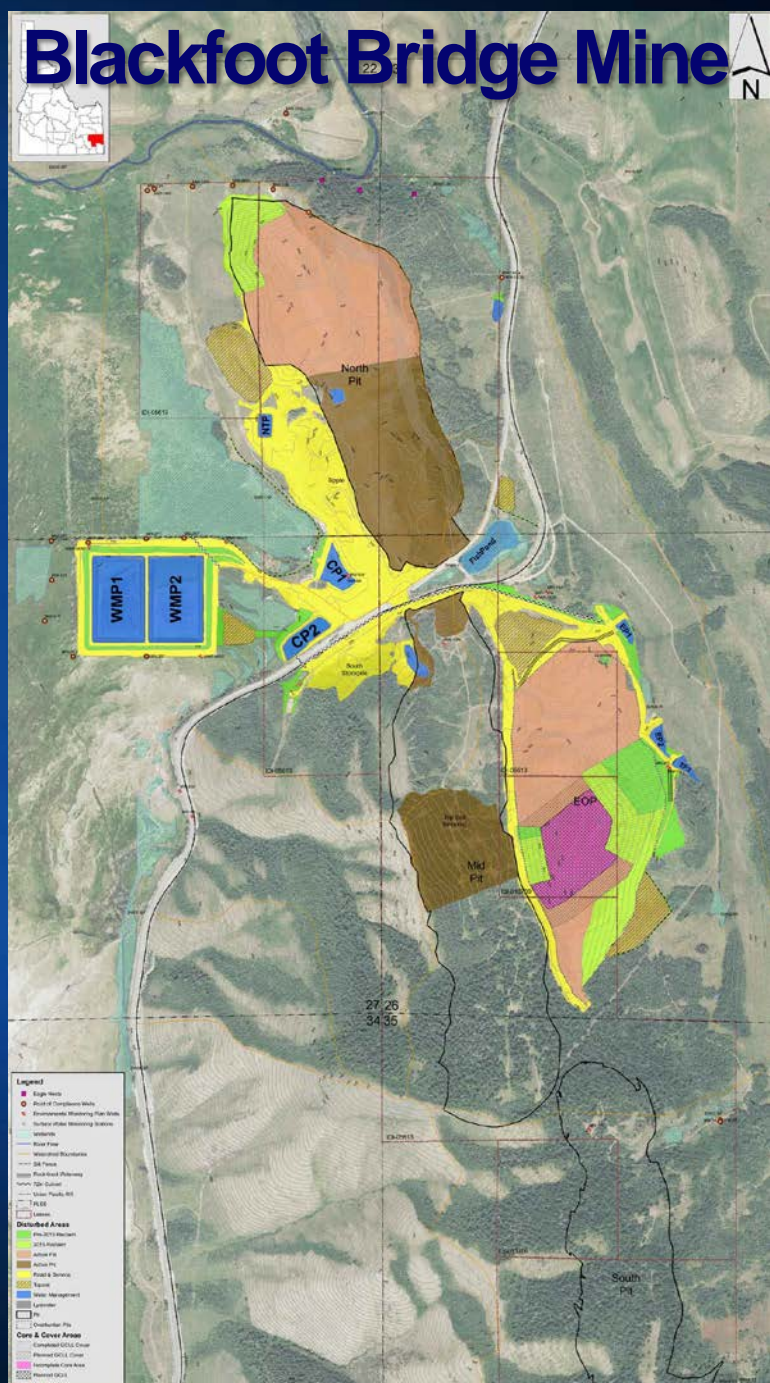
