Farmed Smart Update

Kay Meyer, Executive Director

9/20/16

Agenda

- Defendable, Quantifiable, and Credible tools and models used to determine certification ratings
  - RUSLE2, Crop Energy Estimation Tool
- Certification Progress to Date
- Regulatory Support
- Marketing and Implementation Update

PACIFIC NORTHWEST direct seed ASSOCIATION

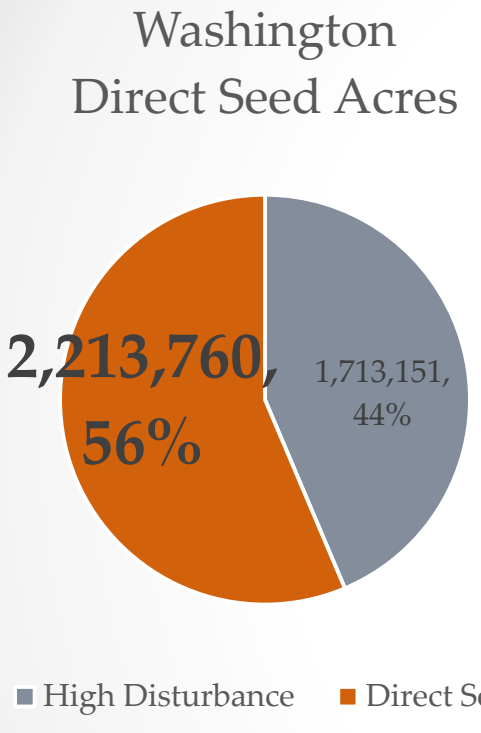
Major Initiative

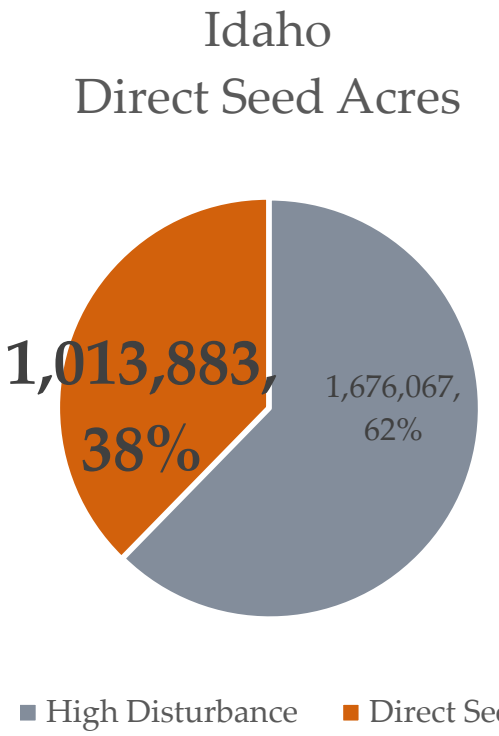
- Development of Farmed SMART Sustainable Agriculture certification program

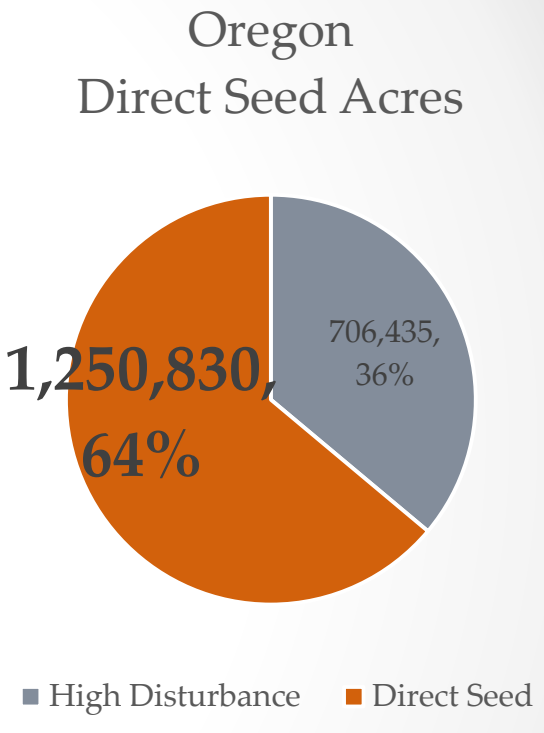
Certification Objectives

- Transition more farmers to a direct seed cropping system.
- Recognize & differentiate certified producers by adding value to their crops and farms.
- Defines results-based auditable standards that provides regulatory predictability
- Using this program as a platform to educate stakeholders on the social, sustainable and environmental benefits of direct seed farming practices.

