Figure 6 Sheep bitten by coyote. Photo Neal Wilson

Figure 7 Owl caught on barbed wire. Photo by Neal Wilson

Figure 8 Porcupine quills and cows. Photo by Neal Wilson.

Contact Information

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Appendix 1

Antelope Creek Habitat Development Area
Summer Range Technician Report 2017

Compiled by Ashly Dyck

Introduction

Antelope Creek is a 5,500 acre research ranch located in the dry mixedgrass prairie 16km west of Brooks, Alberta. Established in 1986, the ranch was purchased through a partnership between the Alberta Fish and Game Association (AFGA), Ducks Unlimited (DU), Alberta Environment and Parks (AEP), and Wildlife Habitat Canada (WHC), and is managed by Neal Wilson and Shannon Burnard. It was formerly a part of the Ward ranch, during which time dry ditches and flood irrigation cells were installed, making the ranch a combination of native grassland pastures, and tame, irrigated pastures. As a research ranch, the main goal of Antelope Creek is to demonstrate how a ranch can successfully incorporate tame and native grassland grazing, wildlife, oil and gas, and research to maintain a healthy and profitable rangeland property.

To this end, summer range technicians are hired and trained to catalogue the plant communities of the native grassland pasture, and document the extent of disturbance from man-made development. Ranch management then uses these evaluations to calculate the carrying capacity of each pasture for optimal grazing management and ecological function.

The range inventory process, from pre- to post-field activities, takes approximately two months, and is planned to occur when the plants are

vegetative and easily identifiable. In the remaining summer months, range technicians perform a variety of other duties, from checking fences and rounding up cattle to hand-weeding and clipping biomass from range cages.

Monthly Activity Summaries

May

The month of May was spent getting oriented around the ranch and the Lethbridge AEP office, and getting the ranch ready for the arrival of cattle. Along with the ranch manager Neal Wilson, we checked fence lines, repaired breakages, finished installing a smooth bottom wire in the irrigation pivot paddocks, replaced broken posts and gates, and rolled wire and pulled posts from old sections of fence that had been eliminated or replaced. We also cleaned out the barn and trained with the horses we would be using to round up and move the cattle once they arrived in June. We prepared the irrigation canals and ditches to transport water to the cattle, which involved hiring and supervising heavy equipment operators to remove beaver dams and repair holes created in canal walls, and areas where the walls of dry ditches had been worn down. I also moved the range cages in fields 1, 3, and Cassils field before the cattle arrived, to avoid resampling of areas that were clipped during 2016. Cattle arrived on the weekend of May 20, 2017, and fences, water, and cattle health were frequently checked thereafter.

June

Similarly, in June time was spent checking on the health of the cattle as they adjusted to their surroundings, placing salt blocks for them, moving them between paddocks on horseback, and checking that they had an ample and steady water supply. Fence checks were regularly performed, and fence repairs were completed in several fields before the cattle were moved

there. Contractor training with AEP and MULTISAR took place in Pincher Creek and Manyberries, AB, over June 5-6, 2017, and quad training took place in Lethbridge on June 9, 2017. One day was spent hand-picking downy brome grass (*Bromus tectorum*, or cheatgrass) around oil and gas lease sites in native grass fields. The hand-picking by summer range technicians, ranch management, and Cenovus staff in

former years was highly successful, as the invasive grass was now confined to small patches around a former lease site in field 2, and a current lease site in field 3. Range inventory of field 4 began on June 16, 2017, with supervision and guidance from Tanner Broadbent, Amanda J Miller, and Ross Adams, and continued until August 5, 2017. Range inventory methods and results will be discussed later in this report.

July

The entire month of July was devoted to range inventory in field 4.

August

August 3 and 4 were spent in Lethbridge, preparing polygon maps using ArcMap, and training in AEP's EcoSys database for recording transect data. An extra day was spent inventorying small, disturbance-related polygons to complete inventory coverage of field 4. The week of August 7, 2017 was spent entering data, and another week was spent compiling data and generating this report. Forage production clipping of enclosures and range cages took place from August 14-18, 2017.

