Ag Pilots Project
Beefing Up the Palouse-An Alternative to the Conservation Reserve Program (CRP)
Final Report

Overview of project

The Beefing Up the Palouse (BUP) pilot project is exploring strategies for converting land coming out of the Conservation Reserve Program (CRP) to a holistically managed forage resource using planned cattle grazing as the principle tool to move towards sustainability. Sustainability is defined as those practices that are economically viable, environmentally sound and socially responsible.

As of 2007, the state of Washington had 1,557,212 acres enrolled in the CRP. The site of this project is located on G & L Farms in Adams County near Benge, Washington. This 6,000-acre farm includes 5,000 acres that are currently enrolled in the CRP. Adams County has one of the largest CRP enrollments nationwide, at over 214,000 acres, and a significant portion of this acreage is nearing the contract end in the next two years (2010-2011). USDA efforts to scale back total enrolled CRP acreage while focusing new offers on smaller contracts through Environmental Priority practices, as required by the 2008 Farm Bill, will likely lead to a significantly reduced CRP presence in Adams County and throughout central Washington as early as 2010.

What is going to happen to the 39 million acres of land currently enrolled in the CRP in the U.S., including the 1.5 million acres in the state of Washington when the contracts expire? Sustainable alternatives to prevent these lands from returning to conventional tillage programs (e.g., winter wheat/fallow in Adams County) need to be characterized and replicated. To be viable these alternatives should be able to produce revenue equal to, or greater than the CRP contract payments (i.e., $50-55 per acre) while concurrently enhancing ecosystem processes and services.

Due to contract restrictions and payment reductions, no land enrolled in the CRP program was grazed in this study. Land adjacent to lands in the CRP with similar topography and soil type and planted to grass/legume pasture was used to duplicate the effects of grazing and recovery periods. Some CRP land was used to test different fertilizer effects and alfalfa inter-seeding techniques. The 1,000-acres of non-CRP land (500 acres of which are in grass/legume pasture) plus another 300+ acres of land in the CRP were Certified Organic in May 2008.

Affiliated Partners/key personnel and their roles

Donald D. Nelson, WSU Extension Beef Specialist and Project Director: Technical advisor on cattle management, planned grazing and holistic decision-making

Gregg Beckley, G & L Farms: Owner of project site farm and co-project manager

Maurice Robinette, Lazy R Ranch, cow-calf producer and eastern Washington representative of the Washington Sustainable Food and Farming Network: Co-project manager and technical advisor on cattle management, planned grazing, monitoring and holistic decision-making

Dick Coon, Bar U Ranch, cow-calf producer/stocker operator and President, Washington Cattlemen's Association: Acquire and manage cattle, plan and implement planned grazing, fence construction and water development

Shannon Neibergs, WSU Extension Economist: Develop and design data collection and evaluation plans; develop the project's feasibility study and business plan and assist in project implementation

Steve Van Vleet, WSU Whitman County Extension Agent: Evaluation of grass and legume varieties and seeding mixtures, inter-seeding strategies and BIOAg Tour coordinator

Lynne Carpenter-Boggs, WSU CSANR Biologically Intensive Organic Agriculture Program (BIOAg) Coordinator: Coordination of outreach activities through WSU BIOAg program and management of soil analyses GIS mapping by graduate and undergraduate students

Joel Huesby, Thundering Hooves, LLC: Cooperative grazing and production, processing and marketing of pasture-finished grass-fed beef

Anne Schwartz, President, Washington Tilth Producers: Advisory and outreach

Tom Lamar, Executive Director, Palouse-Clearwater Environmental Institute: Advisory and outreach

Trudy Bialic, Director of Public Affairs, PCC Natural Markets: Advisory and outreach

Timeline of project throughout the Ag Pilots funding (Dec. 1, 2007-June 30, 2009)

December 12, 2007: Ag Pilots Team meeting, G & L Farms

January 22, 2008: Ag Pilots Team conference call

January 24, 2008: Ag Pilots Team met with Adams County Farm Service Agency Committee to update them on our project and to seek approval to graze a section of CRP land on G & L Farms without a reduction in payment, Ritzville, WA

February 29, 2008: Ag Pilots Team conference call

March 5, 2008: Collected forage samples from CRP nitrogen fertilization demonstration area and control plots

April 4, 2008: Collected monitoring data from Land EKG transect T-202 in Pasture 355W

April 17, 2008: Ag Pilots Team meeting, G & L Farms

April 17, 2008: Collected monitoring data from Land EKG transects T-201 in Pasture 153 and T-203 in Pasture 355W-SW

Apr. 19- July 29, 2008: Grazed 196 head of cattle owned by Joel Huesby and Mike Para on a contract gain basis @ $34/lb. gain

April 25, 2008: Grass/legume variety comparison demonstration data collection, G & L Farms

May 8, 2008: Collected monitoring data from Land EKG transect T-204 in Pasture 355W-NW

May 12, 2008: Aerially applied 50 lbs. of urea to the south grass/legume variety demonstration plot and 100 lbs. to the north plot.

May 14, 2008: Ag Pilots Team planning conference call

May 28, 2008: BIOAg Tour with a stop at G & L Farms to look at cattle and discuss Beefing Up the Palouse project

June 3, 2008: Grass/legume variety comparison data collection, G & L Farms

June 5, 2008: Ag Pilots Team meeting, G & L Farms

June 10, 2008: Ag Pilots Team met with Ruckelshaus Center staff, Pullman, WA

July 17, 2008: Ag Pilots Team meeting, G & L Farms

July 24, 2008: Grass/legume variety comparison data collection, G & L Farms

August 8, 2008: Grass/legume variety comparison and inter-seeding data collection, G & L Farms

August 12, 2008: Grass/legume variety comparison and inter-seeding data collection, G & L Farms

September 17, 2008: Collected monitoring data from Land EKG transects T-202 in Pasture 355W and T-204in Pasture 355W-NW

September 30, 2008: Ag Pilots Team planning conference call

September 30, 2008: Collected monitoring data from Land EKG transects T-201 in Pasture 153 and T-203 in Pasture 355W-SW

October 30, 2008: Ag Pilots Team meeting at G & L Farms

Nov. 25 & 26, 2008: Soil samples taken at the four Land EKG transects to determine soil organic and inorganic carbon, soil bulk density and moisture content, G & L Farms

March, 2009: Took soil samples from a CRP stand and the fertilized CRP plots to determine soil organic carbon, G & L Farms.