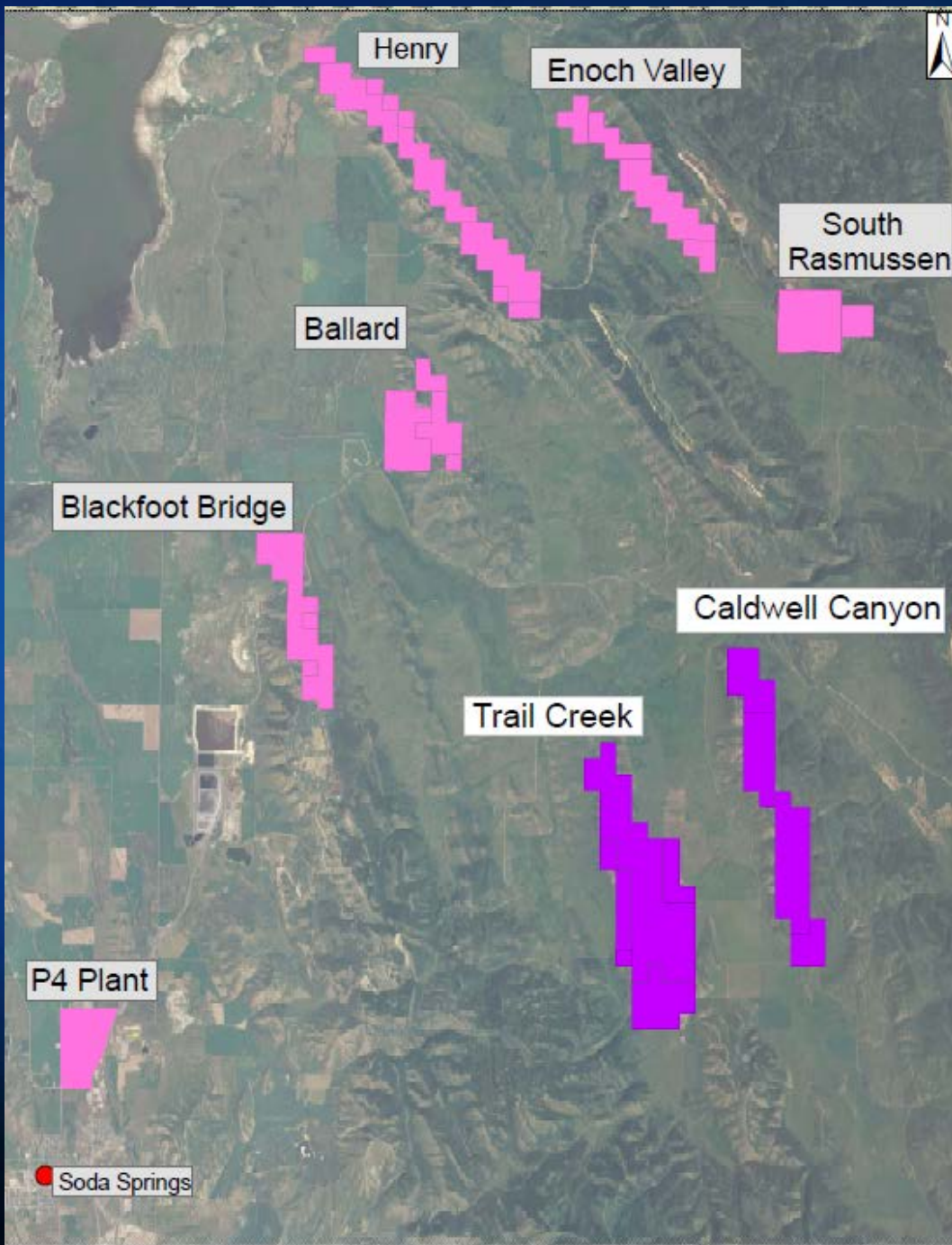


