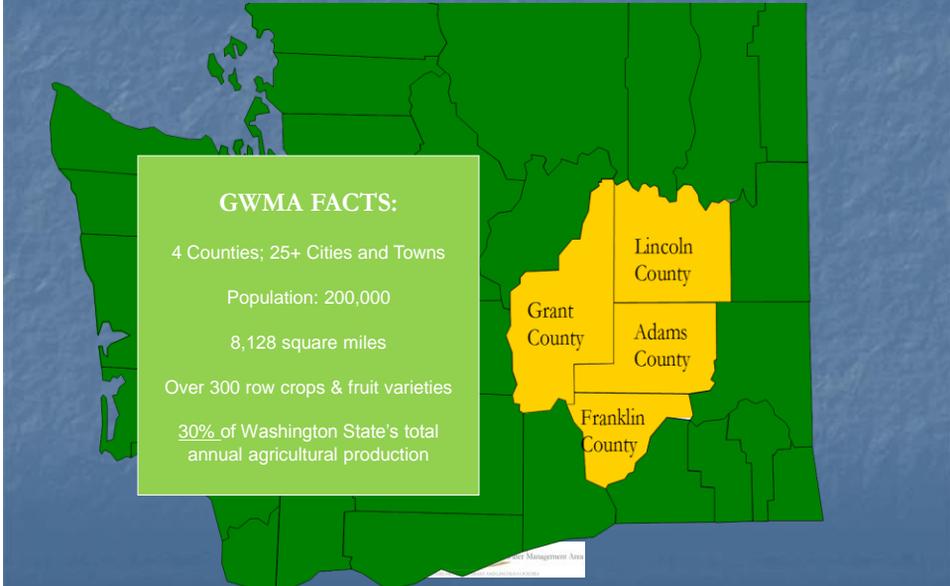
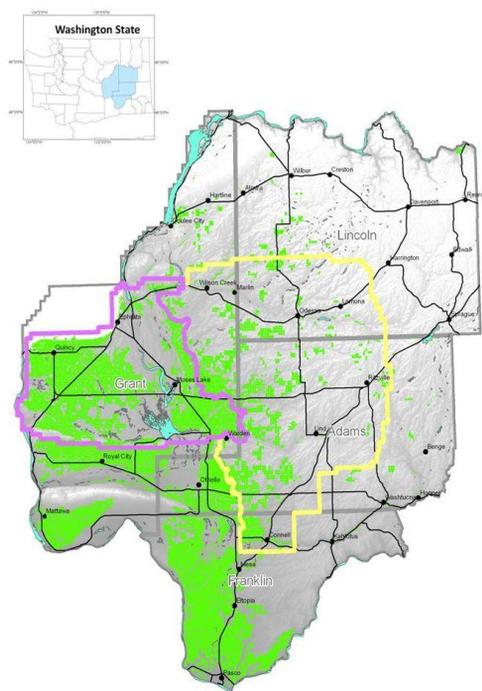


Columbia Basin Ground Water Management Area (GWMA)



Columbia Basin Ground Water Management Area





DEEP SOIL SAMPLING

- ∩ The Deep Soil Sampling program is designed to educate land owners and managers on the presence of nitrate in the soil profile and to monitor the effectiveness of best management practices in nitrate movement. Through this program, the land owners and managers will receive baseline or supplemental analysis data on the presence of nitrate at one-foot increments in their soil with full or substantial cost coverage of the sampling and analysis born by GWMA.
- ∩ The five-year program began in the spring of 2000. Land owners and managers in Adams, Franklin and Grant counties are being offered the opportunity to have deep soil sampling of their property paid for by the GWMA.
- ∩ The purpose of the Deep Soil Sampling program is to provide owners and managers of Basin farmers, golf courses, sprayfields and parks with information regarding the presence of nitrate in their soil to a level of 10 feet or the impeding layer.
- ∩ Funding is limited to \$150 per composite sample per field to a maximum of \$1,000 per property owner. Cooperators have been asked to sign up the same fields for a period of five years. Analysis results will be used to develop trends in the effectiveness of best management practices in regard to nitrate movement in the soil profile.



REASON FOR THE PROJECT

- ∩ GWMA initiated a baseline well sampling program in the fall of 1998. In addition, Irrigation Water Management was introduced as a BMP in the summer of 2000. In order to educate growers, and quantify the potential extent of agriculture's contribution to nitrates in groundwater, the Executive Board initiated a Deep Soil Sampling program in 2000. Due to the initial success of the program, and its applicability for long-term sampling, it has continued to some extent through 2005. Soil samples to 10 feet of depth are taken to profile the amount and location of nitrate in the soil profile.
- ∩ This cost share program utilizes the power of imparting knowledge to growers as to past nitrogen practices and how they can impact the current amount and location of nitrate in the soil profile. The idea is to inform and educate growers of the need to be more judicious in fertilizer and water applications. It can also serve to introduce the importance of doing Irrigation Water Management. Another potential value of the program is to monitor implementation of IWM BMPs over time.