March 13, 2009: Ag Pilots Team meeting, G & L Farms

March 17, 2009: Tilled and reseeded 25 different combinations of cool season grasses and grass/legume mixes in the grass/legume variety demonstration, G & L Farms

March 19, 2009: Seeding grass/legume variety comparison demonstration plots, G & L Farms

March 28, 2009: Took vegetation biomass and soil samples within the nitrogen (urea) fertilized grass/legume variety demonstration and control plots, G & L Farms

April 10, 2009: Ag Pilots Team meeting to work on USDA/CSREES/AFRI Managed Ecosystems grant proposal to continue and expand Ag Pilots project, WSU Pullman.

April 14, 2009: Collected monitoring data from Land EKG transects T-202 in Pasture 355W, T-203 in Pasture 355W-SW and T-204 in Pasture 355W-NW

April 13 & 15, 2009: 304 hd. of yearling cattle owned by Para Cattle Company, Othello, (681 lbs. avg. wt.) were delivered to G & L Farms to be grazed on a contract gain basis of $.34/lb. gain.

April 28, 2009: Ag Pilots Team meeting to develop the experimental design, determine plot sizes, locations, etc. for the AFRI Managed Ecosystems project proposal, G & L Farms

May 15, 2009: Grass/legume variety demonstration data collection, G & L Farms

May 19-20, 2009: How to Survive and Be Profitable in the Beef Business-Planned Grazing and Grass-fed Beef Production Conference co-sponsored by the Ag Pilots-Beefing Up the Palouse project and the Extension

Grass-fed Beef Production/Pasture Management Team, Richland, WA (64 attendees)

May 21, 2009: Ag Pilots Team met with Terry Gompert from the University of Nebraska to discuss planned ultra high stock density grazing strategy for proposed AFRI project, G & L Farms

June 2, 2009: Submitted USDA/CSREES/AFRI Managed Ecosystems grant proposal

June 12, 2009: Collected monitoring data from Land EKG transect T-201 in Pasture 153

June 14, 2009: BIOAg Tour preparation and data evaluation, G & L Farms

June 15, 2009: BIOAg Tour stopped at G & L Farms and got an update on the Beefing Up the Palouse Project.

June 18, 2009: Maurice Robinette presented Beefing Up the Palouse project report to the Ag Pilots Oversight Committee, Seattle, WA

June 23, 2009: Maurice Robinette gave a presentation on the Beefing Up the Palouse project to a group of 30 people as part of a Sustainability Lecture Series, Dayton, WA

June 29, 2009: Steve Van Vleet showcased the Beefing Up the Palouse project to a visiting Iraqi delegation, G & L Farms

June 30, 2009: Ag Pilots funding cycle ends

July 23, 2009: 294 hd. of cattle on contract gain basis shipped off of G & L Farms

August 7, 2009: Deadline for submission of final Ag Pilots report

<u>How the project has met, or has not met, each of the goals outlined at the beginning of the Ag Pilots funding?</u>

Goal #1: Assess the economic feasibility of CRP conversion to a grass-fed natural or organic beef production system.

During the 2008-grazing season (April-July) we grazed 112 head of 2-year old cattle that were being grass-finished for Joel Huesby (Thundering Hooves, Touchet, WA), a natural pasture-finished beef producer, plus 84 head of yearling steers owned by Mike Para (Para Cattle Co., Othello, WA) on a $.34/.lb. gain basis. During the 2009 grazing season (April-July), we grazed 304 head of yearling steers for Mike Para on a contract $.34/lb. gain basis.

We were unable to get a research exemption to graze CRP without payment reduction from Adams County Farm Services Agency.

Published a Farm Business Management Report (EM010) entitled, 2008 Estimated Costs and Returns for a 150-head Cow-calf to Grass-finished Beef Production System in the Channeled Scablands Range Area of East-central Washington authored by J. Shannon Neibergs and Donald D. Nelson.

An economic model to evaluate forage availability relative to cow nutrition needs and altering the start of the calving season is currently being programmed. This model will use forage and economic information generated by this Ag. Pilots Project. The model contributes to the economic feasibility goal, by examining differing production management strategies to best utilize the project area's resources and to provide an analysis tool to evaluate an operation's unique resource structure. The model is a component of the overall feasibility analysis of utilizing CRP lands as a forage resource. Although this model and report will not be completed by this project's termination date, we look forward to completing the analysis in late Fall 2009 and crediting the Ag. Pilots Project for support. (Shannon Neibergs)

Goal #2: Assess and demonstrate agronomic strategies, including inter-seeding alfalfa for enhancing degraded CRP grass stands into productive pasture in the 12-14 inch rainfall areas of Washington State. (Steve Van Vleet)

Vegetation goals: Evaluate the establishment of legumes into a monoculture of established CRP grass stands. Another goal was to determine the best varieties (grass and legumes) to plant in a 12-14 inch rainfall ecosystem and the establishment potential of the forage species in a CRP system when transitioning from a decadent CRP monoculture of grass to a grass-fed beef forage based system. For results refer to discussion and Tables I and II on pages 12-14.

Goal #3: Monitor the biological effects of planned grazing using the Land EKG rangeland monitoring system. (Maurice Robinette)

Four permanent Land EKG monitoring transects sites have been established. All of them were read before and after grazing during year one. Three of these transects were read before grazing in year-2 and the fourth one was read after one grazing in year two. The intent is to do one more post-grazing reading on all four sites in 2009 (cattle were shipped off of G & L Farms on July 23). No comparisons had been made to determine grazing impacts due to the small amount of data collected in just two years (i.e., comparative at the same site). If the AFRI Managed Ecosystems proposal is funded, we will be able to collect additional data for four more years. It appears that there was nearly complete re-growth at every site post-grazing. The pre-graze readings probably occurred before maximum growth had occurred.