Looking at Reclamation in terms of Ecological Restoration



Michael Vice



South Rasmussen Overburden Area (the Horseshoe)



South Rasmussen Mine



Ecological Restoration



Large Mammals



Small Mammals / Birds



Pollination / Insects



Plant Systems / Diversity



Water Systems / Erosion Control

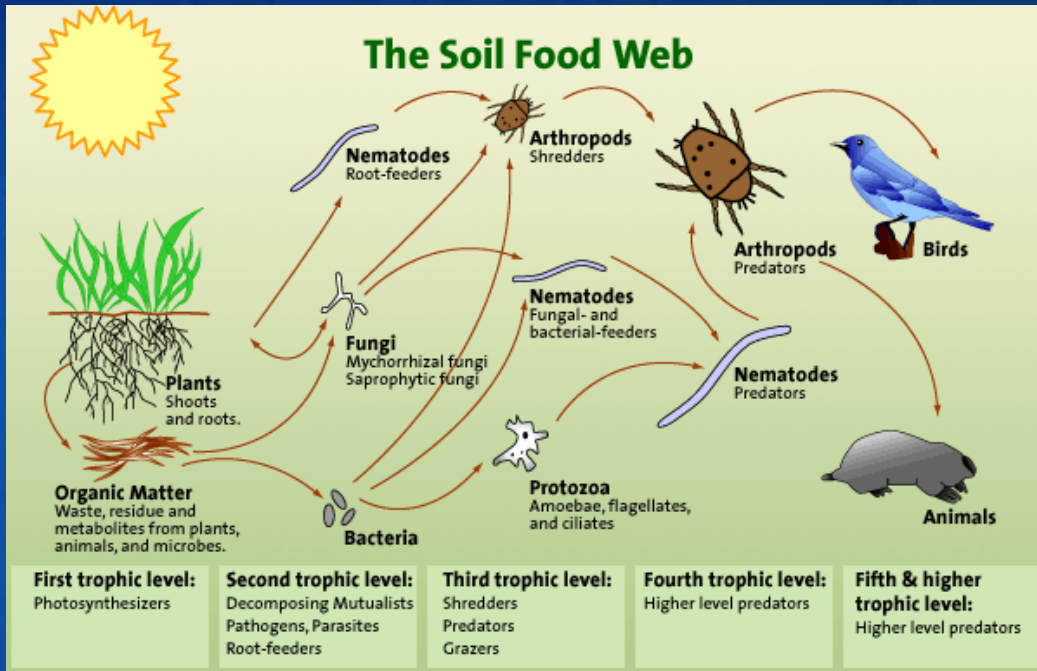


Soil Microbiology/Landscape/Fertility

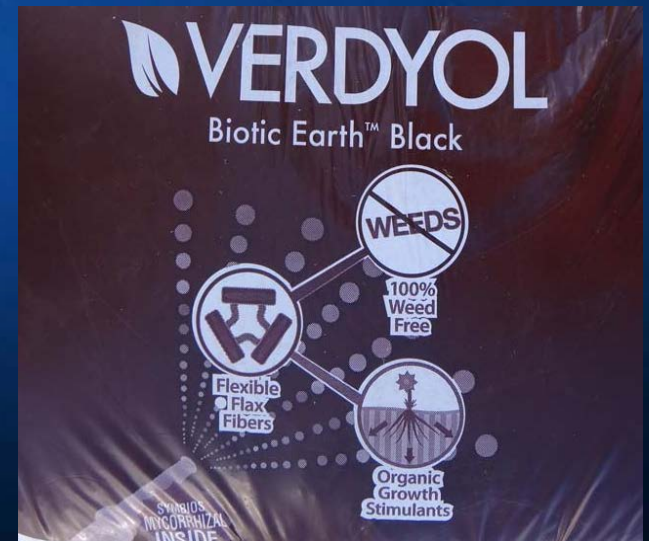
Alluvium and Topsoil is pushed upslope over the liner



The Soil Food Web



Source: <http://www.soilfoodweb.ca/concepts-of-the-soil-foodweb>



Planting Methods Used in Mineland Reclamation

Planting with a
Brillion Seeder



Planting with a Hydro
Seeder/Mulcher

Spreading Fertilizer & Mulch at the Blackfoot Bridge Mine

SUSTANE
Naturally...

SUSTANE® 4·6·4

OMRI

**ALL NATURAL
LANDSCAPERS' CHOICE**

Guaranteed Analysis

Total Nitrogen (N)	4%
0.4% Ammoniacal Nitrogen	
0.4% Other Water Soluble Organic Nitrogen	
3.2% Water Insoluble Organic Nitrogen*	
Available Phosphate (P ₂ O ₅)	6%
Soluble Potash (K ₂ O)	4%
Calcium (Ca)	4%

Derived from aerobically composted turkey litter, hydrolyzed feather meal, and sulfate of potash.
*3.2% slowly available nitrogen from aerobically composted turkey litter and hydrolyzed feather meal.

02700 F569

Coverage & Application Rates

Coverage
50 lbs. covers 2000 sq. ft.
@ 1 lb to per 1000 sq. ft.
provides 44 lbs. N per acre

22.07 kg. covers 500 sq. meters
@ 0.5 kg. N per 100 sq. meters
provides 50 kg. N per hectare

Application Rates
25 lbs. per 1000 sq. ft.
325 g. per 1 sq. m

Medium Granule: 50% 200
Fine Granule: 50% 120

Store in a cool dry place.
Keep out of reach of pets and children.

