

Idaho State Department of Agriculture



Ground Water Program Annual Report

For 2006





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Division of Agricultural Resources

Water Quality Section

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Finally, we would like to express appreciation to a number of private groups who have participated in educational workshops, conferences, and meetings to help protect overall ground water quality in the state. These groups include the: Idaho Water Users Association, Idaho Crop Producers Association, Far West Agribusiness Association, Idaho Farm Bureau, Syngenta, Idaho Potato Association, Idaho Dairy Association, and Idaho Cattleman's Association.

Abstract

The Idaho State Department of Agriculture (ISDA) Ground Water Program implements monitoring and protection activities related to agriculture across the state of Idaho. The focus of these activities is to evaluate ground water quality in areas that may be impacted by agriculture and determine appropriate measures to prevent future detrimental land use practices. Evaluation efforts focus on the establishment of adequate ground water monitoring projects in areas susceptible to water quality problems to determine the extent, degree, and sources of contamination in agricultural areas. ISDA then implements educational, voluntary, and regulatory efforts as well as technical assistance to state, federal, local, and private entities to help correct problems that are contributing to ground water quality problems.

In 2006, the ISDA Ground Water Program implemented 31 distinct monitoring projects. Thirteen of these projects were regional projects, 12 were dairy or confined animal feeding operation (CAFO) projects, five were local nitrate or pesticide projects, three were pesticide related projects, and one was an Environmental Protection Agency (EPA) funded special pesticide monitoring project. Water quality findings from these 31 active projects indicated a varying degree of impacts to ground water with nitrate being the most common constituent of concern. Seven pesticide detections from testing in 2005 across the state were found at levels that initiated the formation or continuation of more intense pesticide projects in 2006 as mandated in the Rules Governing Pesticide Management Plans for Ground Water Protection (IDAPA 02.03.01).

Nitrate monitoring from these projects indicate many well locations across the state have significant nitrate impacts with many exceeding the EPA Maximum Contaminant Level (MCL) of 10 milligrams per liter (mg/L). Sixty three wells or 10 percent of 622 regional project wells sampled by the ISDA Ground Water Program in 2006 exceed the EPA MCL. All of the thirteen active regional projects show mean nitrate concentrations above 2 mg/L suggesting some anthropogenic impacts. Similarly, dairy and CAFO project monitoring show all the twelve active projects having mean concentrations above 2 mg/L in 2005. Ground water testing by the ISDA Dairy Bureau of 657 dairies in 2006 indicates 40 (6.1%) locations exceed the MCL for nitrate.

Pesticide testing of regional, local, and discretionary type projects indicates numerous detections in ground water. However, most detections are less than 20 percent of drinking water or health standard concentrations. Eleven sites tested in 2006 show levels that exceeded 20 percent of a health standard requiring additional response activities. These sites are located in Freemont, Owyhee, Nez Perce, and Payette Counties.

ISDA Ground Water Program staff participated, initiated, or provided technical assistance in many ground water protection activities. The Ground Water Program facilitated or participated in 22 educational workshops across the state and provided technical assistance to five Idaho Soil Conservation Districts with implementation of field projects to help improve Idaho ground water quality in high priority areas. The Idaho CAFO siting team lead by ISDA conducted 21 site assessments for new or expanding CAFOs with 17 low risk determinations and four moderate risk determinations.

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Introduction

Scope

The focus of this report is on ISDA Ground Water Program activities regarding monitoring and protection of Idaho ground water in agricultural areas of the state. The report provides a general overview of these activities and a more detailed synopsis of ground water monitoring findings and ground water projects in 2006. Monitoring from prior years and trend analysis over multiple years of monitoring is addressed in other ISDA Ground Water Program reports.

Monitoring Program Overview

ISDA's ground water quality monitoring effort is multifaceted to provide data and information to ISDA programs and for compliance with other Idaho plans, laws, and rules. ISDA conducts ground water testing activities that fall within distinct categories to fulfill a variety of needs and requirements. The general categories with a brief explanation are listed in the following subsections.

Regional Monitoring

The ISDA regional monitoring projects are located in areas where there is a moderate to high concern that ground water quality is susceptible to degradation from agricultural practices. The sampling design relies on a stratified random sampling framework. To determine new regional monitoring projects, ISDA utilizes data and information from the Idaho Department of Water Resources (IDWR) Statewide Ground Water Monitoring Network and other agency reports. Also, products created from the Ground Water Monitoring Technical Committee have been used to help determine new regional monitoring project locations

The establishment of a coordinated regional ground water quality monitoring effort is important for the overall protection of ground water quality in Idaho. The basis for developing a regional monitoring effort can be found in numerous documents including the: Ground Water Quality Protection Act of 1989, Idaho Ground Water Quality Plan, Agricultural Ground Water Quality Protection Program for Idaho; State Interagency Ground Water Plan Memorandum of Understanding; Dairy Water Quality Laws, Rules, and Memorandum of Understanding (MOU); Beef CAFO Laws, Rules, and MOU; and the Pesticide Laws, Rules, and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Cooperative Agreement with EPA.

Local Monitoring

Local ground water monitoring involves data collection in areas that are less than ten square miles. Local monitoring most effectively addresses determination of sources of contamination. ISDA conducts local monitoring activities related to pesticides and other potential agricultural contaminants (i.e., nitrate, bacteria). Local monitoring is often in response to one or more of the following situations: isolated pesticide detections, isolated nitrate detections above the maximum contaminant level, dairy and beef CAFO detections for nitrate above the maximum contaminant level at animal agriculture locations, and enforcement complaints.