Clipping

Each of the four native fields has one permanent grazing enclosure within it, established in the 1980s, along with 10 range cages that are moved before every grazing season (only 9 cages were found in Cassils field this year). The purpose of clipping is to measure annual biomass productivity, and the effects of climatic variability and grazing on biomass production, and has been performed on Antelope Creek Ranch since 1988. Cassils field has cages only, and no permanent enclosure. Field 4 has an additional 6 cages in the northeast corner, as productivity is greatly varied in this field. For this year, however, only the 10 cages around the main enclosure were clipped.

Range Inventory Methods

Range inventory and rangeland health assessment training were provided by AEP and MULTISAR in early June, and range inventory began on June 16, 2017. Tanner Broadbent, Ross Adams, and Amanda J Miller provided guidance in the range inventory process during visits in June and July.

The range inventory protocol used at Antelope Creek Ranch (ACR) differs from the standard inventory protocol used by AEP contractors in

that all polygons are assessed for plant community composition and range health using detailed transects of 10 microplots along a 50 meter transect, and visual and reconnaissance assessments are discouraged. By contrast, AEP contractors make use of reconnaissance and visual plots in addition to detailed transects of 15 microplots along a 30 metre transect to map plant communities of the inventory area. The AEP Range Inventory Manual is updated annually, and can be consulted for a more detailed description of the AEP inventory taking process.
At Antelope Creek Ranch, each native grassland field has been assigned a series of map units, or polygons, in decile form, based on the Grassland Vegetation Inventory (GVI) and on aerial photos taken in 2012 and 2013. The abbreviations “Lo”, “BlO”, “Sb” and others indicate the ecological range site type that can be inferred to exist below-ground based on soil mapping and topographic interpretation of the landbase. If a polygon is labelled 60Lo-35BlO-05Sb, the polygon would be composed of 60% Loamy, 35% Blowout, and 5% Sub-irrigated range sites, each of which may express distinct plant communities. The task of the ACR summer range technician is to locate the Loamy, Blowout, and Sub-irrigated ecosites, identify each plant community within them, and map the boundaries between these communities. The technician must then report on whether the decile percentages for the GVI polygon ecosites are accurate, based on their observations in the field. The goal of the research at ACR is therefore to confirm or advise changes to the general GVI polygons, as well as to further subdivide them into their component plant communities, and to map out the boundaries of those communities. Each community has a different Ecologically Sustainable Stocking Rate (ESSR), measured in Animal Unit Months per acre (AUM/ac), which indicates the maximum forage consumption per acre that a plant community can support, while still maintaining proper ecological function. When this number is applied to the total area of a polygon, and adjusted for the health of that polygon, it is termed that polygon’s carrying capacity, and can be used by the range manager to make decisions about the unit under management. It is important to ground-truth the GVI polygons in this way to ensure that the plant communities are labelled correctly, and in the correct proportions, so

that the range manager can more precisely plan the grazing of their property and maintain its health. Native fields 2, 3, and Cassils field have been inventoried in previous summers by technicians Ross Adams and Mica Pettibone. This report focuses on the inventory of native field 4.

Plant community boundaries were identified first and drawn onto the GVI polygon map. This identification was completed visually, while consulting the Government of Alberta's Range Plant Communities and Range Health Assessment Guidelines for the Dry Mixedgrass Natural Subregion of Alberta. A 50m transect was then taken of a representative area inside each polygon, to identify the plant community to which it belonged. Transects were run horizontally across slopes, and not down them, and if they were documenting a Blowout ecosite, were placed in such a way as to capture both the high and low areas of the Blowouts. A 20x50cm Daubenmire frame was placed along the transect at 5m intervals, 10 frames total, and the vegetation inside was documented on a 2016 MF5 Range Inventory Form. There was a one-week period during which the Daubenmire frame was lost, and the dimensions were approximated by using a 50cm x 50m frame, and delineating the 20cm mark with a piece of baling twine.