Direct Seed Acres in PNW







In 2012, Average Direct Seed Acres in PNW 53%

Direct Seed Acres = Conservation and No-Till Practices

Based on 2012 Census of Agriculture, National Ag Statistics Service

Farmed Smart Difference

- Innovative approach for voluntary adoption of conservation practices that improve the environment
- Holistic review of dry-land farming systems – not just one practice
- Collaboration with regulatory, environmental, and farmers working toward a common goal
- Defendable, quantifiable, and credible program for educating public on sustainable farming practices

Tools for Farmed Smart

- Defendable, Quantifiable, and Credible tools and models used to determine certification ratings
  - RUSLE2
  - Standardized IPM and Nutrient Management Plan Templates
  - Field Scouting App
  - Crop Energy Estimation Tool
  - Certification Report
- Provided to Farmers to improve their operation through modeling

RUSLE2

- Revised Universal Soil Loss Equation, Version 2
- USDA-Agricultural Research Service (ARS) is the lead agency for developing the modeling science in RUSLE2 model.
- Predicts rill and interrill erosion (sedimentation delivery) by rainfall and runoff, defines Soil Tillage Intensity Rating and Soil Conditioning Index
- Inputs include soil type, slope of ground, annual precipitation rates, field preparation and seeding operations & equipment, crop rotation and residue management

RUSLE2 Example

- 3000 acres, Almira WA
- Soil Tillage Intensity Rating 11
  - Resistance to soil erosion is estimated by calculating Soil Tillage Intensity Rating (STIR). Acceptable range for Farmed Smart certification is 0 - 30.
  - In comparison at typical STIR for conventional system 80 -120
- Soil Conditioning Index
  - A cropping system with diverse crop rotations and cover crops, low disturbance, and high residue is building SOM and will have a positive SCI.

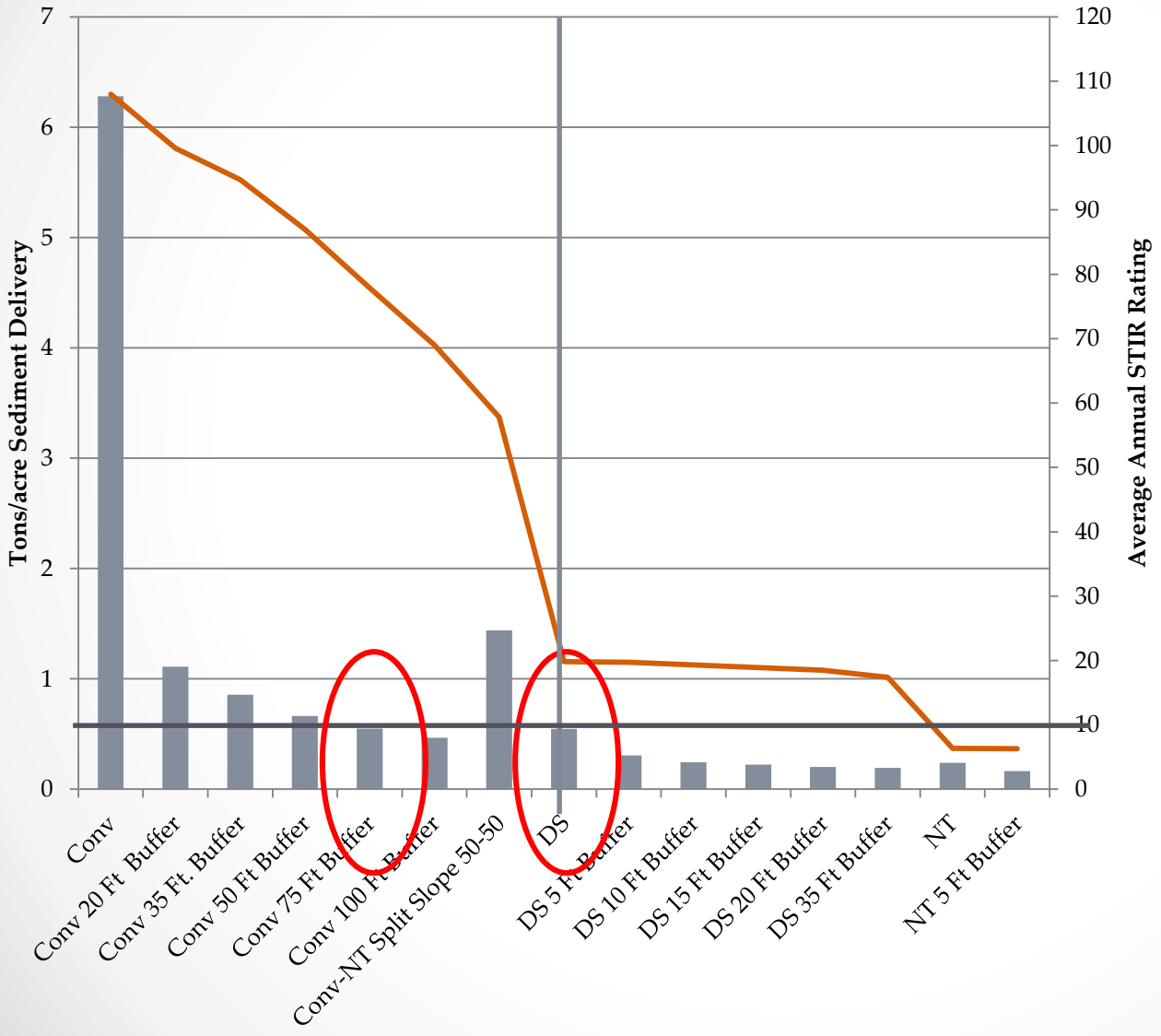
CROP INTERVAL EROSION:

