



Using GPS and VRT for  
precise implement guidance  
and fertilizer application to  
reduce nutrient loading in  
the environment

Anderson & Sons

4,000 ac in Latah and Nez Perce  
Co's

3-yr rotation-ww,sw,broadleaf

Direct-seeding started in 1996

- Rented drills
- Concord yr2000
- JD 1820 and 1860 yr 2005
- 46' ADX400(Flexicoil)2009

# GPS Adoption

- ▶ Sitewinder in spring 2005 (Tammany sprayer)
  - Added autosteer in 2006
- ▶ Trimble EZ Guide 500 in 2007
  - Added autoboom in 2008 (Genesee sprayer)
- ▶ Raven Viper Pro in 2008
  - SmarTrax autosteer (1820 drill)
  - AccuBoom in 2009 – 4-section  $\text{NH}_3$
  - VRT on 1-product control in spring 2009
  - VRT both  $\text{NH}_3$  and Dry in fall 2009

# What is VRT?

- ▶ VRT = Variable Rate Technology
  - Using Viper Pro to automate rate changes across a field
    - ▶ NH<sub>3</sub> and Dry-blend
- ▶ Why would we automate this?
  - Raven 440 had *Rate 1* and *Rate 2*
    - ▶ Forget to change rate back
    - ▶ Sometimes don't realize different zones from tractor

# How to use VRT?

- ▶ Yield maps and soil-tests should help create zones
- ▶ SatShot remote sensing images
  - IR and NDVI satellite images
  - Alternative method for zone creation
    - ▶ Crop greenness/density if no yield map available
    - ▶ Or, combine/layer with yield data
    - ▶ Use instead of yield data
- ▶ Combined with auto-steer/auto-boom to maximize efficiency and product savings

# Change occurs when.....

- ▶ Not when you see the light, but
- ▶ When you feel the heat!
  - Record-high fertilizer prices in 2008
  - Fuel prices over \$4.00 per gallon
- ▶ Payoff would be much slower at today's input prices.
- ▶ Position our farm to be competitive

# How we got started

- ▶ Willingness to Change
- ▶ Local interest in VRT
- ▶ Combine trades with AFS
- ▶ Latah Soil & Water Conservation District alerted us to NRCS web site
- ▶ Explored and started the CIG process

# One of many forms to submit

- ▶ Quarterly Progress Report
- ▶ Request for Reimbursement
- ▶ Annual Financial Status Report
- ▶ Report of Goods & Services Completed, but not yet paid.

REQUEST FOR ADVANCE OR REIMBURSEMENT		OMB APPROVAL NO. 0348-0004		PAGE 1 OF 1 PAGES	
1. TYPE OF PAYMENT REQUESTED <input type="checkbox"/> ADVANCE <input checked="" type="checkbox"/> REIMBURSEMENT <input type="checkbox"/> FINAL <input checked="" type="checkbox"/> PARTIAL		2. BASIS OF REQUEST <input checked="" type="checkbox"/> CASH <input type="checkbox"/> ACCRUAL			
3. FEDERAL SPONSORING AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH THIS REPORT IS SUBMITTED <i>NRCS, Idaho</i>		4. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER ASSIGNED BY FEDERAL AGENCY <i>68-0211-8-153</i>		5. PARTIAL PAYMENT REQUEST NUMBER FOR THIS REQUEST <i>1</i>	
6. EMPLOYER IDENTIFICATION NUMBER <i>82-0413802</i>		7. RECIPIENT'S ACCOUNT NUMBER OR IDENTIFYING NUMBER <i>10-1-08</i>		8. PERIOD COVERED BY THIS REQUEST FROM (month, day, year) <i>10-1-08</i> TO (month, day, year) <i>12-31-08</i>	
9. RECIPIENT ORGANIZATION Name: <i>Anderson &amp; Sons</i> Number and Street: <i>1291 Satter RD</i> City, State and ZIP Code: <i>Genesee, ID 83832</i>		10. PAYEE (Where check is to be sent if different than Item 9) Name: Number and Street: City, State and ZIP Code:			
11. COMPUTATION OF AMOUNT OF REIMBURSEMENTS/ADVANCES REQUESTED					
PROGRAMS/FUNCTIONS/ACTIVITIES		(a)	(b)	(c)	TOTAL
a. Total program outlays to date <i>12-7-08</i>		<i>\$ 25928.33</i>			<i>\$ 25928.33</i>
b. Less: Cumulative program income		<i>- 0 -</i>			<i>- 0 -</i>
c. Net program outlays (Line a minus line b)		<i>25928.33</i>			<i>25928.33</i>
d. Estimated net cash outlays for advance period		<i>- 0 -</i>			<i>- 0 -</i>
e. Total (Sum of lines c & d)		<i>25928.33</i>			<i>25928.33</i>
f. Non-Federal share of amount on line e		<i>12964.17</i>			<i>12964.17</i>
g. Federal share of amount on line e		<i>12964.16</i>			<i>12964.16</i>
h. Federal payments previously requested		<i>0</i>			<i>0</i>
i. Federal share now requested (Line g minus line h)		<i>12964.16</i>			<i>12964.16</i>
j. Advances required by month when requested by Federal grantor agency for use in making prescribed advances		1st month	2nd month	3rd month	
		-	-	-	
12. ALTERNATE COMPUTATION FOR ADVANCES ONLY					
a. Estimated Federal cash outlays that will be made during period covered by the advance				\$	
b. Less: Estimated balance of Federal cash on hand as of beginning of advance period				\$	
c. Amount requested (Line a minus line b)				\$	