GOALS AND OBJECTIVES

1. Set up standards, and utilize an EPA approved Quality Assurance Project Plan for the collection of soil samples.
2. Educate consultants and CD Staff on the standards and set up programs to work with growers for the implementation and use of these guidelines.
3. Attend meetings, fairs, forums, and other venues to give presentations, and promote DSS concepts. Offer signups for DSS cost share.
4. Compute budget numbers that will determine actual participants.
5. Calculate cost share amounts and distribute funds to participating growers who meet the standards.
6. Use CD and consultant personnel for technical assistance in enrolling growers in the DSS program and to insure guidelines are being followed.
7. Sample fields to a depth of 10 feet, and analyze for nitrate content per foot of soil depth sampled.
8. Geo-reference the sampled area so that a return visit can be made in subsequent years to continue tracking nitrate location and movement.
9. Supply results to growers, and give a reasonable explanation of the results.

Cost-Share to Growers

Ω Major Emphasis:

- **To Provide Monetary Incentives to Growers for Implementation of Nutrient and Irrigation BMPs**

Ω Carrot approach - not a stick!



DEEP SOIL SAMPLING EDUCATION PROGRAM

- ∩ **Purpose - Education of Cooperating Person**
 - Can't fix a problem until convinced you have one.
- ∩ **Available to all GWAC's**
- ∩ **How to Accomplish**
 - Help of Conservation Districts
 - Help of Participating Labs/Consultants



Methods & Conditions

- ∩ **Sample to depth of impeding layer or 6 - 10 feet.**
- ∩ **Test for Nitrate per foot of depth sampled**
- ∩ **Sample to be taken by a participating lab or soil nutrient consultant**
- ∩ **Results shared with Cooperator by Lab or Consultant.**



PROJECT DESCRIPTION

- ❏ GWMA started the Deep Soil Sampling Program early implementation program in 2000 and had approximately 240 growers apply for the program. Nearly 300 growers applied for the DSS program in 2001 and 374 applied in 2002. GWMA contacted Conservation Districts and Private Consultants and updated their list of those who had the capability of obtaining soil samples through a 10-foot soil profile depth. A revised list of providers of the service was prepared and distributed to those growers who were randomly selected to participate in the program from GWMA signup lists.
- ❏ The soil profile is sampled in one-foot intervals to a depth of 10 feet. Each foot of soil is analyzed for nitrate content, and the results reported in parts per million, and also converted to pounds per acre.
- ❏ Each sample source is located by GPS coordinates so that it can be revisited for sampling purposes in future years. This allows a comparison in management practices and cropping rotations over time, and is a valuable component of GWMA's long term monitoring program.
- ❏ Results will be returned to each grower by the provider of the service along with an explanation of the meaning of the results. In many cases, it is possible to determine the impact of crop rotation, soil type, and irrigation type on the location of nitrates in the soil.



OUTCOME MEASUREMENTS

- ❏ In early 2003, a review was made of the accomplishments of this program, and it was determined that it had accomplished most of the purposes for which it was originally established. Growers have responded positively about the value of the information they have received. Farm management practices have been changed to better manage fertilizer and water applications on crops, and this accomplished the original intent of the program.
- ❏ GWMA determined that it was important to keep a reduced version of the Deep Soil Sampling program in place in order to be able to introduce the educational concept of nitration migration through the soil to new growers, or participants that had not originally been part of the program. In some cases, the program has been carried out for multiple years on the same field to accomplish this purpose.
- ❏ The educational benefits derived from being able to physically demonstrate to growers the location of nitrates in the soil profile is invaluable. In addition, the information developed from the sampling will continue to allow GWMA to determine effectiveness of IWM, and nutrient BMP implementation.

ROW CROP SAMPLE

Date: 03/27/01
 Report No: S8477
 Grower: ~~Ground Water Management Area~~
 Client: Ground Water Management Area
 Sampler: Royal Consulting Service
 Project: GWMA 2001 Deep Soil Sampling Program