Crop year	*Start date*	*End date*	*Crop*	*STIR*	--
1	8/2/-1	8/1/1	vegetations\Wheat, winter, CMZ 50 lo ppt, 16-18 in. spac. early plant	11	
2	8/2/1	8/1/2	vegetations\Barley, spring, CMZ 50, 7 in. spac.	11	
3	8/2/2	8/1/4	vegetations\Wheat, winter, CMZ 50 lo ppt, 16-18 in. spac. early plant	11	
4	8/2/4	8/1/5	vegetations\Wheat, spring, CMZ 50, 7-10 in. spac.	11	

SCI and STIR Output

Soil conditioning index (SCI)	*SCI OM subfactor*	*SCI FO subfactor*	*SCI ER subfactor*	*Avg. annual slope STIR*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*
0.76	0.49	0.93	0.97	7.23	0

Sedimentation Delivery Analysis



Conventional with 35 Ft. Buffer ~ .855 t/a/y

Sed. delivery, t/ac/yr

Average Annual STIR value

A direct seed field provides about the same buffer protection from sediment delivery as a high disturbance field with a 75 foot buffer ~ .5 t/a/y

Buffer Requirement

	Farmed Smart
Stream Type STIR	30 or Less + Farmed SMART Certified
Ephemeral/ Short Term Intermittent (0-6 Months) Stream Order 1, 2	Low Disturbance/High Residue Field is Buffer No Additional Setback Needed
Intermittent (7-10 months) Stream Order 2, 3	Additional 15 Ft. Setback (Filter Strip Standard)
Perennial (11+ Months) Stream Order 3, 4, 5	Additional 35 Ft. Setback (Filter Strip allowing bank vegetation)
Perennial Major Fish-bearing Stream Order 6+	Additional 50 Ft. Setback (Filter Strip allowing bank vegetation)

Protecting waterways while keeping working lands working

Direct Seed fields have high residue and water infiltration, so waterways are protected from sedimentation and chemical runoff

Cropland Energy Estimation Tool

- Developed by NRCS Energy Program
- Technically vetted and tested to be scientific correct
- Compares energy use, fossil fuel usage, chemical usage, and greenhouse emission between a high disturbance operation "benchmarked" and Farmed Smart "planned" operation
- Inputs include crop rotation; planting, weed and pest management; and residue management, soil health amendments, amount of chemicals used and energy to manufacture

CEET Example

- 1400 acre wheat-fallow farm Grant Co.
- Diesel Reduction

BENCHMARK

Diesel Use

Crop Name	Operation Description	No. Times	Diesel Use [gal/ac]
Wheat	Drill, deep furrow 12 to 18 in spacing	1	0.60
	Sprayer, post emergence	1	0.13
	Harvest, killing crop 50pct standing stubble	1	1.53
Fallow	Shredder, flail or rotary	1	0.73
	Sprayer, post emergence	1	0.13
	Chisel, st. pt. 5 in deep, coil tine har	1	0.96
	Harrow, spike tooth	1	0.34
	Sprayer, post emergence	1	0.13
	Sweep plow 20-40 in wide	1	0.74
	Fert applic. surface broadcast	1	0.16
	Cultivator, field with spike points	1	0.74
	Rodweeder	1	0.46
		Total:	6.65

PLANNED

Diesel Use

Crop Name	Operation Description	No. Times	Diesel Use [gal/ac]
Wheat	Drill or air seeder, hoe-chisel openers 12-15 in spac. with; fert op	1	1.30
	Sprayer, post emergence	1	0.13
	Harvest, killing crop 50pct standing stubble	1	1.53
	Sprayer, pre-emergence	1	0.13
		Total:	3.09