Dairy and CAFO Monitoring

ISDA is monitoring ground water nitrate concentrations at all dairies in Idaho. Monitoring at Beef CAFOs is developing based on ground water protection priorities, enforcement, and response to complaints. The dairy ground water monitoring implemented jointly by the Dairy Section and the Division of Agricultural Resources Water Quality Section. ISDA's Dairy Section implements the Rules Governing Dairy Waste, IDAPA 02.04.14 (Dairy Waste Management Program). Under these rules, dairy operations are to prevent ground water contamination and also be in compliance with the Idaho Ground Water Rule of 1997 (IDAPA 58.01.11).

As part of this regulatory responsibility, ISDA is working with dairies to ensure compliance of waste systems for the protection of ground water quality. ISDA has developed a tiered approach for monitoring nitrate concentrations at dairy wells and to assess the source of nitrate in ground water at dairies. Once a determination of nitrate source is complete, then operational changes can be addressed to prevent further contamination.

BMP Effectiveness Monitoring

BMP effectiveness monitoring is the evaluation phase of the BMP feedback loop. The premise of the feedback loop is that nonpoint source pollution control is achieved through implementation of best management practices and effectiveness evaluation. Integrated BMP systems are used to prevent pesticides from leaching beyond the root zone. In areas where there is a pesticide concern, BMPs approved by the state will be implemented on the ground on a site specific basis and then evaluated through monitoring. These BMPs will be modified as needed to achieve water quality standards.

Water quality monitoring is performed to evaluate the effectiveness of BMPs in protecting water quality and to demonstrate compliance with nonpoint source water quality standards. One method of evaluation is to compare analytical results from representative ground water quality monitoring locations to the ground water quality criteria. Other techniques that may be used in conjunction with ground water monitoring include soil testing, vacuum lysimetry, and related techniques which can provide additional data for the evaluation of BMPs.

Protection Activities Overview

Ground water quality protection related to agriculture has been a focus in Idaho. The Idaho State Legislature passed the Ground Water Act (1989) and the Ground Water Quality Plan (1992) for overall guidance and protection of ground water. The Agricultural Ground Water Quality Protection Program for Idaho was passed by the Idaho Legislature, and signed by Governor Batt in 1995 and printed in 1996. ISDA is the lead agency in implementing the Agricultural Ground Water Quality Protection Program for Idaho (1996) through the Agricultural Ground Water Coordination Committee which meets quarterly. These plans and efforts are implemented in coordination with the Idaho Agricultural Pollution Abatement Plan (APAP) and various cooperating agencies.

The goal of the Agricultural Ground Water Quality Protection Program for Idaho (1996) is to protect the state's ground water and interconnected surface water from contamination originating from agricultural activities. The purpose of the program is to describe the management approaches to prevent ground water contamination and to respond to the occurrence(s) of such ground water contamination. Some of the objectives of the program are to: identify agricultural sources of ground water contamination, identify and describe the management approaches, identify and describe implementation strategies, and identify roles and responsibilities of agencies involved in the protection of ground water quality.

These potential agricultural contaminant sources and their impacts are, in part, addressed through education, BMPs, and potentially regulations. Some pollutant sources such as pesticides, dairies, beef CAFOs, and swine and poultry facilities are currently being addressed through regulations. Nonpoint source issues related to ground water protection, such as general agriculture and fertilizer use, are to be addressed through projects where best management practices (BMPs) are being implemented. An area of focus is related to aquifers that have been impacted by nitrate. These areas have been designated by the Idaho Department of Environmental Quality (IDEQ) as Nitrate Priority Areas. ISDA is leading the effort with the Idaho Soil Conservation Commission (ISCC), Idaho Soil Conservation Districts (SCDs), and the Natural Resources Conservation Service (NRCS) to develop agricultural implementation projects where the ISDA, ISCC, and landowners are providing matching funds and support. ISDA is providing BMP effectiveness monitoring.

Regional Ground Water Quality Projects

Site Selection

ISDA regional project locations are based on review of data from a variety of sources including the: IDWR Statewide Ambient Ground Water Program, IDEQ Public Water Supply Database, USGS ground water quality database, ISDA Dairy Ground Water Quality Database, and Farm Bureau ground water testing data. ISDA evaluates these data sources in addition to site recommendations from other agency water quality professionals for new regional project locations. ISDA Ground Water Program staff meet regularly to determine the need for new regional projects and to consider continuation or discontinuation of existing projects based on funding availability. ISDA Ground Water Program staff discuss this information with other state and federal water quality professionals at the Agricultural Ground Water Quality Coordination Committee during quarterly meetings each year. Current regional project locations are situated in areas known to have concerns for nitrate and/or pesticides in ground water.

<u>Design</u>

The sampling design relies on a stratified random sampling framework. To determine the regional strata (aquifers), ISDA utilizes data and information from the IDWR Statewide Ground Water Monitoring Network. Also, products created from the Idaho Ground Water Monitoring Technical Committee have been used recently to determine new ISDA regional strata. Homogenous aquifer areas are delineated and considered strata and then the areas become part of numerous ISDA ground water monitoring projects. Under the stratified random sampling regime, sections are randomly selected and one well is randomly selected per section. The statistical element to be tested is a qualifying well (Table 1). A qualifying well is a well that: has a confirmed well log, has a confirmed owner and location, can be easily accessed, and can be sampled at an outdoor faucet that does not have any filters, surge tanks, chlorination devices, or water softening devices between the well and faucet. A statistical unit is a section of land (Table 1). A statistical population can be obtained within sections that are within the boundaries of each regional ground water strata (Table 1). A statistical frame consists of maps of sections of land within each regional ground water strata (Table 1). A statistical probability analysis then is completed on preexisting water quality data to determine the

number of wells needed to be monitored to provide an overall high probability of defining the true water quality of a given strata.