Goal #4: Assess the replicability of this project by describing the place-dependent factors likely to affect feasibility by mapping these factors utilizing known parameters, as well as Geographic Information Systems (GIS). (Lynne Carpenter-Boggs)

The map below shows the estimated potential productivity across the Palouse River watershed based on NRCS data. These estimates take into account soil texture, pH, organic matter, depth to bedrock, and precipitation. The location of G & L Farms is indicated, and like 40% of the Palouse it is estimated to support 1-2 Animal Unit Months (AUMs) per acre. Toward the center 30% of the Palouse precipitation increases and grazing potential greatly improves to 2.1-5.1 AUMs, largely depending on very localized soil conditions, slopes, and aspect. In portions of this area too, pasture improvement has been considered more worthwhile. On the eastern 30% there is potential for up to 5.5 AUMs according to NRCS assumptions.

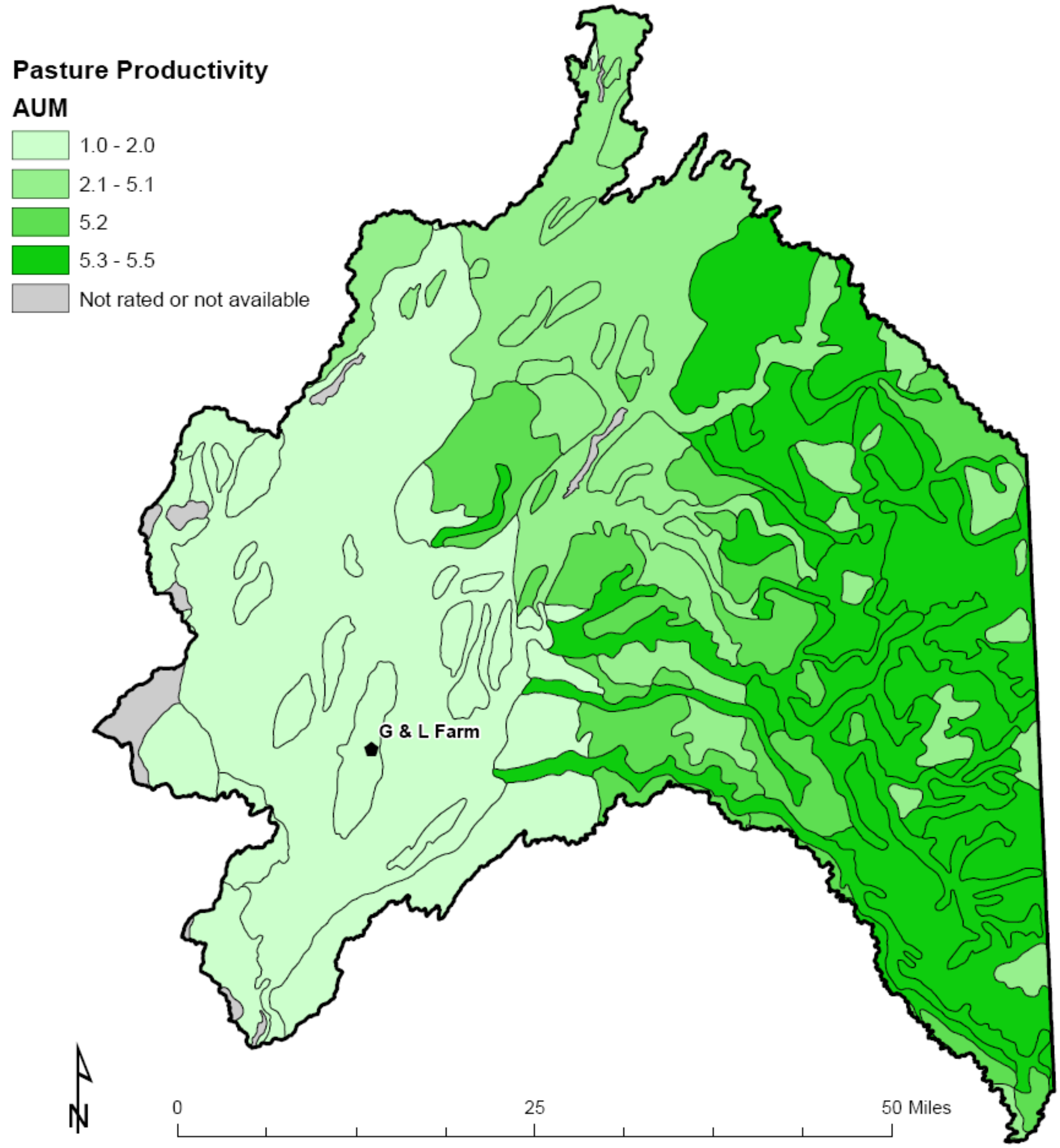
This map is based on soil and precipitation (natural resource supplies and limitations), and does not take into account other significant limitations of water for cattle and knowledge. As for water, at G & L Farms several existing wells are accessible and water development to allow grazing was relatively minor. In locations where wells and/or ponds or other major structures are needed, this will dramatically increase base infrastructure development costs in order to take advantage of the grazing potential.

In the first year of Beefing Up the Palouse project, 1.7 AUMs were supported as well as some harvested hay that provided the landowner income similar to the CRP payment. It also supported a part-time cattle manager. In the second year, production increased to approximately 2.5 AUMs largely due to more intensive grazing management. This is 75% more than the average 1.5 AUMs estimated by NRCS, made possible by pasture improvement and planned grazing. Producers considering replicating this production shift should be strongly encouraged to improve the plant biomass and protein production through seeding and fertilization prior to intensive grazing for profit. Knowledge of or access to skills in intensive planned grazing was a significant factor in the success and profitability of this project. Expanded education in planned grazing will be necessary to support mass replication of the success seen at G & L Farms.