CEET Example

- Cost Comparison: 1400 acre farm in Grant County

Per Acre Costs

Energy Inputs (Added) to the Field	BENCHMARK Wheat-Fallow 2.00 yr				PLANNED Wheat-Fallow 2.00 yr				Difference
	Amount MMBTU/ac/yr	Energy Type	Amount Used [Unit/ac]	Cost [$/ac/yr]	Amount MMBTU/ac/yr	Energy Type	Amount Used [Unit/ac]	Cost [$/ac/yr]	Cost Change [$/ac/yr]
Field Operations	0.36	Diesel	2.56 Gal	$10.75	0.11	Diesel	0.78 Gal	$3.28	$7.48
Agrichemicals/Fertilizers	0.67	Agrichemicals	34.1 lb	$25.24	0.70	Agrichemicals	34.4 lb	$26.99	($1.75)
Soil Amendments	0.28	Soil Amend	0.03 ton	$0.63	0.28	Soil Amend	0.03 ton	$0.63	$0.00
Labor	0.00	Labor	0 day	$0.00	0.00	Labor	0 day	$0.00	$0.00
Total:	**1.41**			**$39.83**	**1.20**			**$34.10**	**$5.73**

Total Field Costs

Energy Inputs (Added) to the Field	BENCHMARK Wheat-Fallow 2.00 yr				PLANNED Wheat-Fallow 2.00 yr				Difference
	Amount MMBTU/yr	Energy Type	Amount Used [Unit]	Cost [$/yr]	Amount MMBTU/yr	Energy Type	Amount Used [Unit]	Cost [$/yr]	Cost Change [$/yr]
Harvested Operations	146.74	Diesel	1056 Gal	$4,433.94	146.74	Diesel	1056 Gal	$4,433.94	$0.00
Field Operations	491.06	Diesel	3533 Gal	$14,837.76	149.62	Diesel	1076 Gal	$4,520.88	$10,316.88
Irrigation Delivery Energy	0.00	Electricity	0 KWH	$0.00	0.00	Electricity	0 KWH	$0.00	$0.00
Other Delivery Energy	0.00	Electricity	0 KWH	$0.00	0.00	Electricity	0 KWH	$0.00	$0.00
Agrichemicals/Fertilizers	923.91	Agrichemicals	47092.5 lb	$34,824	967.04	Agrichemicals	47523.8 lb	$37,239	($2,415)
Soil Amendments	388.13	Soil Amend	34.5 ton	$863	388.13	Soil Amend	34.5 ton	$863	$0
Labor	0.00	Labor	0 day	$0.00	0.00	Labor	0 day	$0.00	$0.00
Total:	**1949.84**			**$54,959**	**1651.52**			**$47,057**	**$7,902**

CEET Example

- Reduction of Greenhouse Emissions

Energy Input	Units	Value	CO_2 [lb]	N_2O [lb]	CH_4 [lb]	Total CO_2 [lb]	SO_2 [lb]	NO_x [lb]
Liquid								
Diesel	Gal	2457.0	54,980.0	1.19	6.83	55,492.8	0.70	44.23

Certification Benefits

Environmental

- Decrease Soil Erosion by 95%
- Improve Water Quality
- Healthy Soil
- Reduced Chemicals through Precision Placement & Cover/Rotations
- Improve Air Quality
- Improve Wildlife Habitat

Regulatory

- Proactive approach to managing regulatory expectations
- Letter from Department of Ecology that certified farmers are meeting water quality regulations in WA state
- DEQ, Region 10 EPA, & Department of Ag potential support

Marketing

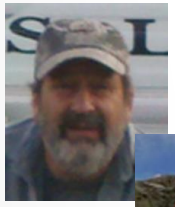
- Financial Incentives and Patronage Program
- Market Premium and/or Access
- Sought after by land-lords, retailers, certification partners
- Rebates
- Tax Credits for Equipment
- Higher ranking on NRCS programs

Progress to Date

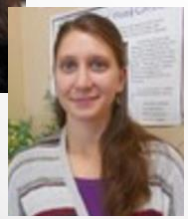
6 Farmed Smart auditors contracted and trained

- Conservation District Employees
- Certified Crop Planners
- Regional conservation experts