Table 1. Project design, statistical categories and factors.

Statistical Category	Statistical Factor			
Element	A qualifying well			
Sampling Unit	A section of land			
Population	Sections in each of the regional ground water strata			
Frame	Detailed map of sections of land in each of the regional			
	ground water strata			

Each regional project is designed to be sampled for five years on an annual basis for nutrients, common ions, and pesticides. Pesticide results from the first year are evaluated to determine the extent of future pesticide monitoring. If there are limited detections the first year, further monitoring for pesticides occurs during the third and fifth sampling years. Subsequent long term monitoring is addressed in the fifth year of each project. Pesticide sampling at those wells that have pesticides detected at greater than 20 percent of a reference point commonly is continued in the following year and local project activities may be initiated if follow-up testing result warrant increased attention. All projects require a project monitoring plan to be written prior to formal project sampling.

Standard Operating Procedures

For all projects and monitoring activities, ISDA Ground Water Program staff adheres to established Standard Operating Procedures (SOPs) written by ISDA Ground Water Program staff and kept on file at ISDA. These protocols establish set guidelines for monitoring projects, monitoring wells, quality control and assurance, shipping and handling, laboratory requirements, and other protocols essential to quality work. ISDA staff also follows the ISDA Quality Management Plan (QMP), and Quality Assurance Project Plan (QAPP) which meets EPA standards and concurrence.

Current Project Areas

The ISDA Ground Water Program currently is implementing regional monitoring activities through 15 distinct projects in the state (Figure 1). Thirteen of the 15 projects were actively monitored in 2006. Projects are named relative to their respective regional part of the state and been assigned distinct project numbers for tracking purposes. Regional projects have been started at a variety of times over the last 10 years and thus are in different stages in terms of duration (Table 2). The number of wells sampled per active project area range from 25 to 73 with a total of 622 wells sampled in 2006 as part of the overall regional sampling effort (Table 3). The Eastern Snake River Plain Project and Rathdrum Prairie Project were not sampled in 2006 due to good water quality relative to agrichemicals that was determined over the initial five years of monitoring. Future testing of these projects will be completed to determine if good water quality is being maintained.



Figure 1. Map showing locations of 15 regional project areas.

Project No.	Project Name	Start Year	Status (2006)	Inorganics Testing (All wells-2006)	Pestcide Testing (2006)	Wells Monitored (2006)
	Lower Boise			nitrate, nitrite, ammonia,		
	Basin Regional			chloride sulfate, bromide,		
220	Study	2003	active	fluoride, orthophosphorus	none	59
	Washington and			nitrate, nitrite, ammonia,		
	Payette Counties			chloride sulfate, bromide,		
710	Regional Study	1996	active	fluoride, orthophosphorus	none	48
	Minidoka County			nitrate, nitrite, chloride		
	Shallow Aquifer			sulfate, bromide, fluoride,		
730	Regional Study	1997	active	orthophosphorus	none	42
	Minidoka County			nitrate, nitrite, chloride		
7.40	Deep Aquifer	1007		sulfate, bromide, fluoride,		
740	Regional Study	1997	active	orthophosphorus	none	45
	Jerome-Gooding-			nitrate, nitrite, chloride		
750	Lincoln Counties	1007		sulfate, bromide, fluoride,		72
/30		1997	active	ormophosphorus		15
	Gem and Payette			nitrate, nitrite, ammonia,	Iollow-	
770	Study	1008	active	fluoride orthophosphorus	up (2 wells)	40
110	Study	1770	active	nitrata nitrita ablarida	(2 wens)	40
	Twin Falls County			sulfate bromide fluoride		
780	Regional Study	1998	active	orthophosphorus	all wells	73
		1770	uotivo	nitrate nitrite chloride	un wens	10
	Cassia County			sulfate, bromide, fluoride.		
790	Regional Study	1998	active	orthophosphorus	all wells	46
	Central Henry's					
	Fork Basin			nitrate, nitrite, chloride		
	Aquifer Regional			sulfate, bromide, fluoride,		
805	Study	2003	active	orthophosphorus	all wells	45
0.20	Rathdrum Prairie	1000				0
820	Regional Study	1998	inactive	none	none	0
	N 11 1			nitrate, nitrite, chloride		
820	Mud Lake	1009	aatiwa	sulfate, bromide, fluoride,	all walls	20
830	Eastern Suales	1998	active	ormophosphorus	all wells	50
	Eastern Snake					
840	Regional Study	1008	inactive	none	none	0
040	Regional Study	1990	mactive	nitrata nitrita ammonia	follow	0
	Owyhee Regional			chloride sulfate bromide	ionow-	
860	Study	1999	active	fluoride, orthophosphorus	(1 well)	26
	Grand View and			nitrate, nitrite, ammonia	(1,,,,,)	
	Bruneau Area			chloride sulfate, bromide.		
865	Regional Study	2006	active	fluoride, orthophosphorus	all wells	25
	Clearwater Plateau			nitrate, nitrite, ammonia.	follow-	
	Aquifer Regional			chloride sulfate, bromide,	up	
950	Study	2001	active	fluoride orthophosphorus	(2 wells)	68

Table 2. ISDA regional project general information for 2006.