VERDYOL
Biotic Earth™ Black



Net Wt. 50 lb. (22.67 kg.)



by **granite SEED**
and erosion control

1077 West 2100 South
JAIL DR. #802
MIDLAND TX 79701-1844
Fax: 817.768.9977
www.granite.com



Flexterra® HP-FGM™

HIGH PERFORMANCE-FLEXIBLE GROWTH MEDIUM™ (HP-FGM™)
High Performance Erosion Control and Vegetation
for Steep Slopes and Critical Sites

INSTALLATION GUIDELINES

Erosion Control and Vegetation:

Step One: Apply fertilizer with specified prescriptive agronomic formulations and 50% of seed mix with a small amount of HP-FGM™ for visual marking.

Step Two: Mix balance of seed and apply HP-FGM at a rate of 50 pounds per 125 gallons (23 kg/475 liters) of water over freshly seeded surfaces. Confirm loading rates with equipment manufacturer.

INSTALL PRODUCT AT THE FOLLOWING TYPICAL APPLICATION RATES:

Slope Gradient/Condition	English	SI
< 3H to 1V	3000 lb/acre	3400 kg/ha
> 3H to 1V & < 2H to 1V	3500 lb/acre	3900 kg/ha
> 2H to 1V & < 1H to 1V	4000 lb/acre	4500 kg/ha
> 1H to 1V	4500 lb/acre	5100 kg/ha
Below ECB or TRM	1500 lb/acre	1700 kg/ha
As infill for TRM	3500 lb/acre	3900 kg/ha

PRODUCT COMPOSITION

NON-FAST FOOD INGREDIENTS		
Thermally Processed	80%	Compost, Non-Made 100%
Weathered granulated wood Fibers	80%	Biodegradable Hydrolocking Fibers
Wetting Agents	10%	Organic Particles made from Fuller's Earth

WARRANTY

PROFILE PRODUCTS LLC ("Profile") warrants that the product will be applied to the site in accordance with the application rates and instructions provided on the product label. Profile does not warrant the product's performance or the results of its use. Profile's liability is limited to the replacement of the product. Profile is not responsible for any damage to property or persons resulting from the use of the product. Profile is not responsible for any damage to property or persons resulting from the use of the product. Profile is not responsible for any damage to property or persons resulting from the use of the product.

NET WEIGHT 50 LBS (22.7 Kg)
NET DRY WEIGHT 44 LBS (20 Kg)

PROFILE PRODUCTS LLC
730 LAKE COOK ROAD • SUITE 400 • BUFFALO GROVE, IL 60089
CUSTOMER SERVICE: 800-368-8481 • WWW.PROFILEPRODUCTS.COM
FLEXTERRA IS A REGISTERED TRADEMARK OF PROFILE PRODUCTS LLC
FLEXIBLE GROWTH MEDIUM (FGM) IS A TRADEMARK OF PROFILE PRODUCTS LLC
MANUFACTURED BY PROFILE PRODUCTS LLC - COMMERCE, TX
U.S. PATENT #'s: 5,942,625; 5,779,782; 5,741,812; 6,360,478 AND PATENTS PENDING



What is Sustane 3-7-2 w/ Mycorrhizae & Humates?



SUSTANE[®]
Naturally...

SUSTANE[®] **3·7·2**
with Mycorrhizae & Humates

Guaranteed Analysis

Total Nitrogen (N)	3%
0.2% Ammoniacal Nitrogen	
0.2% Other Water Soluble Organic Nitrogen	
2.6% Water Insoluble Organic Nitrogen*	
Available Phosphate (P ₂ O ₅)	7%
Soluble Potash (K ₂ O)	2%
Calcium (Ca)	4%
Sulfur	3%

Derived from aerobically composted turkey litter and feather meal.

*2.6% slowly available nitrogen from aerobically composted turkey litter and feather meal

Non-Plant Food Ingredients

Humic Acid

Derived from lignite and composted turkey litter.