- Tami Stubbs



- Charlie Peterson
- Eric Choker

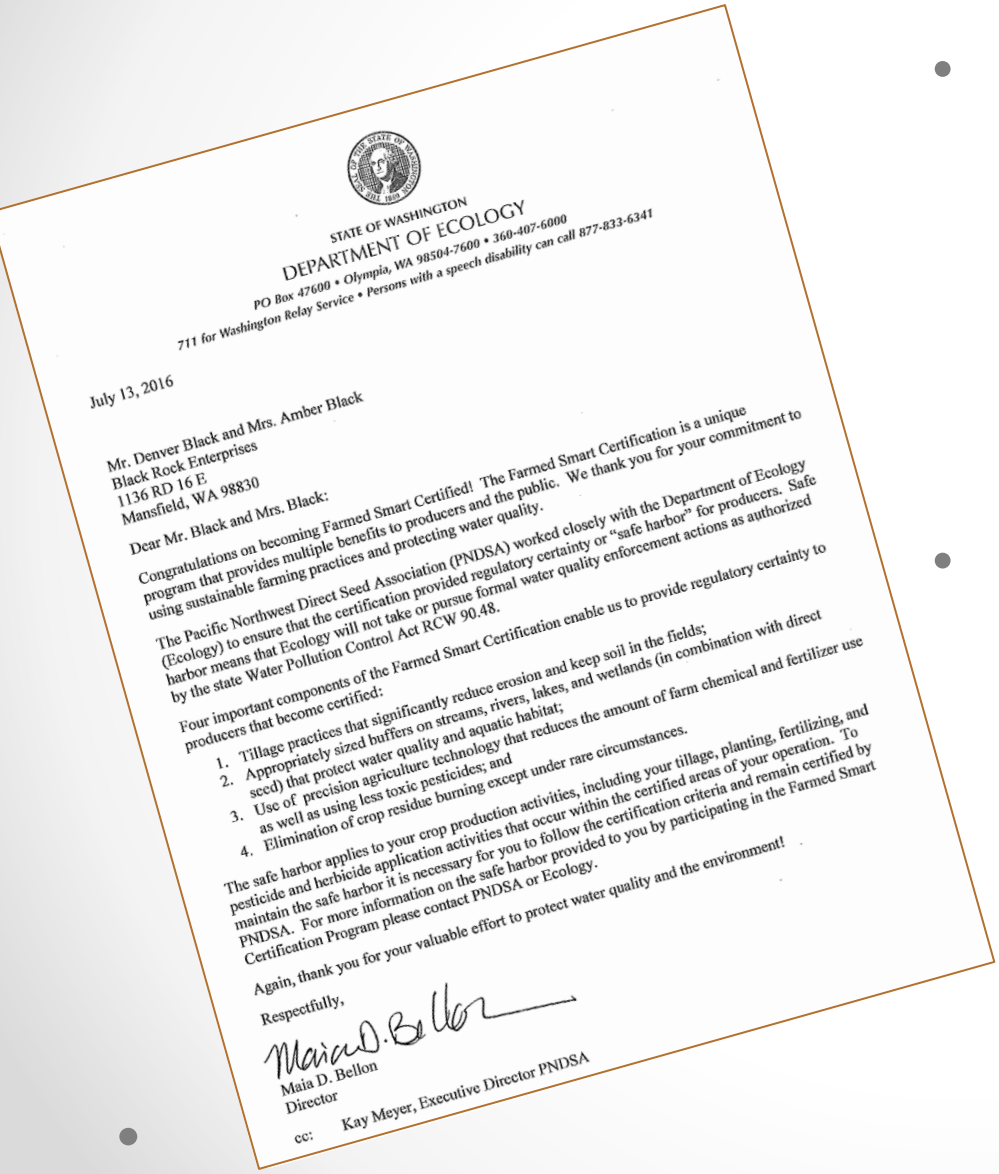


- Amanda Ward
- Liz Hanwacker
- Jon Merz

Certifications To Date

- 14 farmers certified to date
  - Reviewing certification ratings and making minor adjustments to document all practices/equipment
  - 45,000 acres and 20 miles protected waterways
- Goal of 40 Certifications Complete by year end representing 125,000 acres

Ecology's Letter of Support & MOU



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

July 13, 2016

Mr. Denver Black and Mrs. Amber Black
Black Rock Enterprises
1136 RD 16 E
Mansfield, WA 98830

Dear Mr. Black and Mrs. Black:

Congratulations on becoming Farmed Smart Certified! The Farmed Smart Certification is a unique program that provides multiple benefits to producers and the public. We thank you for your commitment to using sustainable farming practices and protecting water quality.

The Pacific Northwest Direct Seed Association (PNDSA) worked closely with the Department of Ecology (Ecology) to ensure that the certification provided regulatory certainty or "safe harbor" for producers. Safe harbor means that Ecology will not take or pursue formal water quality enforcement actions as authorized by the state Water Pollution Control Act RCW 90.48.

Four important components of the Farmed Smart Certification enable us to provide regulatory certainty to producers that become certified:

1. Tillage practices that significantly reduce erosion and keep soil in the fields;
2. Appropriately sized buffers on streams, rivers, lakes, and wetlands (in combination with direct seed) that protect water quality and aquatic habitat;
3. Use of precision agriculture technology that reduces the amount of farm chemical and fertilizer use as well as using less toxic pesticides; and
4. Elimination of crop residue burning except under rare circumstances.