Water Quality Findings

Nitrate

Many of the projects established were developed in response to nitrate problem areas known or believed to exist in the state. As a result, many of the projects have served to better define the extent, possible sources, and overall severity of the problems in terms of median or mean levels, and MCL exceedances. In addition, many of the projects have been extended well beyond the original five-year plan to better understand the problem and to evaluate trends in nitrate concentrations in ground water. The focus of this annual report addresses only 2006 data and observed statistics and does not present an evaluation of trends. However, numerous ISDA project reports have been written, in part, addressing nitrate trends in Idaho ground water. These reports are available on the ISDA Water Program website at http://www.agri.idaho.gov/Categories/Environment/water/gwReports.php .

Descriptive statistics of ISDA regional projects indicate many areas in the state have elevated nitrate concentrations in ground water. Mean and median nitrate concentrations of wells tested during regional monitoring are found to be above background nitrate concentration of 2 mg/L suggesting some anthropogenic influences on ground water quality (Neely, 2004). All mean ground water nitrate concentrations per project exceed the 2 mg/L level (Table 3). Median ground water nitrate concentrations per project exceed the 2 mg/L level in 7 of the 13 regional projects (Table 3). Wells located in the Washington and Payette Regional Study have the highest mean and median values, 7.6 mg/L and 6.9 mg/L, respectively. The Central Henrys Fork Basin Aquifer Regional Study is next with a mean value of 5.6 mg/L and a median of 4.9 mg/L (Table 3).

		Nitrate Findings (2006)						
Project No.	Project Name	Wells Monitored	Mean (mg/L)	Median (mg/L)	High (mg/L)	Wells from 5 mg/L to 10 mg/L	Wells exceeding MCL (10mg/L)	
220	Lower Boise Basin Regional Study	59	2.9	1.6	14	11 (19%)	2 (3%)	
710	Washington and Payette Counties Regional Study	48	7.6	6.9	25	7 (15 %)	21 (44%)	
730	Minidoka County Shallow Aquifer Regional Study	42	4.5	4.2	13	17 (40%)	2 (5%)	
740	Minidoka County Deep Aquifer Regional Study	45	3.9	2.8	7.9	17 (38%)	0	
750	Jerome-Gooding-Lincoln Counties Regional Study	73	2.5	1.8	16	4 (5%)	1 (1%)	
770	Gem and Payette Counties Regional Study	42	3.2	1.2	22	6 (14%)	4 (10%)	
780	Twin Falls County Regional Study	73	4.6	4.5	14	30 (41%)	2 (3%)	
790	Cassia County Regional Study	46	5.5	4.7	17	15 (33%)	8 (17%)	
805	Central Henry's Fork Basin Aquifer Regional	45	5.6	49	48	13 (29%)	7 (16%)	
820	Rathdrum Prairie Regional Study	0	-	-	-	-	-	
830	Mud Lake Regional Study	30	2.7	2.3	10	4 (13%)	1 (3%)	

Table 3. Descriptive statistics of ground water nitrate concentrations from regional monitoring.

840	Eastern Snake Plain Aquifer Regional Study	0	-	-	-	-	-
860	Owyhee Regional Study	26	2.3	0.02	16	2 (8%)	3 (12%)
865	Grand View and Bruneau Area Regional Study	25	8.0	1.6	110	3 (12%)	5 (20%)
Clearwater Plateau Aquifer 950 Regional Study		68	3.6	1.3	39	10 (15%)	7 10%)
All Active Regional Projects Combined		622	4.3	2.8	110	140 (23%)	63 (10%)

Of the 622 wells tested, 23% or 140 wells had nitrate concentrations between 5 to 10 mg/L and 10% or 63 wells in the regional network exceeded the EPA MCL of 10 mg/L for nitrate (Table 3 and Figure 2). Ten projects had one or more wells with nitrate levels above the EPA MCL. The projects having the most wells exceeding the MCL include the (1) Washington and Payette Regional Study (44%), (2) Grand View and Bruneau Area Regional Study (20%) and (3) Cassia County Regional Study (17%) (Table 3). The highest single well detection for ground water nitrate (110 mg/L) was recorded from a well west of Grand View in Owyhee County. The Minidoka County Deep Aquifer was the only regional project in 2006 to have no wells with nitrate above the EPA MCL (Table 3).



Figure 2. Map showing nitrate detections in ground water from 2006 that exceeded the EPA MCL of 10mg/L. Detections are from regional monitoring projects only.

Pesticides

Table 4 presents the regional projects tested for pesticides in 2006, the number of wells sampled, and the type of pesticide analysis performed. A total of 219 wells were tested for various pesticides in the regional project areas in 2006.

Project Number and Name	Number of Wells Sampled	Analysis (EPA Method Number)
865 Grandview	25	507/508, 515.2, 632
805 Central Henrys Fork Basin	45	507/508, 515.2, 632
780 Twin Falls	73	507/508, 515.2, 632
790 Cassia	46	507/508, 515.2, 632
830 Mud Lake	30	507/508, 515.2, 632

Table 4. Summary of pesticide sampling in ISDA regional projects.

There were 119 positive detections in 219 wells (36%) during the 2006 regional project pesticide sampling, as seen on Table 5. Nineteen different types of pesticides were detected (Table 5).

Table 5. Summary of pesticide detections from ISDA regional project areas.