Once the plant community and reference plant community (RPC) were identified for a polygon, the health of that polygon was assessed by comparing it to the RPC and filling out the Grassland Range Health Assessment Score Sheet. In many cases the plant community identified in the transect was the RPC, but in some cases it was identified as a community successional to an RPC, due to changes in precipitation, disturbance, overgrazing, or soil development. Disturbances and linear features were identified next, and indicated on the map. This included patches of Crested Wheat Grass (CWG, or *Agropyron pectiniforme*) or other agronomic plant species near culverts and dam walls, well sites, pipelines, roads and trails, canals and dry ditches. Agronomic disturbances greater than 1 ha were mapped and treated as polygons – with transects and health assessments – and those under 1 ha were given a range health assessment, and included as a decile within the larger polygon in which they were located. Nearly all of the disturbances

greater than 1 ha were patches of CWG that had been mapped previously. Because these disturbances were being managed in the same fashion as the surrounding native grasses, the native grassland health form was used to assess the health of the CWG patches. Pipelines were treated in a similar fashion, and were assessed using native range health assessments. Man-made, linear features such as fences, roads, truck trails visible on the GVI map, dry ditches and canals were all treated as polygon boundaries. They did not receive transects or range health assessments because they are abrupt, man-made transitions between sites and too small and narrow to be assessed and mapped as separate units. If, however, the agronomic plant species had spread beyond these linear features, into the surrounding native grassland, these were mapped and either treated as polygons or deciled out within the larger polygon to which they belonged, depending on the size of the disturbance – greater or less than 1 ha, respectively.

In the instance where a polygon was split by a linear feature, and the plant community was determined by visual assessment to be the same on both sides, the first polygon received a transect and a range health assessment, and the second received a range health assessment only. This was done because the first transect was assumed to be representative of the plant community of both polygons, while the range health of each could have varied as a result of the disturbance.

Wetlands were assessed by first observing the bands of vegetation radiating outwards from the water's edge, and documenting the three most prominent species in each band, as well as the approximate percentage of the riparian area was made up by each band. The percentage of bare ground, extent of pugging and animal impact, and percentage of invasive species was also estimated for each band, and used to determine the overall health of the riparian area as follows:

- • Healthy: < 1% invasive species, no bare ground, no pugging.
- • Healthy with Problems: < 15% invasive species, < 15% bare ground, visible pugging.
- • Unhealthy: > 15% invasive species and/or > 15% bare ground, visible pugging.

Because ACR wetlands are man-made, typical riparian health assessments were not deemed necessary. “Bare ground” was classified as visible soil found between vegetation that would still have been bare if the water was at its usual level, not just ground left bare by receding water.

Numbering

Polygons were numbered in a three-part system. The first number is the field number, 4. The second number corresponds to the original GVI polygon, numbered arbitrarily by myself, 1-9. While the original map only had 7 non-riparian, upland polygons, two additional ones were created by the author for ease of identification: the CWG patches were treated as their own polygon, polygon 1, and largest polygon (polygon 2) was split in two along the powerlines, creating polygons 2 and 8. The third and final number corresponds to the polygon’s range health assessment, and usually increases chronologically, from 1 through to 44. Polygon 4.3.1 therefore corresponds to the first transect and range health assessment conducted in polygon 3 of field 4. Transects share the same numbering system, so that they may be quickly linked to their polygon.

Results and Discussion

This summer’s focus was on native field 4, an 1178 acre field on the south-west corner of the property. It borders with one canal, two gravel roads (one running through field 3, and one adjacent to the canal), native fields 1 and 3, and one neighbouring farm to the south. Field 4 is underlain by soil of the Hemaruka soil series (HUK), with a corner in the northeast belonging to the Ronalaine series (ROL). Within the pasture, there are 11 man-made wetlands, all of which are linked by canals, 6 well sites, two two-track quad trails, a series of pipelines and dry ditches, 16 range cages (one group of 10, and one of 6), and one enclosure used to measure biomass productivity. The man-made wetlands were installed by Ducks Unlimited in the 1980s, and two were dry at the time of inventory collection. Salting locations vary, but are generally placed on the western side of the paddock, where the cattle are less inclined to graze on their own due to its distance from main gates and water sources.