The safe harbor applies to your crop production activities, including your tillage, planting, fertilizing, and pesticide and herbicide application activities that occur within the certified areas of your operation. To maintain the safe harbor it is necessary for you to follow the certification criteria and remain certified by PNDSA. For more information on the safe harbor provided to you by participating in the Farmed Smart Certification Program please contact PNDSA or Ecology.

Again, thank you for your valuable effort to protect water quality and the environment!

Respectfully,

Maia D. Bellon
Director

cc: Kay Meyer, Executive Director PNDSA

- *"ensure that the certification provides regulatory certainty or "safe harbor" for producers"*
- *"four important components enable use to provide regulatory certainty*
  - *no-till practices that significantly reduce erosion…*
  - *appropriately sized buffers…*
  - *use of precision ag technology…*
  - *no crop burning…"*

PACIFIC NORTHWEST direct seed ASSOCIATION

MOU Signing

PACIFIC NORTHWEST direct seed ASSOCIATION

MOU Signing

PACIFIC NORTHWEST direct seed ASSOCIATION

Other Regulatory Support

- Provide Farmed Smart overview with positive feedback from:
  - Oregon Department of Ag
  - Idaho Department of Environmental Quality
  - Environmental Protection Agency

Market Development Update

- Hired Blue Sky Marketing to develop Farmed Smart strategic marketing plan and partner program:
  - Agribusiness – Distribution Channel Partners
  - Environmental Partners
  - Consumer Partners

- Begin developing two PSA's and one Web Video

- Market development funded by Department of Ecology's Centennial Clean Water and Federal Clean Water Action (319)

Market Development Example

- Environmental Partners
- WeedIt Infrared Sprayer
- Spot Spraying Green Weeds in No-Till Fallow Field - Reduced 86% chemical application in one pass over 5000 acres

Tax Credit Example

- Tax credit for Farmed Smart farmers providing protected waterways, clean water, lower emissions, less greenhouse gases
- Farmer's Are Invested in Low Disturbance and Precision Ag Equipment to Improve Water Quality
  - No-Till Drill: $250,000 ($20,000 savings)
  - Quad Track: $300,000 ($24,000 savings)
  - Self Propelled Sprayer: $200,000 ($16,000 savings)
  - Precision Ag Equipment: $30,000 ($2,400 savings)
  - Stripper Header: $75,000 ($6,000 savings)
  - Combine: $250,000 - $1MM ($20,000 - $80,000 savings)

Additional Funding Partners

- NRCS RCPP - Farmed Smart Funding Awarded
  - Palouse Conservation District
    - Funding 1 FS auditor
  - Spokane Conservation District
    - Support FS outreach and education and technical assistance
- Farmed Smart Funding Requested
  - Okanogan Conservation District RCPP
    - Funding Farmed Smart audits, technical assistance for farmers, outreach and education
  - Department of Ecology 319 Funding
    - Farmed Smart implementation support

Additional Funding Partners

- Other Grants
  - Grant County Conservation District
  - Northwest Farm Credit Services
  - Responsible Nutrient Management Foundation

Farmed Smart Difference

- Innovative approach to protecting water quality
- Farmer led voluntary program
- Regulatory and environmental groups working with farmers to protect water quality
- Flexibility in best management practices so farmers can choose what works best in their region
- Educate environmental, policy groups and consumers about safe and sustainable farming practices
- Market development for long term funding from public and environmental partners