Pesticide	Number of	Range (µg/L)	Mean (µg/L)	Median	Reference Point	County of
245	Detections	0.01.0.0	0.60	(µg/L)	$(\mu g/L)$	Detection
2,4-D	9	0.21 - 2.2	0.62	0.42	70 (MCL) ¹	Cassia (1)
						Fremont (5)
						Teton (1)
						Twin Falls (2)
Atrazine	26	0.027 - 2.2	0.16	0.059	3 (MCL)	Cassia (11)
						Fremont (1)
						Jefferson (1)
						Owyhee (4)
						Twin Falls (9)
Bentazon	1	0.23			$200 (HAL)^2$	Twin Falls
Bromacil	1	0.56			90 (HAL)	Twin Falls
Bromoxynil	1	0.13			$140 (RfD)^3$	Owyhee
Dacthal	3	0.091 - 2.2	0.86	0.28	70 (HAL)	Owyhee (1)
						Twin Falls (2)
Desethyl	55	0.025 - 1.4	0.091	0.045	4	Cassia (17)
Atrazine						Fremont (1)
						Jefferson(1)
						Owyhee (7)
						Twin Falls (29)
Desisopropyl	1	0.069			4	Fremont
Atrazine						
Diazinon	3	0.036 - 0.058	0.048	0.051	0.6 (HAL)	Cassia (2)
						Twin Falls (1)
Dicamba	1	43			200 (HAL)	Owyhee
Dinoseb	3	0.26 - 2.5	1.0	0.26	7 (MCL)	Fremont (2)
						Owyhee (1)
Diuron	3	0.028 - 0.2	0.091	0.045	10 (HAL)	Cassia
Hexazinone	4	0.051 - 0.087	0.069	0.068	400 (HAL)	Cassia (3)
						Twin Falls (1)
MCPA	1	0.48			4 (HAL)	<u>Jefferson</u>
MCPP	1	0.21			7 (RfD)	Twin Falls
Metribuzin	2	0.043 - 0.21	0.13	0.13	200 (HAL)	Fremont (1)
						Owyhee (1)
Simazine	2	0.042 - 0.053	0.048	0.048	4 (MCL)	Cassia
Tebuthiuron	1	0.86			500 (HAL)	Fremont
Triallate	1	0.095			$0.45 (FQPA)^5$	Fremont

¹MCL – EPA Maximum Contaminant Level

²HAL – EPA Health Advisory Level

³RfD – EPA Reference Dose

 4 Breakdown product of Atrazine. MCL of 3 µg/L for Atrazine will be used as Reference Point.

⁵FQPA – Food Quality Protection Act

ISDA regulates pesticide use and handling under Title 22 Chapter 34, Pesticides and Chemigation, Idaho Code. ISDA is the lead agency in developing the Idaho Pesticide Management Plan (PMP) for Ground Water Protection and the recently passed Rules Governing Pesticide Management Plans for Ground Water Protection. ISDA has the authority to implement pesticide programs through a cooperative working agreement with the EPA, Idaho state laws and department rules. The Idaho PMP outlines processes to protect ground water from pesticides and defines pesticide detections based on the concentration of the detection compared to a reference point. The reference point refers to health based concentrations. Idaho has adopted the EPA's MCLs in the Idaho Ground Water Quality Rule (1997). Where no MCL exists, the ISDA will use EPA Health Advisories Levels (HAL) first if they exist, and then an EPA Reference Dose (RfD) number.

The PMP breaks the pesticide detections into the following detection levels:

Level 1: Detection above the detection limit to less than 20% of Reference Point.

Level 2: Detection at 20% to less than 50% of Reference Point.

Level 3: Detection at 50% to less than 100% of Reference Point.

Level 4: Detection greater than 100% of Reference Point.

Figure 3 shows the pesticide detections for the Grandview regional project. A total of 25 wells were sampled for pesticides; nine wells had one or more positive pesticide detections within the ground



Figure 3. Pesticide results from ISDA 2006 sampling of Project 865: Grandview Regional Monitoring Project.

water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 7 wells. Atrazine was detected in 4 wells, bromoxynil, dacthal, dicamba, dinoseb, and metribuzin were detected in one well each. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP except for a Level 2 detection of dicamba located northwest of Grandview. ISDA will conduct follow up testing based on the elevated level of dicamba.

Figure 4 shows the pesticide detections for the Central Henry's Fork Basin regional project. A total of 45 wells were sampled for pesticides; 11 wells had one or more pesticides detected within the ground water. The most frequently detected pesticide was 2,4-D, which was detected in six wells. Dinoseb was detected in two wells. Desisopropyl atrazine and desethyl atrazine, breakdown products



Figure 4. Pesticide results from ISDA 2006 sampling of Project 805: Central Henry's Fork Basin Regional Monitoring Project.

of the pesticide atrazine, were each detected in one well. In addition, atrazine, metribuzin, tebuthiuron, and triallate were each detected in one well. All detections were below any health standards set by the EPA or the state of Idaho. One well located southwest of Drummond had a Level 2 dinoseb detection. One well located east of Ashton had Level 2 desethyl atrazine and Level 3 atrazine detections. ISDA will conduct follow up sampling on these two wells. One well located east of Ashton had a Level 2 triallate detection. This well has had historic elevated detections of triallate, and ISDA will continue to work with the homeowner and growers in the area to prevent an increase in concentration. The well water decreased from a Level 4 detection in 2005 to the current Level 2 detection in 2006.

Figure 5 shows the pesticide detections for the Twin Falls regional project. A total of 73 wells were sampled for pesticides; 35 wells had one or more positive pesticide detections within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 29 wells. Atrazine was detected in nine wells, 2,4-D and dacthal were each detected in two wells. The following pesticides were detected in one well each: bentazon, bromacil, diazinon, hexazinone, and MCPP. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP.



Figure 5. Pesticide results from ISDA 2006 sampling of Project 780: Twin Falls Regional Monitoring Project.

Figure 6 shows the pesticide detections for the Cassia regional project. A total of 46 wells were sampled for pesticides; 21 wells had one or more positive pesticide detections within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 17 wells. Atrazine was detected in 11 wells, diuron and hexazinone were each detected in three wells, diazinon and simazine were each detected in two wells, and 2,4-D was detected in one well. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP.