Payments for CRP contracts are approximately $50-$80 per acre per year across the Palouse, being higher in the eastern high rainfall zone. The lower payment common near Benge was replaced even in the first year of the Beefing Up the Palouse, and increased in year 2. The far greater (3-4 times) potential productivity (or even more with intensive planned grazing) in the eastern Palouse could provide returns greater than the current CRP payment.

In summary, this agricultural model is definitely replicable in the Palouse. Availability of water and knowledge/skill in planned grazing will determine the profit level, but the potential is good to provide returns greater than the current CRP payment rate.

Pasture productivity on non-irrigated soil mapunits in the Palouse WRIA



Goal #5: Demonstrate that fundamental underlying principles and pilot results can be applied in different environments and situations using adaptive management.

The May 19-20 conference, How to Survive and Be Profitable in the Beef Business-Planned Grazing and Grass-fed Beef Production, brought together 64 cow-calf and grass fed producers and presenters from Washington, Idaho, Oregon, Montana, Colorado and Nebraska. Each producer represented a unique resource base. The project's principles and management recommendations had applications to each producer. Responses on the conference evaluation questionnaire indicated a range of actionable items they were going to evaluate or implement. Evaluating a ranch's carrying capacity, implementing planned grazing and cow breed and frame size were commonly identified as management issues the producers were going to evaluate. Monitoring ecosystem processes and quantifying forage production was another item that was identified as a management priority.

<u>Project successes and challenges</u>

Infrastructure:

One challenge this project faced was the lack of fencing, corrals, loading facilities and water delivery infrastructure. Over the years, as farms became more specialized and no longer raised livestock, the fences were removed to facilitate farming practices. Fencing and water distribution systems are expensive to construct and maintain and need to be amortized over a number of years. Today, one of the most cost effective fencing methods is the use of high tensile electric fences (both permanent and temporary) and battery or solar powered energizers. High stock density grazing requires the availability of larger volumes of water than conventional low stock density systems. A combination of buried and aboveground pipe, pumping systems, portable water storage tanks and truck mounted water tanks were used in this project. A multi-year agreement between the landowner and the cattle grazier to accomplish infrastructure development has been developed.

Research exemption to graze CRP:

Another challenge we encountered was several unsuccessful attempts to obtain a research exemption from the Farm Service Agency to graze land currently under CRP contract without incurring the 25% payment reduction and to not be restricted by the prohibition of grazing during the primary bird nesting period from April to August.

An additional challenge to-date has been the lack of success using a variety of methods to inter-seed forbs and legumes in existing CRP stands. This was constrained by regulations that prevented the project from directly grazing CRP stands. The hypothesis is to graze the CRP stand to remove forage growth and to use the cattle's hoof action to break up the existing thatch and then broadcast a desired seed mix and use intensive grazing to incorporate the seed into the soil layer. This grazing strategy may be the most sustainable and successful method to establish a more desirable forage mix into existing CRP stands. However, we could not test this because of CRP grazing restrictions that were beyond the projects control.

Land EKG Monitoring:

Had some problems getting all of the rangeland monitoring data together, mostly because of the volume of data and the amount of it and how dispersed over time the monitoring activities were. Need a better system of keeping everything together. Better use of the Land EKG Datastore website and prompt data entry in the future will help alleviate this problem.

Where is the project heading?

Properly evaluating ecosystem changes in long-term programs such as transitioning CRP land to a grass-fed beef system takes multiple years of research analysis to yield reliable results. Nevertheless, through this project we have strengthened partnerships between agencies and groups with differing viewpoints, were able to see the economic benefits of converting to a grass-fed beef based system instead of a government based subsidy program, and identified some of the environmental benefits of this system compared to a fallow/wheat farm-based system.

This project has produced additional unanswered questions such as: What is the impact of different grazing strategies on the ecosystem processes and the associated ecosystem services? What is the magnitude of these impacts? How long does it take for these impacts to appear? More specifically, what is the impact on carbon sequestration? What are the effects of these impacts on productivity (i.e., biomass production and cattle gains)? We want to continue and expand this project to get answers to these questions. To this end, the Ag Pilots Team identified the USDA/CSREES Agriculture and Food Research Initiative's (AFRI) Managed Ecosystem program as a potential source of funding

On June 2, 2009, we submitted a proposal for $487,365 to fund a 4-year project entitled Planned Cattle Grazing Strategies on Former CRP Land to Enhance Ecosystem Services in a Multi-functional Agricultural Production System to the AFRI program. Proposals will be reviewed at the end of August 2009 with funding of approved projects projected to be available January 2010.

Synopsis of results of the pilot study/project:

Results from 2008 Grazing Season (Dick Coon)

Number of cattle grazed:

Huesby: 112 hd.- avg. in-wt. 907 lbs. (charged @$.40/lb. gain)
Para: 84 hd.- avg. in-wt. 593 lbs. (charged @ $.34/lb. gain)
Total 196 hd.- avg. in-wt. 778 lbs.

Acres grazed: 393
Acres hayed: 107
Total acres: 500
Grazing period: April 19 through July 29, 2008 (102 days)
Average daily gain: 2.42 lbs./hd./day
Total gain: 42,062 lbs.
Revenue from gain: $15,885.64
Value of hay harvested: $3,159.00
Total gross revenue: $19,044.64
Gross revenue/acre: $48.46

Results from 2009 Grazing Season (Dick Coon)

Number of steers delivered: 304 hd.
Average in-weight: 681 lbs./hd.
Grazing period: April 13 to July 23, 2009 (101 days)

Death loss: 10 hd. (8-alfalfa bloat, 1-buller and 1-bovine respiratory disease)
Total gain: 61,097 lbs.
Charge/lb. gain: $.34
Average daily gain: 2.33 lbs./hd./day
Acres grazed: 500
Total gross revenue: $20,772.98
Gross revenue/acre: $41.55
Less ½ cost of Bloat-guard blocks: $1,793.22
Total net revenue: $18,979.76
Net revenue/acre: $37.96

Note: Management suggestions regarding future bloat prevention in paddocks that contain a high percentage of alfalfa (50%+): (1) do not graze until alfalfa is over 10% bloom (Anibal Pordomingo recommends at least 50% bloom), (2) use of Bloat-guard blocks, or (3) swath and wilt alfalfa before grazing.