Arbuscular Mycorrhizae Inoculum	4.80 propagules per g
3.36 propagules Glomus Intraradices	
0.48 propagules Glomus Etunicatum	
0.48 propagules Glomus Deserticola	
0.48 propagules Glomus Clarum	
70% Glomus Intraradices (Utah isolate)	
10% Glomus Deserticola (Mojave isolate)	
10% Glomus Etunicatum (Colorado isolate)	
10% Glomus Clarum (Arizona isolate)	

Coverage & Application Rates

-For Revegetation

Final fertilizer recommendations should be based on laboratory soil tests and specific site conditions including but not limited to aspect and slope. Use high rates for soils low in organic matter and steeper slopes.

Apply 1-3 tons per acre

-Turfgrass Coverage

50 lb. covers 1500 ft²
@ 1 lb. N per 1000 ft²
provides 44 lb. N per acre

22.67 kg covers 139 m²
@ 0.5 kg N per 100 m²
provides 50 kg N per hectare

37.5 lb. per 1000 ft²
187.5 g per 1 m²

Medium Grade: Mesh Size -7+14
(2.8 mm to 1.4 mm) SGN 200

121213

F689



Mycorrhizae are the fungi that colonize the root system of a host plant, providing increased water and nutrient absorption capabilities, while the plant provides the fungus with carbohydrates formed from photosynthesis. There is a perfect symbiotic relationship that forms between the fungi and plants.



Sustane Natural Fertilizer, Inc.
310 Holiday Avenue
Cannon Falls, MN 55009 USA
+1 507-263-3003 • www.sustane.com



What is Sustane 3-7-2 w/ Mycorrhizae & Humates?



SUSTANE® 3·7·2 with Mycorrhizae & Humates

Guaranteed Analysis

Total Nitrogen (N).....	3%
0.2% Ammoniacal Nitrogen	
0.2% Other Water Soluble Organic Nitrogen	
2.6% Water Insoluble Organic Nitrogen*	
Available Phosphate (P ₂ O ₅)	7%
Soluble Potash (K ₂ O)	2%
Calcium (Ca)	4%
Sulfur	3%

Derived from aerobically composted turkey litter and feather meal.

*2.6% slowly available nitrogen from aerobically composted turkey litter and feather meal

Non-Plant Food Ingredients

Humic Acid.....12%
Derived from lignite and composted turkey litter.

Arbuscular Mycorrhizae Inoculum.....4.80 propagules per g
3.36 propagules Glomus Intraradices
0.48 propagules Glomus Etunicatum
0.48 propagules Glomus Deserticola
0.48 propagules Glomus Clarum

70% Glomus Intraradices (Utah isolate)
10% Glomus Deserticola (Mojave isolate)
10% Glomus Etunicatum (Colorado isolate)
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121213

F689

Sustane Natural Fertilizer, Inc.
310 Holiday Avenue
Cannon Falls, MN 55009 USA
+1 507-263-3003 • www.sustane.com



2000#/acres = 60# N-140# P₂O₅- 40# K₂O

Humates, which are composed of various forms of carbon, are naturally occurring material that is very rich in humified organic matter and humic substances.

Humates are now recognized as the single most productive input in sustainable agriculture. They consist of humic and fulvic acid along with the raw humates (prehistoric plant matter) from which these powerful natural acids are derived.

Humic acid is a powerful fungi promotant. Beneficial fungi (including mycorrhizal fungi) are the missing link in many soils. It stabilizes nitrogen and improves nitrogen efficiency. Humic acid complexes phosphate to reduce lock-ups, making it an ideal additive with fertilizers.

Humates are the only known substance with the ability to hold onto every other nutrient in the soil, which enables heightened nutrient absorption. Humates contain an auxin-like growth promotant that can enhance cell division and elongation. They increase the permeability of plant cells to increase nutrient uptake by up to 40%.





SEED-AIDE AERO™

SOIL STABILIZATION GRANULES

Designed for Facile Application and Effective Erosion Control

APPLICATION GUIDELINES

Apply aerially, hydraulically, with a high-volume drop spreader, large-opening broadcast spreader or by hand.

APPLY PRODUCT AT THE FOLLOWING TYPICAL APPLICATION RATES:

Slope Gradient/Condition	English	SI
? 6H:1V	450-600 lb/ac	500-700 kg/ha
> 6H:1V to ? 4H:1V	600-1000 lb/ac	700-1150 kg/ha
> 4H:1V to ? 3H:1V	1000-1500 lb/ac	1150-1700 kg/ha
> 3H:1V to ? 2H:1V	1500-3000 lb/ac	1700-3400 kg/ha

Consult comprehensive CSI formatted Seed Aide Aero specification for additional details.