Figure 6. Pesticide results from ISDA 2006 sampling of Project 790: Cassia Regional Monitoring Project.

Figure 7 shows the pesticide detections for the Mud Lake regional project. A total of 30 wells were sampled for pesticides; 2 wells had one or more positive pesticide detections within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in one well. Atrazine and MCPA were each detected in one well. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP.



Figure 7. Pesticide results from ISDA 2006 sampling of Project 830: Mud Lake Regional Monitoring Project.

Local Ground Water Quality Projects

Site Selection

ISDA selects local project locations based on review of data from a variety of sources including the: IDWR Statewide Ambient Ground Water Program, IDEQ Public Water Supply Database, USGS ground water quality database, ISDA Dairy Ground Water Quality Database, and Farm Bureau ground water testing data. To develop new projects, ISDA evaluates these data sources and recommendations from other agencies. ISDA Ground Water Program staff meet on a regular basis to determine the need for new local projects as well as to consider continuation or discontinuation of existing projects while also considering available funding. ISDA Ground Water Program staff respond to complaints or concerns regarding potential local agricultural contamination of ground water and conduct onsite initial assessments to determine if future monitoring work is needed. ISDA Ground Water Program staff discuss this information with other state and federal water quality professionals at the Agricultural Ground Water Quality Protection Committee during quarterly meetings each year as well as the IDEQ chaired Ground Water Monitoring Technical Committee.

Design

ISDA Ground Water Program staff relies almost entirely upon sampling of privately owned domestic wells for local projects. Because local projects are typically less than 10 square miles, selection of wells for sampling is generally less stringent than for regional projects. Most wells within the area of concern may be sampled. When wells are abundant, selection is made by taking into account many

factors such as well placement, well depth, well log information, and proximity to area of concern. Monitoring wells are installed where deemed needed and funding is available. All projects require a project monitoring plan to be written prior to formal project sampling.

Standard Operating Procedures

For all projects and monitoring activities, ISDA Ground Water Program staff follows established protocols kept on file at ISDA. These protocols establish guidelines for establishing monitoring projects, monitoring wells, quality control and assurance, shipping and handling, laboratory requirements, and other protocols essential to quality work. ISDA staff also follow the ISDA QMP and QAPP which meet EPA standards and concurrence.

Project Areas

Although ISDA Ground Water Program staff sample a number of projects that fit the criteria of less than 10 square miles, only those not related to beef CAFOs or dairies are presented in this section. Beef CAFO and dairy related projects are presented in the Dairy and Confined Animal Feeding Operation Water Quality Projects section of this document. In 2006, staff implemented two local monitoring projects that meet this criterion. One project is located northwest of Eagle, Idaho and the other is located south of Mountain Home, Idaho.

Water Quality Findings

Nitrate

Elmore County Project

There were 26 wells analyzed for nitrate in the ISDA local project 810, located approximately three miles south of downtown Mountain Home (Figure 8). There were six wells (or 23% of wells tested) with concentrations over the EPA's MCL of 10 mg/L for nitrate, and most of the elevated wells were located near the intersection of S. 18th E. and Hamilton Roads (Figure 8).



Figure 8. Nitrate results from ISDA 2006 sampling of Project 810: Elmore County Local Project.

Table 6 presents statistics for the 26 wells sampled for the Elmore County local project. All wells tested had nitrate detections that were greater than the laboratory detection limit of 0.033 mg/L. Six wells, or 23% of the wells sampled, were over the EPA MCL for nitrate. Eight wells, or 31%, had nitrate concentrations ranging from 2 mg/L to less than 5 mg/L. The maximum detection was 31 mg/L. The median concentration was 3.9 mg/L, while the mean concentration was 7.9 mg/L. Sampling of this project will continue on a yearly basis indefinitely.

Concentration Range (mg/L)	Number of Wells
<ldl (0.033)<="" td=""><td>0</td></ldl>	0
LDL to <2.0	7 (27%)
2.0 to <5.0	8 (31%)
5.0 to 10	5 (19%)
>10	6 (23%)
Median Value (mg/L)	3.9
Mean Value (mg/L)	7.9
Maximum Value (mg/L)	31

Table 6.	Summary	of nitrate	concentrations	from	Project	810.
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Eagle Local Project

There were 18 wells analyzed for nitrate in the Eagle Local Project located approximately three miles northwest of Eagle along Beacon Light Road (Figure 7). There were seven wells (or 38.9% of wells tested) with concentrations over the EPA's MCL of 10 mg/L for nitrate (Figure 9).



Figure 9. Nitrate results from ISDA 2006 sampling of Project 530: Eagle Local Project.

Table 7 presents nitrate statistics for the 18 wells sampled for the Eagle local project. All wells tested had nitrate detections that were greater than the laboratory detection limit of 0.033 mg/L. Seven wells, or 38.9% of the wells sampled, were over the EPA MCL for nitrate. The maximum detection was 48 mg/L. The median value was 6.7 mg/L, while the mean value was 14 mg/L. Sampling of this project will continue on a yearly basis indefinitely.

Concentration Range (mg/L)	Number of Wells
<ldl (0.033)<="" td=""><td>0</td></ldl>	0
LDL to <2.0	3 (16.6%)
2.0 to <5.0	5 (27.8%)
5.0 to 10	3 (16.7%)
>10	7 (38.9%)
Median Value (mg/L)	6.7
Mean Value (mg/L)	14
Maximum Value (mg/L)	48

 Table 7. Summary of nitrate concentrations from Project 530.