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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N #/cc	Lab #	Depth	Field ID	NO3 -N #/cc	Lab #	Depth	Field ID	NO3 -N #/cc
7400	1	UBS B87	499	7404	1	K-2	22	7444	1	TSK-4	11
7407	2		51	7425	2		5	7445	2		10
7408	3		52	7426	3		7	7446	3		16
7409	4		95	7427	4	row crop	14	7447	4	row crop	34
7410	5		67	7428	5		15	7448	5		25
7411	6	row crop	40	7429	6	row crop	24	7449	6	row crop	10
7412	7		53	7430	7		9	7450	7		18
7413	8		51	7431	8		8	7451	8		15
7414	1	G-1	21	7432	9		5	7452	9		14
7415	2		45	7433	10		8	7453	10		18
7416	3		57	7434	1	K-8	83	7454	1	W-2	42
7417	4		73	7435	2		89	7455	2		25
7418	5	row crop	41	7436	3		17	7456	3		35
7419	6		20	7437	4		19	7457	4	row crop	42
7420	7		25	7438	5	row crop	12	7458	5		46
7421	8		25	7439	6		13	7459	6		41
7422	9		51	7440	7		13	7460	7		40
7423	10		53	7441	8		12	7461	8		20
				7442	9		12				
				7443	10		15				

ORCHARD SAMPLE

Date: 02/27/02
 Report No: S18817
 Grower: ~~Deep Cereals~~
 Client: Royal Consulting Services
 Sampler: Deep Cereals
 Project: GWMA 2002 Deep Soil Sampling Program
 Sample Date: 02/27/02

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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N #/cc	Lab #	Depth	Field ID	NO3 -N #/cc	Lab #	Depth	Field ID	NO3 -N #/cc
7424	1	ORCHARD	20	7428	1	ORCHARD	1.0	7432	1	ORCHARD	0.0
7425	2		30	7429	2		0.0	7433	2		0.0
7426	3		11	7430	3		0.0	7434	3		0.0
7427	4	ORCHARD	11	7431	4		0.0	7435	4		0.0
7428	5		6	7432	5		0.0	7436	5		0.0
7429	6		6	7433	6		0.0	7437	6		0.0
7430	7		1	7434	7		0.0	7438	7		0.0
7431	8		1	7435	8		0.0	7439	8		0.0
7432	9		1	7436	9		0.0	7440	9		0.0
7433	10		1	7437	10		0.0	7441	10		0.0
7434	1	ORCHARD	2	7442	1	ORCHARD	0.0	7446	1	ORCHARD	0.0
7435	2		4	7443	2		0.0	7447	2		0.0
7436	3		4	7444	3		0.0	7448	3		0.0
7437	4		4	7445	4		0.0	7449	4		0.0
7438	5		2	7446	5		0.0	7450	5		0.0
7439	6		1	7447	6		0.0	7451	6		0.0
7440	7		1	7448	7		0.0	7452	7		0.0
7441	8		2	7449	8		0.0	7453	8		0.0
7442	9		1	7450	9		0.0				
7443	10		48	7451	10		0.0				

ROW CROP SAMPLES

Date: 4/18/2001
 Report No: _____
 Grower: _____
 Client: Ground Water Management Area
 Sampler: Professional Ag, Pasco
 Project: GWMA 2001 Deep Soil Sampling Program

SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N	Lab #	Depth	Field ID	NO3 -N
	ft		#/ac		ft		#/ac
		Sample # 5				Sample # 1	
8802	1		158	4408	1		21
8803	2		160	4409	2		15
8804	3		86	4410	3		12
8805	4		178	4411	4		10
8806	5		176	4412	5		16
8807	6		224	4413	6		12
8808	7		120	4414	7		16
				4415	8		15
				4416	9		12
				4417	10		16

1102

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ROW CROP SAMPLES

Date: 03/05/01
 Report No: S8164
 Grower: _____
 Client: Royal Consulting Service
 Sampler: Dean Alverson
 Project: GWMA 2001 Deep Soil Sampling Program



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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N	Lab #	Depth	Field ID	NO3 -N	Lab #	Depth	Field ID	NO3 -N
	ft		#/ac		ft		#/ac		ft		#/ac
3971	1	<i>U2 B83 Rill</i>	103	3985	1	<i>U26 B85</i>	31	3999	1	<i>U64 & 63</i>	133
3972	2		48	3986	2		14	4000	2		12
3973	3	<i>row crop</i>	5	3987	3		3	4001	3	<i>row crop</i>	8
3974	4		7	3988	4	<i>row crop</i>	3	4002	4		10
3975	1	<i>U2&3 B83 Circle</i>	25	3989	5		1	4003	1	<i>J70 B83 1/2 Circle</i>	89
3976	2		10	3990	1	<i>U40 B85</i>	27	4004	2	<i>row crop</i>	26
3977	3		21	3991	2		68	4005	1	<i>U87/88 B85</i>	25
3978	4		51	3992	3		134	4006	2		129
3979	5	<i>row crop</i>	40	3993	4	<i>row crop</i>	92	4007	3	<i>row crop</i>	41
3980	6		34	3994	5		113				
3981	1	<i>U25 B85</i>	17	3995	6		142				
3982	2		16	3996	7		96				
3983	3	<i>row crop</i>	8	3997	8		86				
3984	4		4	3998	9		24				