Grass/legume Variety Evaluation Plots (Steve Van Vleet)
On March 21, 2006, a research study was developed to evaluate grass and legume varieties that would establish and persist in a 12-14 inch rainfall zone (Table I, page 12). The study area was seeded using a Carter plot drill. The forages planted consisted of: one each of brassica, plantain and forage Kochia; eight species of legumes; ten species of warm-season grasses; and twenty-two species of cool-season grasses. In each year 2007-09, forage species that did not establish or had a poor stand were tilled and seeded to additional forage species. In early April 2007, nine different species of warm-season grass, one cool-season grass, one legume and seven grass/legume mixes were seeded in areas where other species had died out. In March 2008, four cool-season grasses, two experimental legume varieties and three perennial mixes were seeded in the 2007 plots that had low species survival. None of the species seeded in 2008 established, and the plots were tilled and reseeded with twenty-five different combinations of cool-season grasses and grass/legume mixes on March 17, 2009. Frequent rains occurred just after seeding and the soil crusted over, inhibiting emergence. No establishment occurred in the 2009 plots and the plots were tilled for continuing research. During the term of the research study, species establishment and stand were evaluated. The varieties that effectively established, persisted and could be recommended for seeding in a 12-14 inch precipitation zone are listed in Table II, page 14.

In the early spring of 2007, demonstration plots were established to determine if legume species could be inter-seeded into established CRP grass stands. Several management practices were used to improve legume establishment. The practices included: no disturbance, burning, burning and skew treading, mowing, mowing and skew treading and grazing. After each practice the area was seeded using an International 510 disc drill (7 inch spacing). Alfalfa seedlings started emerged in all seeded areas under all practices; however most of the seedlings soon perished. Less than 1% of the alfalfa established in each seeded area under all management practices. The extremely poor establishment and survival rate of the seedlings was attributed to the competiveness of the established grasses and their ability to utilize the available moisture. Also, with some practices the vegetative thatch layer was so thick that many seeds did not penetrate the thatch layer and never came in contact with the soil, rendering germination impossible.

Another small study was conducted to determine establishment of alfalfa after intensively grazing a nine-acre field of heavy vegetative weed and litter cover. The small pasture used in the study consisted of annual and perennial weeds (67%), crested wheatgrass (30%) and alfalfa (less than 5% in entire field). After 75% of the vegetation was removed from the study area by intensive grazing; and prior to removal of the livestock, alfalfa was aerially seeded in February. Evaluations were collected to determine if alfalfa establishment would be greater under this intensive grazing system. The alfalfa establishment in this site was significantly greater and increased to 28% in the 9-acre pasture. Further replicated research is needed to determine if alternative grazing practices and the inter-seeding of legume species can be viable for increasing the diversity and ecosystem health in thatch-bound CRP.

A fertilizer demonstration area was developed in 2008 to determine the effects of fertilizer on soil nitrate levels and vegetation biomass production in decadent CRP grass stands. Overall the soil nitrogen in the grass stands under long-term CRP contract on G & L farms were at the most minimal level. Two one half acre plots were marked out (South plot, North plot). Three forage samples were collected on March 5, 2008 within each plot and from two check areas away from the plots. On May 12, 2008, fifty pounds of urea was aerially applied to the south plot and one hundred pounds to the north plot. Vegetation biomass samples and soil samples were taken March 28, 2009 within the fertilized plots and from the check areas. Soil samples were also taken at one foot intervals up to four feet in depth and sent to Northwest Agriculture Consultants for analysis. After evaluating the soil analysis data it was determined the fertilizer applications had no effect on the soil nitrogen from 1-4 feet in depth. Also, there was no significant difference in forage biomass sample weight collected at the same stage of development from 2008 to 2009.

Table I

Forages 2006	Forages 2007	Forages 2008	Forages 2009
Alfalfa (Ladak)	Alfalfa (Rugged)	OG0203 orchardgrass @ 4 lb/ac	Big bluegrass/Seco OG @ 4 lb/ac
Alfalfa (Nomad)	Big Bluestem (Roundtree)	Seco orchardgrass @ 4 lb/ac	Secar bluebunch wheatgrass/ Seco OG @ 4 lb/ac
Alfalfa (Rambler)	Indiangrass (native)	Pubescent wheatgrass (Luna) @ 10 lb/ac	Big bluegrass/Arido tall fescue @ 4 lb/ac
Big Bluegrass (Sherman)	Indiangrass (Osage)	USDA PMC SYN 2 alfalfa @ 4 lb/ac	Arido tall fescue @ 4 lbs/ac
Big Bluestem	Little Bluestem (Camper)	USDA orchardgrass Syn B @ 4 lb/ac	Seco orchardgrass @ 4 lbs/ac
Blue Grama	Little Bluestem (Aldous)	Alfalfa (TS4002) @ 4 lb/ac	Seco O.G/Siberian W.G @ 4 lb/ac
Bluebunch wheatgrass (Whitmar)	Sheep Fescue	4-way perennial mix plus "Nutrigreen" forage winter pea @ 20 lb/ac	Arido T.F/Siberian wheatgrass @ 4 lb/ac
Bluebunch wheatgrass	Switchgrass (Alamo)	4-way perennial mix plus male sterile triticale "CMS-	Arido TF/Seco OG/Ladak alfalfa @ 4 lb/ac