Pesticides

Eagle Local Project

There were 18 wells analyzed for pesticides using EPA Methods 507/508, 515.2, and 632 in the Eagle Local Project located approximately three miles northwest of Eagle along Beacon Light Road (Figure 10). In addition, two wells were sampled for volatile organic compounds (VOCs).

Figure 10 and Table 8 presents the pesticide detections for the Eagle Local Project. A total of 18 wells were sampled for pesticides. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 11 wells. Dacthal was detected in 8 wells, and atrazine was detected in 7 wells. The VOC 1,2,3-trichloropropane was detected in 2 wells. All detections were below any health standards set by the EPA or the state of Idaho. All detections were within the Level 1 category established by the Idaho PMP.



Figure 10. Pesticide results from ISDA 2006 sampling of Project 530: Eagle Local Project.

Pesticide	Detections	Range (µg/L)	Mean (µg/L)	Median (µg/L)	Reference Point (µg/L)
1,2,3-Trichloropropane	2	2.4 - 4.4	3.4	3.4	$3 (MCL)^{1}$
Atrazine	7	0.025 - 0.065	0.033	0.029	40 (HAL) ¹
Dacthal	8	0.13 – 5.7	2.5	2.4	70 (HAL) ¹
Desethyl Atrazine	11	0.03 - 0.085	0.044	0.041	3

 Table 8.
 Summary of pesticide detections from ISDA Project 530: Eagle Local Project.

¹HAL – EPA Health Advisory Level

²MCL – EPA Maximum Contaminant Level

³Breakdown product of Atrazine

Dairy and Confined Animal Feeding Operation (CAFO) Water Quality Projects

ISDA is monitoring ground water nitrate concentrations at all dairies in Idaho. Monitoring at Beef CAFOs is developing based on ground water protection priorities, enforcement, and response to complaints. ISDA's implements the Rules Governing Dairy Waste, IDAPA 02.04.14 (Dairy Waste Management Program). Dairy operations are to prevent ground water contamination and also be in compliance with the Idaho Ground Water Rule of 1997 (IDAPA 16.01.11).

As part of this regulatory responsibility, ISDA is working with dairies to ensure compliance of waste systems for the protection of ground water quality. ISDA has developed a tiered approach for monitoring nitrate concentrations at dairy wells and to assess the source of nitrate in ground water at dairies. Once a determination of nitrate source is complete, then operational changes can be addressed to prevent further contamination.

Site Selection

Beef CAFO and dairy project locations are based on review of nitrate data, complaints, requests by other agencies, and assessments conducted by the ISDA Ground Water Program and inspectors. Ground Water Program and Animal Industries Division personnel meet regularly to discuss locations that are a priority for monitoring and evaluation.

Design

ISDA Ground Water Program staff rely almost entirely upon sampling of privately owned domestic wells to evaluate beef CAFO and dairy related projects. Monitoring wells are installed for those projects where deemed needed and funding is available. Since most beef CAFO and dairy projects are typically less than 10 square miles, ISDA staff selects wells that are available and meet the requirements needed for an upgradient – downgradient type study. In many cases, all wells within the area of concern are sampled. When wells are abundant and project areas are larger, selection is made taking into account many factors such as well placement, well depth, well log information, and proximity to the area of concern. All projects require a monitoring plan be written prior to sampling.

Standard Operating Procedures

Established protocols written by ISDA Ground Water Program staff are adhered to for CAFO projects. These protocols meet EPA standards and establish set guidelines for creating monitoring

projects, sampling wells, quality control and assurance, shipping and handling, laboratory requirements, and other protocols essential to quality work.

Water Quality Findings

Nitrate

The ISDA Water Program sampled 295 wells related to dairy and beef CAFO projects in 2006 (Table 9). Exceedance of the EPA health standard of 10 mg/L for nitrate varied between projects from 0% to 69%. Project locations, number of wells sampled, and nitrate statistics are listed in Table 9. Constituents tested for generally consist of (but are not limited to): Nitrate, Ammonia, Chloride, Sulfate, Total Coliform, E. Coli, and N15 Isotopes.

Table 9. Distribution of 2006 sampling for dairy and beef CAFO related projects.

Project Name	Sample Month	# Wells Sampled	# Wells over 10 mg/L Nitrate	Mean Nitrate	Median Nitrate	Max Nitrate	County	Geographic Location
Bliss	April	17	2	5.8	5.0	30.0	Gooding	NW of Bliss
Marsing	May	16	9	16.3	12.0	67.0	Owyhee	NW of Marsing
Sunnyside	May	35	23	15.7	15.0	72.0	Washington	South of Weiser
Bliss	July	17	1	3.9	4.1	10.0	Gooding	NW of Bliss
Dry Lakes	July	10	6	11.2	12.0	32.0	Canyon	South of Lake Lowell
American Falls	July	11	2	5.6	3.3	16.0	Power	South of American Falls
Cassia	August	52	16	8.4	7.8	23.0	Cassia	South of Burley
Buhl	August	34	2	5.8	5.8	14.0	Twin Falls	South of Buhl
Purple Sage	October	35	4	5.7	4.0	36.0	Canyon	North of Middleton
Bliss	October	16	0	4.4	5.3	8.6	Gooding	NW of Bliss
Marsing	October	16	11	17.9	14.0	65.0	Owyhee	NW of Marsing
Sunnyside	October	34	23	16.1	14.0	50.0	Washington	South of Weiser
Total		295						

Approximately 700 dairies are tested annually for nitrate by the ISDA Dairy Section (Table 10). Nitrate concentration statistics have remained fairly constant from 2002 through 2006 with approximately 5-6% of the dairies above the health standard, a mean value of approximately 3 mg/L, and an approximate median value of 2 mg/L.