AUTHORIZED FOR LOCAL REPRODUCTION (Continued on Reverse) STANDARD FORM 276 (Rev. 7-81) Prescribed by OMB Circulars A-102 and A-110

# Purpose of project

- ▶ Reduce N volume 10-15%
- ▶ Reduce P volume 5-10%
- ▶ Redistribute inputs where they are needed most
  - Improve crop quality – i.e. test wt and/or protein



# Stealth Opener

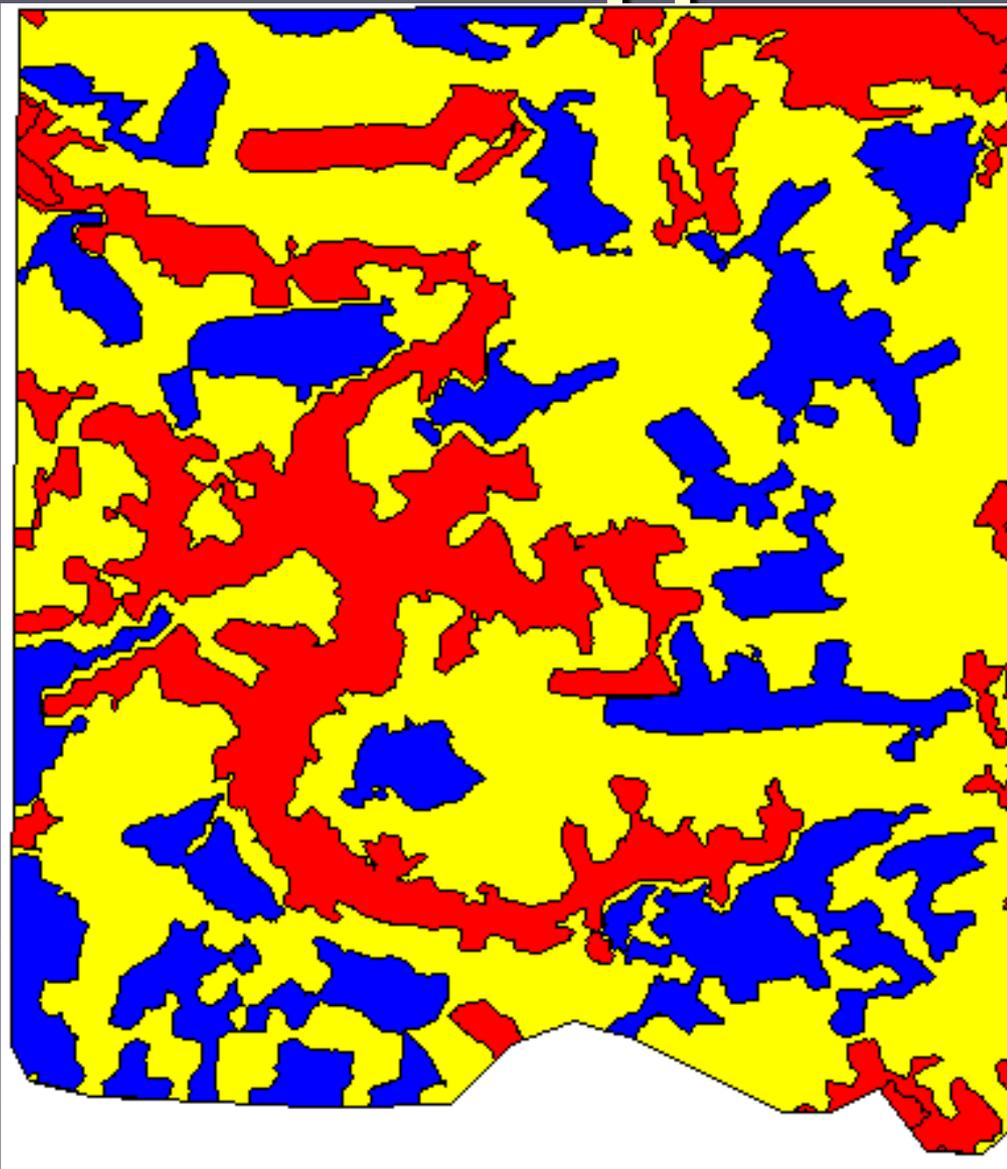


- ▶  $\text{NH}_3$  deep
- ▶ Dry P source with seed
- ▶ 4-section AccuBoom  
AccuBoom widely used in solutions, but not  $\text{NH}_3$  (5% -15% savings)
- ▶ VR both Dry &  $\text{NH}_3$  (5-15% savings)
- ▶ Autosteer (5% maybe)

# IMHO

- ▶ Yield loss is not acceptable
- ▶ MEY = MY
- ▶ VR is going to pay faster in fields with high levels of variability
  - We think we have that variability
  - Yield monitors confirm variability
  - Ground-truth variability with GPS soil samples

# VRA Upper – Fall 2009



Ave Yld	Ac in Zone	# N applied	# Dry applied
85	36	126	50
70	99	100	100
55	39	67	130

# Three Fields in One!

## *Soil Test Results by Zone - Upper SWW (top 24")*

	<u>Lo</u>	<u>Mid</u>	<u>High</u>	
	60	100	110	<i>Yield Goal</i>
<b>NO3</b>	59	44	18	
<b>NH4</b>	21	15	16	
<b>P (ace)</b>	1.9	3.4	4.5	
<b>K</b>	46	147	190	
<b>S</b>	2	2	2	
<b>OM%</b>	1.97	3.37	3.9	

# N/P/K application affected by yield potential and soil test results

## *Fertility Guide Results by Zone for Upper SWW*

	<u>Lo</u>	<u>Mid</u>	<u>High</u>	Yield Goal
<b>N</b>	60 94	100 196	110 246	
<b>P</b>	55	25	10	
<b>K</b>	60	0	0	
<b>S</b>	20	20	20	