Pacific NW Direct Seed Association

www.directseed.org

Kay Meyer
Executive Director

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PO Box 5,
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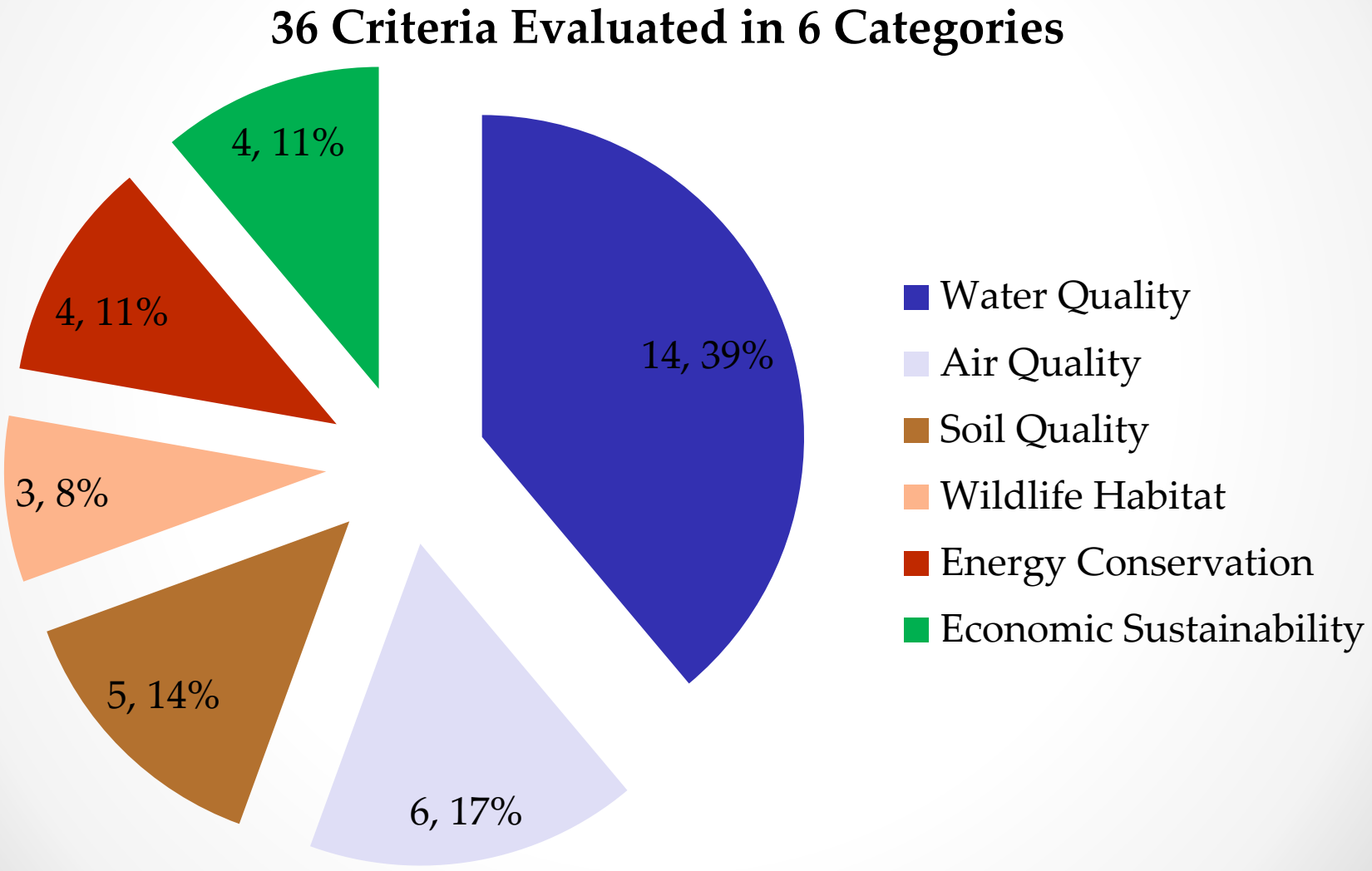
509-995-6335

Certification Criteria Overview



Criteria Development

- Points are awarded on a best management practices rating scale that allows for a variety of management methods and equipment to be used – a results-oriented approach
- Criteria ratings support a variety of direct seed equipment and cropping systems
- Cumulative score must be met with no disqualifying criteria
- Focus is dry-land commodity production ag:
  - Grains – Wheat, Barley
  - Legumes – Garbanzos, Lentils, Peas
  - Oilseeds – Mustard, Rape, Sunflowers, Triticale
  - Specialty: Flax, Millet, Quinoa

Water Quality Benefits

Thunderstorm in central WA carved a 6 foot gully off high disturbance field, causing tons of top soil to be lost

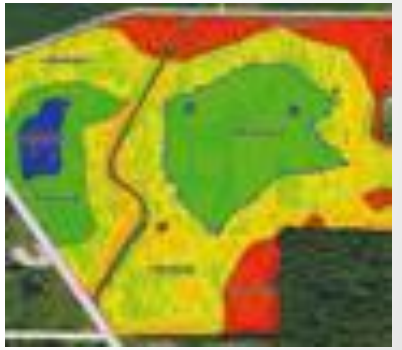
Low disturbance and high residue decreases run off by 97%

- Crop residue and root structure keep water in the field

- Rill and sheet erosion on high disturbance fields are common around the Palouse & Prairie

Water Quality Criteria

- Soil Tillage Intensity Rating
  - Using NRCS RUSLE2 Model
- Integrated Pest and Nutrient Management Plan
- Soil Testing
- Precision placement of nutrients using at least GPS up to variable rate application
- Implementing buffer strips along water sources with recognition



Air Quality Benefits

- Fields covered year round reduce dust storms
- Reduces emissions and use of fossil fuel