AVERAGE ANALYSIS

Recycle* Newprint	70%	Linear Anionic Soil Flocculant and Hydro-Colloidal Polymer	7.5%
Clean Wood Shavings	22.4%	Seaweed Extract Biostimulant	0.1%

The formulation is pelletized and granulated to form Seed Aide Aero granules.

WARRANTY

PROFILE PRODUCTS LLC ("Profile") represents and warrants that its products are manufactured in accordance with the product's specifications and that its products, at the time of delivery to the purchaser, shall be free from all material defects. In the event of a breach of the foregoing warranty, Profile's sole obligation shall be, at its option, to refund the purchase price or to provide products which conform to this warranty, so long as any deficiencies are reported to Profile within thirty (30) days after discovery thereof, but in no event later than one (1) year after the date of manufacture. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, BY LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. FURTHER, IT IS UNDERSTOOD AND AGREED THAT PROFILE'S LIABILITY SHALL NOT EXCEED THE RETURN OF THE AMOUNT OF THE PURCHASE PRICE PAID BY PURCHASER AND UNDER NO CIRCUMSTANCES SHALL PROFILE BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. Products for which a warranty claim is made are to be returned transportation prepaid to Profile's factory. Any use not in accordance with product directions and precautionary statements, and any modifications or alterations to the products, or any adulteration, dilution or alteration by the purchaser shall void this warranty. No employee or representative of Profile is authorized to change this warranty in any way or to grant any other warranty.

NET WEIGHT 50 lb (22.7 kg)
NET DRY WEIGHT 44 lb (20 kg)



MADE IN U.S.A.

PROFILE PRODUCTS LLC
730 LAKE CODE ROAD • SUITE 440 • BUFFALO GROVE, IL 60089
TECHNICAL INFORMATION OR DISTRIBUTION: 800-308-8581
CUSTOMER SERVICE: 800-366-1185 • WWW.PROFILEPRODUCTS.COM
SEED-AIDE IS A REGISTERED TRADEMARK OF PROFILE PRODUCTS LLC
AERO IS A TRADEMARK OF PROFILE PRODUCTS LLC
MANUFACTURED BY PROFILE PRODUCTS LLC - LIMESTONE, TN

Wide-Track D6T with Herd Broadcast Spreader



Over 4.5 miles of Erosion Control Wattles at Blackfoot Bridge



Ecological Restoration



Large Mammals

A horizontal bar with a brownish-orange background featuring images of deer and a moose.



Small Mammals / Birds

A horizontal bar with a brownish-orange background featuring images of a squirrel and a bird.



Pollination / Insects

A horizontal bar with a brownish-orange background featuring images of butterflies and bees.



Plant Systems / Diversity

A horizontal bar with a green background featuring images of grass and plants.



Water Systems / Erosion Control

A horizontal bar with a light blue background featuring images of water and a dam.



Soil Microbiology/Landscape/Fertility

A horizontal bar with a brown background featuring images of soil and a landscape.