# Validate if VRT works/pays

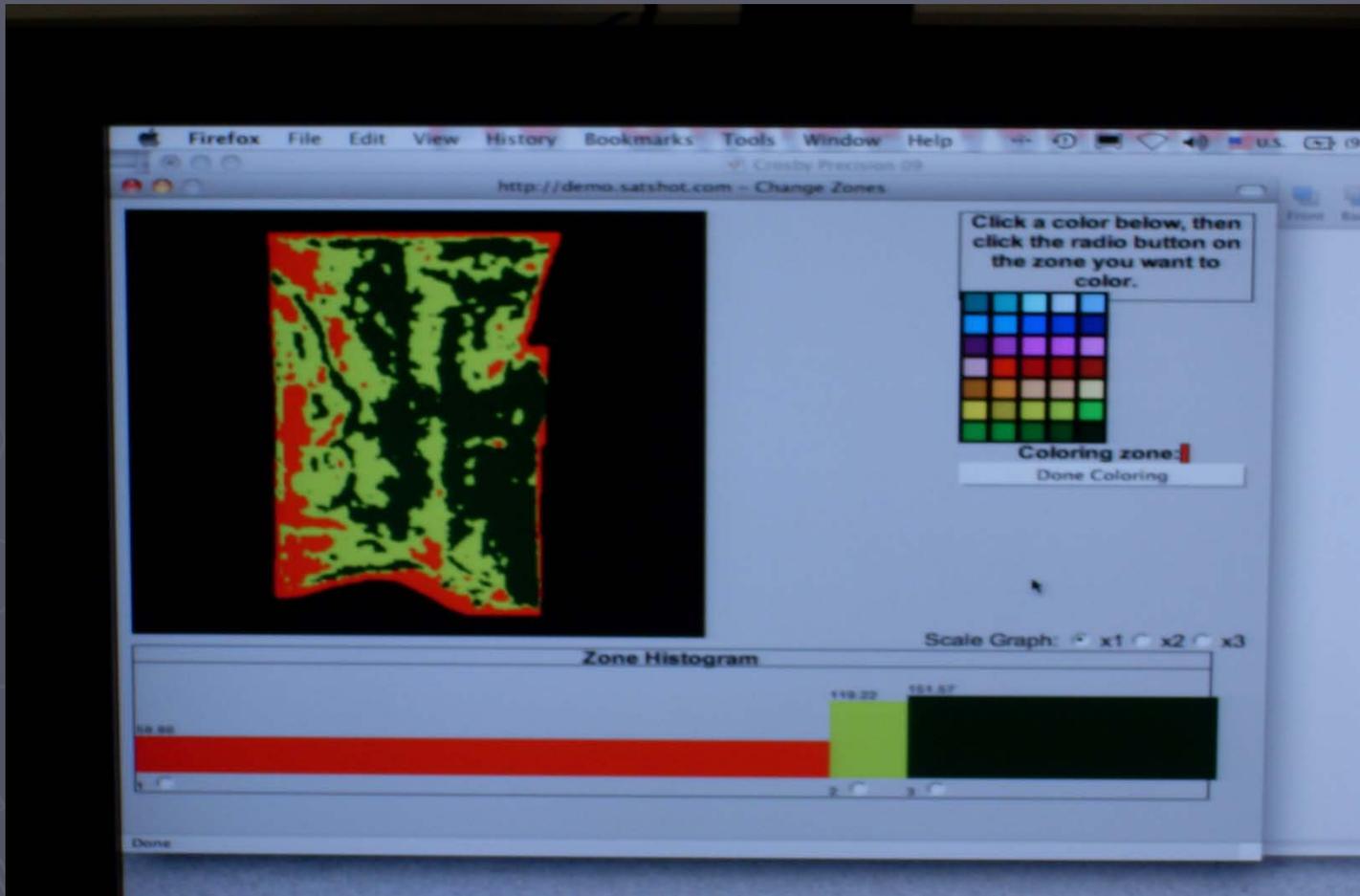
- ▶ Economic analysis of:
  - Average yield compared to VRT yield
  - Resulting cost-savings
  - Resulting equipment costs
- ▶ Harvest plots with yield monitors
  - Reduced P in good soils
  - Reduced N in lower production zones
- ▶ Had plans for plots to verify with weight wagon/scales – nearly impossible
- ▶ Will compare to nearby fields with uniform fertilizer application

# Brand new Flexicoil and threw away dry fert drive

- Built so mechanical drive could be reinstalled



# SatShot Image



# Case ADX400(Flexicoil) on Autosteer



# HRW on DNS stubble



# The 30000 ft view



- ▶ High input prices will drive adoption
- ▶ Consultants with tech skills will be necessary for a lot of us
- ▶ When margins get slim again, VRT will be a survival tool