One pass seeding and fertilizing reduces impacts to climate change

Residue and cover crops keep ground covered year-round and protected from wind storms

Air Quality Criteria

- Use NRCS Crop Energy Model to determine reduction of greenhouse emissions
- Validate heights and methods used to keep crop residue in field
- Ensure preparing fields, seeding, and fertilizing occur in 1-2 passes
- No whole field burning

PACIFIC NORTHWEST direct seed ASSOCIATION

Soil Health Benefits

Every drop of water is captured and kept in the soil

Low disturbance soils have 40-50% higher water infiltration and holding capacity –
which means more water available for the crop to grow

PACIFIC NORTHWEST direct seed ASSOCIATION

Soil Health Benefits

Improves soil health & productivity

Minimizing disturbance of soil improves soil health, structure, and organic matter

Multi-species cover crop direct seeded near Nez Perce, ID

Soil Health Criteria

- Use of diverse crop rotations and cover crops
- Positive Soil Conditioning Index
- Monitor Soil Organic Matter
- Soil testing
-

Wildlife Habitat Benefits

- High residue fields provide food and cover for wildlife, increase water infiltration, and decrease sedimentation into streams and waterways, improving fish habitat

Wildlife Criteria

- Implementation of wildlife practices windbreaks, wetland preservation, bird houses, pollinators, riparian buffers, watering options, etc.
- CRP and direct seed fields

Energy Conservation Benefits

- Planting in 1 – 2 passes provides a minimum 50% reduction in fossil fuel usage
- Evaluated through fuel usage evaluation and use of alternate or renewable energy sources within their operation

Economic Viability

Reduces operation costs for famers

- Reduces fuel usage by 50%
- Reduces labor costs by 50%
- Reduces maintenance costs by 40%
- Better utilization of chemicals

Data based on direct seed mentoring program study conduct by Dr. Kate Painter, Ag Economist, 2010

Economic Viability Criteria

- Monitoring budgets, monitoring yields, monitoring input costs, bottom line
- Required to attend at least 4 training events/year

About the Graph

1. The sediment delivery analysis was conducted using NRCS RUSLE model to evaluate the Farmed Smart Sustainable Ag criteria and the affect of different cropping systems and filter strip sizes to determine their effectiveness in reducing sediment delivery from reaching waterways.
2. The RUSLE analysis was completed using the same assumptions of a 3-year crop rotation of fall wheat, legume, spring cereal; 22" average rainfall; same soil type and filed slopes. The variables that were adjusted were the level of disturbance in the cropping system measured by STIR (Soil Tillage Index Rating) and size of buffers.
3. Sediment Delivery from farm fields is graphed on the left axis with the farming system across the bottom axis. From left it show sediment delivery of a conventional tillage system and the associated sediment delivery. Moving across to the right shows differing levels of buffers and their effect on mitigating sediment delivery into waterways.
4. In the middle of the graph there is a vertical line showing that everything to the right of the line is below a 30 STIR rating (Soil Tillage Intensity Rating) which qualifies under NRCS practice standards as direct seed. The circle shows all of the direct seed systems' effect on sediment delivery with and without buffer systems.
5. The right hand axis and the red line show the STIR rating of each system. It is only a coincidence that the Conventional system sediment delivery bar meets the conventional system STIR rating of 108.

Key Findings

1. The horizontal orange line shows the sediment delivery of a conventional tillage system with a 35 ft. buffer. All of the direct seed and no-till systems easily achieve near 50% reductions above the best conventional system with a 35 Ft. buffer and they can do that without the implementation of a buffer along the waterway. With minimal setbacks from streams (5-10 Ft.) using direct seed or no-till, we can achieve up to 96% reductions in sediment delivery and associated nutrient runoff into waterways!

2. Direct Seed systems are providing substantial protection to waterways from sedimentation and chemical run off, which are the main drivers for non-point pollution in ephemeral and intermittent streams and these upland practices need to be acknowledged when determining buffer widths.

Summary of Stats

- Conventional system (Conv) with a 108 STIR without buffers along waterways has an approximate sediment delivery of 6.28 tons/acre/year.
- A conventional system with a 35 foot buffer has approximate sediment delivery of .855 tons/acre/year (an 86% reduction in sedimentation delivery without a buffer)
- A Direct Seed two pass system (DS) of a 20 STIR without buffers along waterways has an approximate sediment delivery of .55 tons/acre/year (36% better protection from sediment delivery than a conventional system with 35 foot buffer).
- A Direct seed system with a 10 foot buffer further reduces sediment delivery to .24 tons/acre/year (72% better protection from sedimentation delivery than a conventional system with a 35 foot buffer).
- A direct seed field without a buffer provides about the same protection from sediment delivery as a conventional system with a 75 foot buffer.