The GVI map to be ground-truthed showed 7 upland polygons, and 11 Lentic riparian areas. Of the upland GVI polygons, the majority were classified in GVI as primarily loamy (Lo). However, after ground-truthing and breaking up these 7 GVI polygons into 66 smaller, plant community polygons, 75% of the area corresponded with blowout (BlO) range sites, and plant communities DMGA15, DMGA16, DMGA34, DMGA35, and DMGA39 were common (**Table 2** and **Figure 2**). Only 8% of sites were found to be loamy, and 12% were sub-irrigated (Sb) – a combination of 6% overflow (Ov) and 6% saline lowland (SL).
Most blowout sites have excellent ground cover of moss and lichen, and have uncommonly high amounts of *Poa pratensis* present, increasing their biomass productivity to above-average levels. The western-most sites also have small amounts of CWG present, and areas near dry ditches have some patches of weedy species, such as thistle (*Sonchus arvensis* and *Cirsium arvense*). The weedy species and CWG are explained by nearby development, but the amount of *Poa pratensis* was unexpected. It is likely due to a combination of factors: the increased precipitation the Brooks area has received over the last 10 years, causing *Poa pratensis* to replace *Poa sandbergii* in the DMGA39 plant communities, and the undergrazing of areas in field 4 west of the wetlands, allowing the *Poa pratensis* to go to seed. **Figure 3** is a detailed comparison of the precipitation levels in Brooks from the years 1996-2006, to the years 2007-2017, and illustrates this 10 year wet cycle. Antelope Creek Ranch is approximately 16km away from Brooks, and some variation is possible. Historically, cattle have favoured the eastern side of the paddock because it is close to the gate through which they enter the field, and management has observed that they spend much of their time there, only moving west when the eastern side has become over-grazed. As the wetlands are the herd's main water source, and these lie in the centre of the polygon (**Fig. 1**), cattle require incentive to move beyond them. Consequently, management has been placing salt blocks in the west side of the paddock. However, the areas in the centre and east of the paddock, between the wetlands and the main gate, are still the most heavily utilized, and are where nearly all of the healthy with problems (HWP) scores were observed (**Fig. 4**). The west side of field 4

also has the least amount of human interference – by well-sites, roads to well sites, pipelines, or man-made wetlands – and received consistently healthy ratings. Additionally, of the 75% of field 4 covered by blowout range sites, over 49% are late-stage blowouts DMGA15, 16, and 35, indicating that these blowouts are beginning to break down and becoming successional to loamy sites. The increased plant biomass caused by the 10 year wet cycle, along with the late seral stage of the majority of field 4's blowouts, could explain why they were mistaken as loamy sites when the aerial photo was analysed. This serves as an example of the importance of ground-truthing.

The overflow and saline lowland areas were accurately reflected by the initial GVI map. Most overflow sites received HWP or unhealthy ratings due to the presence of weedy species, or a large amount of bare ground and pugging in the heavily grazed sites in the east of the pasture. Nearly all of the saline lowland sites received unhealthy ratings (**Fig. 4**). This can also be largely attributed to the 10 year wet cycle which has likely kept these areas submerged for periods of time, possibly bringing sub-surface salts to the root zone of plants, affecting the plant community composition and increasing bare ground.

As **Table 2** and **Figure 2** illustrate, the range site type with the smallest land percentage is loamy. Of those sites, however, almost all received healthy ratings. As **Figure 4** illustrates, the only sites that were rated healthy with problems are those closest to the main gate and road within the paddock, as they are the most highly disturbed by development and traffic, and the areas most favoured by cattle, and therefore the most susceptible to overgrazing.