Plant Species Diversity begins with a Diverse Seed Mix

Modified GCLL Cover at BfB Mine

% / lbs	NAME	SCIENTIFIC NAME	VARIETY	Seeds/lb	Seeds in Mix/lb	% of Total Seeds/lb	Type
14.00%	Mountain Bromegrass	<i>Bromus marginatus</i>	Garnet	64,000	8,960	7.37%	Bunch-N
7.00%	Great Basin Wildrye	<i>Leymus cinereus</i>	Magnar	130,000	9,100	7.48%	Bunch-N
6.25%	Bluebunch Wheatgrass	<i>Pseudoroegneria spicata ssp spicata</i>	Goldar	140,000	8,750	7.20%	Bunch-N
1.00%	Big Bluegrass	<i>Poa secunda ssp ampla</i>	Sherman	882,000	8,820	7.25%	Bunch-N
1.55%	Idaho Fescue	<i>Festuca idahoensis</i>	Winchester	450,000	6,975	5.74%	Bunch-N
1.25%	Sheep Fescue	<i>Festuca ovina</i>	Covar	680,000	8,500	6.99%	Bunch-N
5.50%	Thickspike Wheatgrass	<i>Elymus lanceolatus ssp lanceolatus</i>	Bannock	154,000	8,470	6.97%	Sod-N
7.10%	Western Wheatgrass	<i>Pascopyrum smithii</i>	Rosanna	110,000	7,810	6.42%	Sod-N
8.50%	Pubescent Wheatgrass	<i>Thinopyrum intermedium ssp barbulatorum</i>	Greenleaf	100,000	8,500	6.99%	Sod-Intro
1.85%	Orchardgrass	<i>Dactylis glomerata</i>	Paiute	427,200	7,903	6.50%	Sod-Intro
0.35%	Kentucky Bluegrass	<i>Poa pratensis</i>	Ginger	2,177,000	7,620	6.27%	Sod-Intro
4.75%	Northern Sweetvetch	<i>Hedysarum boreale</i>	Timp	46,000	2,185	1.80%	Legume-N
0.90%	Rocky Mtn Penstemon	<i>Penstemon strictus</i>	Bandera	592,000	5,328	4.38%	Forb-N
10.00%	Small Burnet	<i>Sanguisorba minor</i>	Delar	49,000	4,900	4.03%	Forb-Intro
1.00%	Lewis Blue Flax	<i>Linum lewisii</i>	Appar	293,000	2,930	2.41%	Forb-N
0.10%	Western Yarrow	<i>Achillea millefolium var. occidentalis</i>	VNS*	2,770,000	2,770	2.28%	Forb-N
3.25%	Blanket Flower	<i>Gaillardia aristata</i>	VNS*	132,000	4,290	3.53%	Forb-N
0.65%	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	VNS*	500,000	3,250	2.67%	Forb-N
4.00%	Fernleaf Biscuitroot	<i>Lomatium dissectum</i>	VNS*	45,000	1,800	1.48%	Forb-N
21.00%	Quickguard-Cover Crop	<i>Triticum aestivum x Secale cereale</i>		13,000	2,730	2.25%	Cover
100.00%					121,591	100.00%	

*Variety Not Stated

Seeded at a rate of 35 PLS#/acre (Pure Live Seed)

Plant Species Diversity begins with a Diverse Seed Mix

Simple 1 Cover at BfB Mine

% / lbs	NAME	SCIENTIFIC NAME	VARIETY	Seeds/lb	Seeds in Mix/lb	% of Total Seeds/lb	Type
10.70%	Mountain Bromegrass	<i>Bromus marginatus</i>	Garnet	64,000	6,848	7.00%	Bunch-N
6.00%	Great Basin Wildrye	<i>Leymus cinereus</i>	Magnar	130,000	7,800	7.97%	Bunch-N
5.00%	Bluebunch Wheatgrass	<i>Pseudoroegneria spicata ssp spicata</i>	Goldar	140,000	7,000	7.16%	Bunch-N
0.75%	Big Bluegrass	<i>Poa secunda ssp ampla</i>	Sherman	882,000	6,615	6.76%	Bunch-N
1.00%	Idaho Fescue	<i>Festuca idahoensis</i>	Winchester	450,000	4,500	4.60%	Bunch-N
0.65%	Sheep Fescue	<i>Festuca ovina</i>	Covar	680,000	4,420	4.52%	Bunch-N
4.25%	Thickspike Wheatgrass	<i>Elymus lanceolatus ssp lanceolatus</i>	Bannock	154,000	6,545	6.69%	Sod-N
4.25%	Western Wheatgrass	<i>Pascopyrum smithii</i>	Rosanna	110,000	4675	4.78%	Sod-N
5.50%	Pubescent Wheatgrass	<i>Thinopyrum intermedium ssp barbulatum</i>	Greenleaf	100,000	5,500	5.62%	Sod-Intro
1.50%	Orchardgrass	<i>Dactylis glomerata</i>	Paiute	427,200	6,408	6.55%	Sod-Intro
0.25%	Kentucky Bluegrass	<i>Poa pratensis</i>	Ginger	2,177,000	5,443	5.56%	Sod-Intro
1.75%	Northern Sweetvetch	<i>Hedysarum boreale</i>	Timp	46,000	805	0.82%	Legume-N
6.00%	Sainfoin	<i>Onobrychis viciifolia</i>	Eski	30,000	1,800	1.84%	Legume-Intro
0.80%	Rocky Mtn Penstemon	<i>Penstemon strictus</i>	Bandera	592,000	4,736	4.84%	Forb-N
7.30%	Small Burnet	<i>Sanguisorba minor</i>	Delar	49,000	3,577	3.66%	Forb-Intro
0.50%	Lewis Blue Flax	<i>Linum lewisii</i>	Appar	293,000	1,465	1.50%	Forb-N
0.05%	Western Yarrow	<i>Achillea millefolium var. occidentalis</i>	VNS*	2,770,000	1,385	1.42%	Forb-N
3.00%	Blanket Flower	<i>Gaillardia aristata</i>	VNS*	132,000	3,960	4.05%	Forb-N
0.50%	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	VNS*	500,000	2,500	2.56%	Forb-N
0.25%	Mountain Big Sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>	VNS*	2,500,000	6,250	6.39%	Shrub-N
19.00%	Antelope Bitterbrush	<i>Purshia tridentata</i>	VNS*	15,000	2,850	2.91%	Shrub-N
21.00%	Quickguard-Cover Crop	<i>Triticum aestivum x Secale cereale</i>		13,000	2,730	2.79%	Cover
100.00%					97,812	100.00%	