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ROW CROP SAMPLES

Date: 03/14/01
 Report No: SB321
 Grower: ~~John Village~~
 Client: Ground Water Management Area
 Sampler: Royal Consulting Service
 Project: GWMA 2001 Deep Soil Sampling Program



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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N #/ac	Lab #	Depth	Field ID	NO3 -N #/ac	Lab #	Depth	Field ID	NO3 -N #/ac
5561	1	U13 B83 North	30	5576	1	U30 B82 West	56	5587	1	U100/101 B Big Circle	24
5562	2	row crop	59	5577	2	row crop	70	5588	2	row crop	33
5563	3		57	5578	3		36	5589	3		23
5564	4		72	5579	4		4	5590	4		26
5565	1	U13 B83 S. 1/2 Circle	31	5580	5		11	5591	5	34	
5566	2	row crop	80	5581	6	U95/96 B81	8	5592	6	66	
5567	3		40	5582	1	33	5593	1	4		
5568	4		53	5583	2	170	5594	2	Orchard B 8	4	
5569	1	U30 B82 East	51	5584	3	row crop	112	5595	3	2	
5570	2		21	5585	4		45	5596	4	1	
5571	3	row crop	6	5586	5	39	5597	5	3		
5572	4		8		5598	6	Orchard	1			
5573	5		15			5599	7	2			
5574	6		17								
5575	7		19								

ROW CROP SAMPLES

Date: 03/08/01
 Report No: SB225
 Grower: ~~John Village~~
 Client: Ground Water Management Area
 Sampler: Royal Consulting Service
 Project: GWMA 2001 Deep Soil Sampling Program



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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	NO3 -N #/ac	Lab #	Depth	Field ID	NO3 -N #/ac	Lab #	Depth	Field ID	NO3 -N #/ac
4789	1	U68 B85	23	4802	1	U72/75 B82 North	100	4817	1	U76 B82 North	130
4790	2	row crop	31	4803	2	row crop	26	4818	2	row crop	42
4791	3		96	4804	3		9	4819	3		9
4792	4		43	4805	4		11	4820	4		8
4793	5		59	4806	1	U72/75 B82 South	141	4821	5	7	
4794	6		10	4807	2		113	4822	1	U76 B82 South	60
4795	7		11	4808	3	row crop	28	4823	2	14	
4796	8		23	4809	4	row crop	48	4824	3	9	
4797	1	U72/75 B82 Middle	141	4810	5		72	4825	4	3	
4798	2	row crop	90	4811	6		45	4826	5	9	
4799	3		10	4812	1	U76 B82 Middle	192	4827	6	10	
4800	4		9	4813	2		48				
4801	5		77	4814	3	row crop	2				
				4815	4		1				
				4816	5		44				

ROW CROP SAMPLES

4/9/2001 14:47 1809486266 JLD TESTING PAGE 01

Date: 03/19/01
 Report No: 88396
 Client:
 Sampler:
 Project: GWMA 2001 Deep Soil Sampling Program



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SOIL ANALYSIS REPORT

Lab #	Depth	Field ID	Crop	MOF #	Lab #	Depth	Field ID	Crop	MOF #	Lab #	Depth	Field ID	Crop	MOF #
8250	1	U7071 BEET		19	8250	1	U7071 BEET		19	8250	1	U7071 BEET		19
8257	2			7	8261	2			7	8261	2			7
8258	3			18	8262	3			18	8262	3			18
8260	4	row crop		46	8263	4	row crop		46	8263	4	row crop		46
8260	5			64	8264	5			64	8264	5			64
8261	6			23	8265	6			23	8265	6			23
8262	7			10	8266	7			10	8266	7			10
8263	1	U7071 BEET		19	8267	1			19	8267	1			19
8264	2			17	8268	2			17	8268	2			17
8265	3			17	8269	3			17	8269	3			17
8266	4	row crop		13	8290	1	U7071 BEET		13	8290	1	U7071 BEET		13
8267	5			8	8291	2			8	8291	2			8
8268	6			8	8292	3			8	8292	3			8
8269	7			9	8293	4			9	8293	4			9
8270	8			7	8294	5			7	8294	5			7
8271	9			1A	8295	6			1A	8295	6			1A
8272	10			11	8296	7			11	8296	7			11
8273	1	U7071 BEET		153	8297	8			153	8297	8			153
8274	2			150	8298	9			150	8298	9			150
8275	3	row crop		122	8299	1	U7071 BEET		122	8299	1	U7071 BEET		122
8276	4			126	8300	2			126	8300	2			126
8277	5			101	8301	3			101	8301	3			101
8278	6			70	8302	4			70	8302	4			70
8279	7			12	8303	5			12	8303	5			12
					8304	6				8304	6			
					8305	7				8305	7			