(Secar)
Brassica (Winfred)
Buffalo grass
Canada wildrye
Cicer milkvetch (Oxley)
Crested wheatgrass (Hycrest)
Eastern Gamagrass (Pete)
Grazing Brome (Atom)
Grazing brome (Gala)
Hybrid wheatgrass (Newhy)
Idaho fescue (Winchester)
Indian ricegrass (Nezpar)
Indiangrass
Intermediate wheatgrass
Little Bluestem
Lovegrass
Meadow brome (Fleet)
Meadow brome (Regar)
Orchardgrass (Paiute)
Perennial Kochia (Immigrant)
Plantain (Lancelot)
Prairie Sandreed
Russian wildrye (Bozoisky select)
Sainfoin
Siberian wheatgrass (Vavilov)
Side oats Grama
Slender wheatgrass

Switchgrass (Sunburst)
Switchgrass (Cave in rock)
Switchgrass (Forestburg)
Tri-mix # 1
Tri-mix # 2
Tri-mix # 3
Tri-mix # 4
tri-mix # 5
Tri-mix # 6
14 species mix

2" @ 10 lb/ac
4-way perennial mix plus male sterile triticale "CMS-2" @ 20 lb/ac

Secar BBWG/Arido T.F/Siberian WG @ 4 lb/ac
Tuscanny II tall fescue/Siberian WG/Ladak alfalfa @ 4 lb/ac
Upper edge alfalfa @ 5 lb/ac
Tuscanny II TF/Siberian W.G @ 4 lb/ac
Tuscanny II tall fescue @ 4 lb/ac
Tuscanny II TF/Ladak alfalfa @ 4 lb/ac
Lincoln smooth brome / Ladak/Siberian @ 4 lb/ac
Lincoln smooth brome @ 4 lb/ac
Lincoln smooth brome / Arido tall fescue @ 4 lb/ac
Upper edge/Arido TF/Seco OG @ 4 lb/ac
Secar BB/Tuscanny II TF @ 4 lb/ac
Seco OG/Tuscanny II TF/Ladak @ 4 lb/ac
Arido/Tuscanny II/Siberian/Seco @ 1.6 lb/ac each
Whitmar BB/Lincoln smooth brome @ 4 lbs/a
Pubescent wheatgrass @ 8 lbs/a
Pubescent wheatgrass/Tuscanny II @ 4 lbs/a
Bozoiski wildrye/Siberian W.G @ 4 lb/ac

2007 Species Mixes

Tri-mix #1	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, San Luis slender wheatgrass @ 2 lb/ac PLS
Tri-mix #2	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, Whtimar bluebunch wheatgrass @ 2 lb/ac PLS
Tri-mix #3	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, Vavilov Siberian wheaatgrass @ 2 lb/ac PLS
Tri-mix #4	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, Bozoiski Russian wildrye @ 2 lb/ac PLS
Tri-mix #5	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, VNS intermediate wheatgrass @ 2 lb/ac PLS
Tri-mix #6	Sherman big bluegrass@ 2 lb/ac PLS , Rugged alfalfa @ 3l b/ac PLS, hycrest crested wheatgrass @ 2 lb/ac PLS

(San Luis) Small Burnet (Delar) Smooth brome (Manchar) Tall wheatgrass (Alkar) Tetraploid annual ryegrass (Assertive) Thickspike wheatgrass (Critana) Western wheatgrass (Rosana) Yellow sweetclover (Madrid)	14 Specie Mix	* Sherman big bluegrass @ 1.5 lb/ac PLS Rosana western wheatgrass @ 1.5 lb/ac PLS Manchar smooth brome @ 2 lb/ac PLS NewHy hybrid wheatgrass @ 1.5 lb/ac PLS * Secar bluebunch wheatgrass @ 2 lb/ac PLS * Vavilov Siberian wheatgrass @ 1.5 lb/ac PLS VNS intermediate wheatgrass @ 2 lb/ac PLS Whtimar bluebunch wheatgrass @ 2 lb/ac PLS * Hycrest crested wheatgrass @ 2 lb/ac PLS * Rugged alfalfa @ 1/2 lb/ac PLS VNS Sheep fescue @ 1/2 lb/ac PLS Forestburg switchgrass @ 1 lb/ac PLS San Luis slender wheatgrass @ 2 lb/ac PLS Bozoiski Russian wildrye @ 1.5 lb/ac PLS * Plot comprised of these species in 2009

Table II

Forage Species	Average Stand 2006-2009
Alfalfa (Rambler) @ 5 lb/ac	93
Alfalfa (Nomad) @ 5 lb/ac	99
Alfalfa (Ladak) @ 5 lb/ac	97
Small burnet (Delar) @ 2 lb/ac	63
Russian wildrye (Bozoiski Select) @ 4 lb/ac	91
Big bluegrass (Sherman) @1 lb/ac	95
Siberian wheatgrass (Vavilov) @ 3 lb/ac	97
Bluebunch wheatgrass (Secar) @ 3 lb/ac	93
Bluebunch wheatgrass (Whitmar) @ 3 lb/ac)	94
Crested wheatgrass (Hycrest) @ 4 lb/ac	95
Meadow brome (Fleet) @ 2 lb/ac	82
Fleet brome at 8 lb/ac	89
Forage Kochia (tilled due to potential spread)	99
Tri-mix #1	35
Tri-mix #2	88
Tri-mix #3	94
Tri-mix #4	90
Tri-mix #5	75
Tri-mix #6	95
14 Sp. Mix	93

Soil Carbon Sequestration Potential of Agricultural Systems Incorporating Biologically Based Techniques (Tabitha Brown, et al.)

Soil C sequestration has been identified as a major area where agriculture can contribute to mitigation of global climate change. Interest in soil C sequestration arises from Federal and State policy makers who want defensible C mitigation calculations as well as potential C aggregators that are pursuing various carbon marketing mechanisms. Systems that increase soil carbon stocks and/or reduce emissions of green house gases could diversify farm income through value added product marketing and C trading programs. The amount of C sequestered by agricultural soils are influenced by such site-specific parameters as initial soil organic carbon levels, soil texture, tillage regime, and rotation intensity (Purakayastha et al., 2008; West and Post, 2002; Rasmussen et al., 1998; Carter, 1996). Therefore, soil C dynamics and sequestration rates need to be determined at local and regional scales to provide information suitable for science-based marketing, policy and management decisions.