The most highly grazed areas in the east seem to have the lowest cover of CWG. This is likely because cattle are introduced to the paddock when CWG is vegetative and palatable, and the eastern areas nearest the main gate are the easiest to access. In the west, however, CWG stands may be wolfy and unpalatable by the time cattle find them, and are consequently left standing and able to set seed.

Wildlife use of the paddock is high. A wide variety of birds were frequently spotted in the wetlands, including pelicans and marbled godwits. Coyotes were spotted twice and heard frequently, and prong-

horn antelope were spotted twice: on one occasion, I surprised a coyote stalking a prong-horn buck, and on another I saw a mother and her fawn. The fawn ran under the
fence into paddock 3, and the mother attempted to lure me away from it. I later found the fawn curled up in the grass, waiting for its mother.
Of the 66 polygons, 28 were given healthy ratings, 25 healthy with problems, and 12 unhealthy; the majority of healthy ratings are located on the west side of field 4 (**Fig. 4**). Most disturbance-related agronomic species appeared to be restricted to the disturbance itself: there was very little evidence of spreading of pipeline reclamation species like *Bromus inermis* and *Festuca spp.*, though there appeared to be some wind-borne spread of CWG eastward from the west, and southward from the north. No polygons received a perfect health score, however, due to the extent of *Poa pratensis* across the pasture.

Concluding Remarks

The most pressing issues for management would be the spread of thistles and other weedy species from damp lowlands adjacent to disturbances, the wind-borne spread of CWG, and the disproportionate grazing of the eastern side of the paddock. Health scores were mainly lower due to agronomic species (*Poa pratensis*) resulting from the increased water table from the nearby industrial disturbance, the 10 year wet cycle and water development in the area. It is unlikely that grazing management was the factor in decreasing range health. Continuing salting on the west side of the pasture is likely the best management option, and skim grazing *Poa pratensis* in the spring may help with reducing its vigour in the pasture. It is more likely that range health will increase as agronomics and weedy species around lentic areas will decrease on their own, as the climate becomes drier. Identifying polygon boundaries was the most time-consuming aspect of the inventory process, especially where the changes were gradual. The hands-on training I received in identifying these boundaries on Antelope Creek Ranch, specifically, was especially helpful. The information presented here is meant as a visual representation of the 2017 season. The inventory process should be repeated every 5-10 years, to monitor the effects of precipitation trends

and groundwater levels on plant community composition and rangeland health.

Tables and Figures

Table 1. Plant communities present in ACHDA Field 4, along with their respective areas, and the percent each makes up of the total pasture area of Field 4.

Plant Community	**Area (ac)**	**Area (ha)**	**% Total Pasture Area**
Cond 1 - Desc Cae, Hord Jub, Poa/Rume Cri (Ov)	41.5	16.8	3.4
Cond 2 - Festuca, Brom Ine, Stip Vir (BlO)	2.2	0.9	0.2
Cond 3 - Pucc Nut, Hord Jub, Poa/Sali Rub (SL)	61.1	24.7	5.0
Cond 4 - Stip Vir, Festuca (Lo)	8.8	3.6	0.7
DMGA15	315.9	127.9	26.0
DMGA16	262.0	106.0	21.5
DMGA2	44.1	17.8	3.6
DMGA3	34.6	14.0	2.8

DMGA34	14.9	6.0	1.2
DMGA35	76.5	31.0	6.3
DMGA39	235.9	95.5	19.4
DMGA44	8.2	3.3	0.7
DMGA51	18.4	7.4	1.5
DMGA60	2.66	1.0	0.2
DMGB1	19.7	8.0	1.6
DMGB2	6.5	2.6	0.5
DMGB7	1.0	0.4	0.1
DMGC3	3.7	1.5	0.3
Industrial Disturbance	2.7	1.1	0.2
Wetland/Lentic	56.8	23.0	4.7