*Variety Not Stated

Seeded at a rate of 35 PLS#/acre (Pure Live Seed)

Re-establishing Native Plants with a Diverse Seed Mix



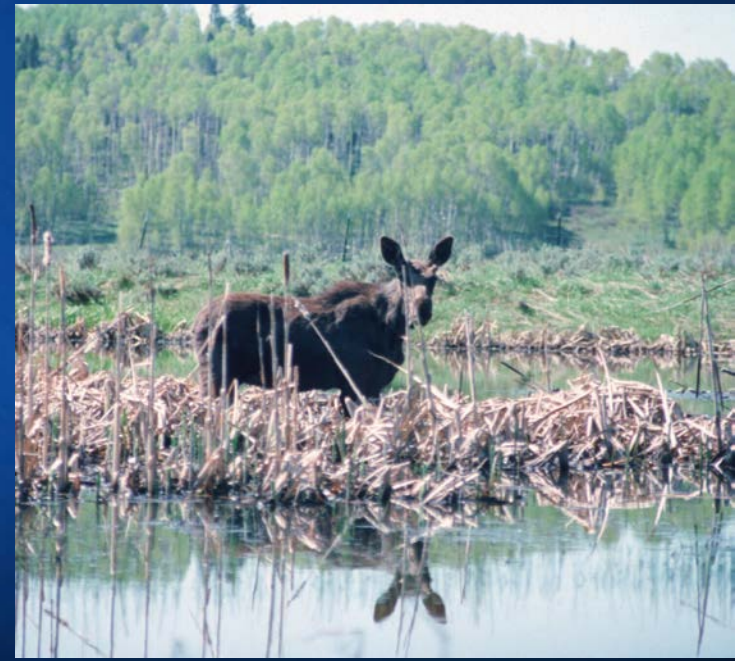
A diverse seed mix attracts pollinators that are important to a healthy ecosystem.



Re-establishing Native Trees



Reclamation Success



Reclamation is more than planting grasses and trees. Ecological restoration, involves restoring systems, such as providing habitat and cover for wildlife.

Bald Eagles at the Blackfoot Bridge Mine



Egg laying was around March 11th. After a 35 day incubation period, the eggs hatched on about April 15-22. Fledging is anticipated around July 15-

Bald Eagle Monitoring

• 21 fledged since 2001



Ecological Restoration



Large Mammals



Small Mammals / Birds



Pollination / Insects



Plant Systems / Diversity



Water Systems / Erosion Control



Soil Microbiology/Landscape/Fertility



There's are lots of laws -
Everyone wants to pass a law as an answer

If there was a law
That said everyone would learn respect
And learn how to love again -
That might work.

Laws aren't the answer
They have them in government,
They have them in churches
Too often as substitutes for love.

People who know love & respect
Don't need those laws
Let's make more people who don't need laws
Instead of more laws,
People need 'Reclaiming too!'

Thank you for your time and attention.