Regardless of specific interests, the same science-based information is required: (1) knowledge of the impact that agricultural practices can have on soil C stocks; and (2) monitoring and verification procedures to assess C stocks at the farm scale. Our overall goal was to conduct baseline soil C sampling at the four Land EKG® monitoring sites located at G&L Farms, Benge, WA. This data would be useful for future studies assessing soil C sequestration rates and process-oriented and other more simple, empirically-based models of regional and national climate change mitigation potential of grazed ecosystems.

Methods: Six soil profile samples were collected at each Land EKG® site (4-Land EKG® sites total) following the sampling schematic in Figure 1. This sampling schematic was based on the zones of observation used in the 2K Rancher Land EKG® monitoring (Orchard and Mehus, 2001). Samples were collected on November 25th and 26th, 2008 and soil cores were divided into 7 depth increments (0- to 10-, 10- to 20-, 20- to 30-, 30- to 60-, 60- to 90-, 90- to 120-, 120- to 150-cm). Samples were air dried, ground to pass a 2-mm sieve, roller ground to a fine powder and then analyzed for total C and N using dry combustion (Leco C-N-S analyzer) and inorganic C using the modified pressure-calcimeter method (Sherrod et al., 2002). Soil bulk density measurements were collected at each site and depth (where possible) to allow for future assessment of annual rates of C change. Gravimetric soil moisture was measured on bulk density samples collected.

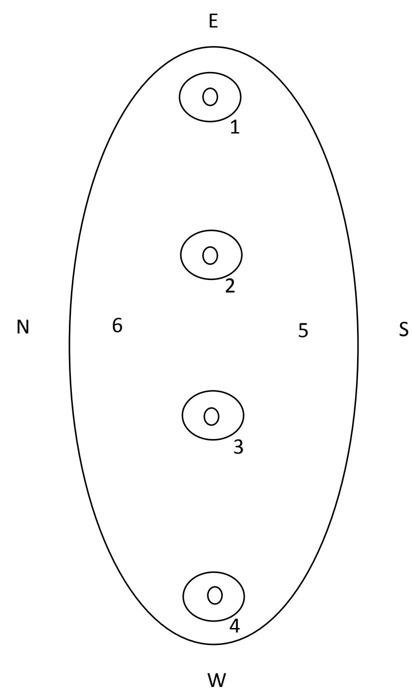


Figure 1. Sampling schematic used for baseline soil sampling at the Land EKG® monitoring sites at G&L Farms, Benge, WA.

Status of Research: The average soil bulk density, percent moisture, and total soil C is presented in Table 1 for the six soil profile samples obtained at each Land EKG® site and depth increment. The total C value includes both organic and inorganic sources of soil C. Under the management scenario (dry-land agriculture), soil organic C data would be the most important information for assessing soil C sequestration potential. Inorganic C analyses have been completed and the data is undergoing quality control before use in calculating soil organic C content (total C minus inorganic C) and distribution with depth.

These data, once finalized, will provide geo-referenced soil organic C and total N data that can be used as baseline values for future measurements of management impacts on profile soil organic C, total N and C sequestration potential. Furthermore, integrating ongoing monitoring activities with additional measurements of the soil system would improve the utility of the monitoring program as a decision support tool for livestock producers. The Land EKG monitoring includes rapid assessment of ecological processes and interpretation of rangeland health trends (Orchard and Mehus, 2001) that could be combined with data collected through this research (e.g. water content, C and N stocks) to identify and prioritize monitoring activities most effective in detecting changes in ecosystem services and processes.

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Table 1. Baseline soil profile measurements (n=6) from the four Land EKG® sites located at G&L Farms, Benge, WA. Samples were collected November 25th and 26th, 2008.

EKG Site	Description	Depth	Moisture	Bulk Density	Total C[¶]	
		cm	%	g cm^{-3}	Mg ha^{-1}	%
1 (T-4)	Location:	0 to 10	17.08 (0.37)[‡]	1.15 (0.05)	14.02 (3.18)	1.21 (0.22)
	46° 52.59094' N,	10 to 20	11.52 (1.86)	1.36 (0.07)	10.59 (1.20)	0.78 (0.09)
	118° 01.88363' W	20 to 30	6.11 (0.45)	1.49 (0.10)	9.49 (1.70)	0.64 (0.12)
	Landscape position[#]: SU	30 to 60	5.85 (0.34)	1.37 (0.05)	17.95 (1.73)	0.44 (0.05)
	Soils: WLD and WLD2[†]	60 to 90	4.79 (0.41)	1.46 (0.02)	18.62 (11.95)	0.42 (0.27)
		90 to 120	4.13 (0.15)	1.57 (0.01)	40.36 (28.00)	0.89 (0.62)
		120 to 150	nd[§]	nd		1.04 (0.29)
2 (T-3)	Location:	0 to 10	16.53 (0.82)	1.13 (0.09)	13.35 (0.78)	1.18 (0.08)
	46° 51.453' N,	10 to 20	10.04 (1.74)	1.30 (0.07)	10.00 (1.30)	0.77 (0.09)
	118° 03.148' W	20 to 30	6.02 (0.40)	1.35 (0.07)	8.94 (0.85)	0.66 (0.08)
	Landscape position: SU	30 to 60	5.97 (0.23)	1.35 (0.04)	18.97 (1.94)	0.47 (0.06)
	Soils: WLD	60 to 90	5.47 (0.47)	1.40 (0.05)	13.50 (2.08)	0.32 (0.05)
	Slope: 2 %	90 to 120	4.77 (0.52)	1.39 (0.07)	23.66 (19.73)	0.56 (0.46)
		120 to 150	nd	nd		0.81 (0.48)
3 (T-1)	Location:	0 to 10	16.39 (0.63)	1.21 (0.08)	13.33 (5.39)	1.09 (0.44)
	46° 52.081' N,	10 to 20	11.77 (1.50)	1.34 (0.06)	11.26 (1.19)	0.84 (0.08)
	118° 01.933' W	20 to 30	6.35 (0.30)	1.44 (0.06)	9.29 (1.64)	0.64 (0.10)
	Landscape position: BS	30 to 60	6.31 (0.12)	1.40 (0.05)	20.46 (4.47)	0.49 (0.09)
	Aspect: N	60 to 90	5.84 (0.33)	1.51 (0.04)	15.17 (4.71)	0.34 (0.11)
	Slope: 14 %	90 to 120	5.30 (0.29)	1.48 (0.13)	21.35 (21.54)	0.49 (0.48)
	Soils: WLD	120 to 150	4.90 (0.04)	1.56 (0.02)	15.26 (11.13)	0.33 (0.24)
4 (T-2)	Location:	0 to 10	15.05 (0.59)	1.19 (0.08)	14.79 (2.35)	1.24 (0.16)
	46° 52.022' N,	10 to 20	12.53 (1.00)	1.34 (0.02)	9.65 (3.19)	0.72 (0.24)
	118° 01.501' W	20 to 30	6.77 (0.38)	1.39 (0.05)	9.91 (0.74)	0.72 (0.05)
	Landscape position: BS	30 to 60	6.48 (0.29)	1.33 (0.06)	20.15 (1.20)	0.51 (0.03)
	Aspect: N	60 to 90	6.13 (0.18)	1.42 (0.07)	14.24 (0.58)	0.33 (0.03)
	Slope: 9 %	90 to 120	5.65 (0.24)	1.47 (0.07)	16.18 (12.48)	0.36 (0.25)
	Soils: WLD	120 to 150	4.90 (0.12)	1.43 (0.04)	9.01 (1.68)	0.21 (0.03)

[†]Soil map unit symbol: WLD – Walla Walla silt loam 5 to 30% slopes; WLD2- Walla Walla silt loam, 5 to 30% slopes, eroded.
[‡] Values in parenthesis represent ± 1 standard deviation.
[§] Values not determined (nd) because no sample could be obtained.
[¶] Missing data indicates where soil bulk density could not be obtained and therefore C content could not be expressed on a Mg C ha^{-1} basis.
[#] Landscape positions are summit (SU) and backslope (BS).

Working relationships and forums

Many key partnerships have developed from the Ag Pilots Project. In carrying out the project, collaborative working relationships were forged between the Washington Sustainable Food and Farming Network, livestock producers, Washington Cattlemen's Association, WSU Animal Sciences, WSU Economic Sciences, WSU Crop & Soil Sciences, and WSU County Extension. Other partnerships have been formed as a result of several annual BIOAg tours that featured the Ag Pilots Project. Among the people who connected during the BIOAg tours were legislators, educators, wildlife representatives, livestock producers, representatives of state and federal agencies, and members of the Audubon society, Palouse Clearwater Environmental Institute, League of Women Voters and the general public. Tour attendees were educated about concerns, challenges and positive results derived from converting decadent CRP stands into a sustainable grass-fed beef system.

Sustainability and application to the larger agricultural community

An article by Maurice Robinette entitled Beefing Up the Palouse appeared in the August 2009 issue of the PCC Sound Consumer, the Puget Consumer Coop Natural Markets publication.

An article that included a discussion of our project appeared in the Winter 2008/9 issue of the Washington State magazine. It is entitled, Re-thinking the Fundamentals: Feeding the World May Require Us to Use Old Knowledge in New Ways,

An article that discussed the project and promoted the following Conferences was published in the Agriculture Section of the Lewiston Morning Tribune, Try Grazing Cattle on CRP Acreage That's Expiring, April 27, 2009.

On May 19-20 our project co-sponsored, along with the Extension Grass-fed Beef Production/Pasture Management Team, the How to Survive and Be Profitable in the Beef Business-Planned Grazing and Grass-fed Beef Production Conference in Richland, WA. We had 64 attendees that expressed great interest in our project's goals and objectives.

A front-page article entitled, Washington State Study Compares Grazing and CRP, appeared in the June 8, 2009 issue of the Western Livestock Journal.

Senator Patty Murray, in a letter of support to the USDA/CSREES for our AFRI Managed Ecosystems proposal stated: "Building on prior research funded by Washington state's Governor's office, WSU will develop planned cattle grazing as a sustainable alternative to the Conservation Reserve Program (CRP). I strongly support the work WSU is doing to develop innovative and sustainable agricultural systems and encourage you to give their project full consideration."

Peter Goldmark, Washington Commissioner of Public Lands, in a letter of support to the USDA/CSREES for our AFRI Managed Ecosystems proposal stated: "DNR currently has several thousand acres in CRP. With the passage of the Food, Conservation, and Energy Act of 2008 (Farm Bill) state trust lands will be ineligible to renew CRP contracts. As we transition out of these contracts, sustainable ecologically responsible options for the management of these lands will be of primary interest to the department, and as such we will be very interested in the results from this project."

The Adams County Farm Service Agency Committee, in a letter of support to the USDA/CSREES for our AFRI Managed Ecosystems proposal stated: "Therefore, the research Mr. Beckley's group has been involved with to date under the 'Beefing Up the Palouse' Ag Pilots project, and wish to continue through this grant proposal, is critical and timely, if we are to provide CRP participants with a full range of options on future land uses as these CRP contracts expire."

G & L Farms was a stop on the 2008 and 2009 BIOAg Tours where the
Beefing Up the Palouse project was featured.

Several of us on the Ag Pilots Team have been invited to participate in the Washington Coordinated Resource Management Tour on October 8. We will have an opportunity to make a brief presentation on the Beefing Up the Palouse project during the tour.

Maurice Robinette is scheduled to give a Beefing Up the Palouse project presentation during the Washington Tilth Conference in November 2009 in Yakima.

By showcasing the Ag Pilots study and educating policy makers and other influential persons about sustainable managed grazing, opinions and decisions are being influenced to accept a broader systems approach that includes livestock grazing as a viable land management tool. Personal observations have been made of policy makers collaborating with other project partners about potential funded programs to study use of managed grazing to address other cases of ecosystem degradation.