Nitrate Concentrations	2002	2003	2004	2005	2006
(mg/L) & Statistics	# of Wells				
	(% of wells)				
0.0 to 2.0	323 (50%)	347 (49.3%)	375 (52.8%)	337 (50.5%)	330 (50.2%)
2.0 to 5.0	175 (27%)	200 (28.4%)	187 (26.3%)	186 (27.8%)	175 (26.6%)
5.0 to 10.0	113 (17%)	119 (16.9%)	111 (15.6%)	104 (15.6%)	112 (17.1%)
> 10.0	40 (6%)	38 (5.4%)	37 (5.2%)	41 (6.1%)	40 (6.1%)
Total	651 (100%)	704 (100%)	710 (100%)	668 (100%)	657 (100%)
Mean (mg/L)	3.4	3.3	3.2	3.4	3.5
Median (mg/L)	2.0	2.0	1.8	2.0	2.0
Maximum (mg/L)	41.5	28.7	33.3	50.2	37.2

Table 10. Dairy nitrate data summary, 2002 - 2006.

The ISDA CAFO Water Program implemented one new project in 2006 and expanded 3 others: one new project in Power County, an expansion of two projects in Canyon County (Dry Lakes and Purple Sage), and an expansion to quarterly sampling for one year in Gooding County (Bliss). Results are summarized and presented in the following sections for two of the projects implemented in 2006.

American Falls Project

The American Falls monitoring project began as a result of high nitrate concentrations detected in ground water at dairy and domestic wells northeast of American Falls, Idaho. Eleven wells were



Figure 11. American Falls Nitrate Concentrations, September 2006.

sampled in September 2006 for a variety of constituents, with a focus on nitrate (Figure 11). Well logs show alternating layers of sand and clay overlying gravel and/or sandstone with static water levels ranging from approximately 25-65 feet below ground level (BGL). Domestic wells are generally completed open hole in the gravel or sandstone with casing depths at approximately 200-300 feet BGL. Ground water flow direction is approximately to the west or southwest.

In September 2006, two wells exceeded the EPA drinking water standard of 10 mg/L for nitrate; the maximum nitrate concentration in a well was 16 mg/L (Table 11). Fecal coliform was not detected in any wells during the sampling event.

Nitrate Concentrations (mg/L) & Statistics	# of Wells (% of wells) mg/L
0.0 to 5.0	6 (55%)
5.0 to 10.0	3 (27%)
> 10.0	2 (18%)
Total	11 (100%)
Mean (mg/L)	5.5
Median (mg/L)	3.3
Maximum (mg/L)	16

Table 11. Nitrate concentration distribution and statistics in all wells sampled, American Falls Project, September 2006.

Dry Lakes Project

The Dry Lakes monitoring project began in April 2005 as a result of high nitrate concentrations detected in ground water at dairy wells south of Lake Lowell near Nampa, Idaho. Seven wells were sampled in the spring of 2005 with a follow-up sampling of ten wells in the summer of 2006 (Figure 12). Well logs indicate static water levels range from approximately 80-250 feet below ground level. Typically, well logs show top soil overlying deep basalts. Domestic wells are generally completed open hole in the basalt aquifer.

In July 2006, six wells exceeded the EPA drinking water standard of 10 mg/L for nitrate; the maximum nitrate concentration in a well was 32.0 mg/L (Table 12). Fecal coliform was not detected in any wells during sampling events in 2005 and 2006.



Figure 12. Dry Lakes Nitrate Concentrations, July 2006.

Table 12. Nitrate concentration distribution and statistics in all wells sampled, Dry Lakes Project, July 2006.

Nitrate Concentrations (mg/L) & Statistics	# of Wells (% of wells) mg/L
0.0 to 5.0	3 (30%)
5.0 to 10.0	1 (10%)
> 10.0	6 (60%)
Total	10 (100%)
Mean (mg/L)	11.2
Median (mg/L)	12.0
Maximum (mg/L)	32.0

Confined Animal Feeding Operation State Siting Team

On July 1, 2001, the "Site Advisory Suitability Determination Act" became law creating a confined animal feeding operation (CAFO) site advisory team comprised of members from ISDA, DEQ, and IDWR. The rules governing the CAFO site advisory team are followed to provide "suitability determinations" on proposed livestock operations based on environmental risk. The suitability determination is provided to the county for their consideration when deliberating permits.

IDAPA 02.04.18 states that a board of county commissioners may request the formation of a CAFO site advisory team to provide a site suitability determination. The team then develops and submits to the county a site suitability determination that contains three parts: 1) Risk Category: A determination of an environmental risk category: high, moderate, low, or insufficient information to make a determination; 2) Description of Factors: A description of the factors that contribute to the environmental risks; and 3) Mitigation: Any possible mitigation of the environmental risks.

Risk Category is determined through the combination of a point-based scoring system and professional judgment. The score sheet is divided into two sections consisting of environmental questions followed by a section of proposed management questions. Points are tallied in both sections and the final score, along with professional judgment, is used to assign a Risk Category. It is then the responsibility of the consultant and the county to ensure proper mitigation of environmental risk beyond that required by state and local regulations.

The CAFO Siting Team has conducted 80 site assessments since 2001 (Figure 13). The number of ratings by risk category are 60 low risks (75%), 19 moderate risks (24%), and 1 high risk (1%). Forty-three of the 80 assessments (54%) were conducted for proposed new facilities and 37 (46%) were conducted for proposed expansions. Twelve counties have requested suitability determinations since 2001 (Table 13). Approximately two-thirds of the 80 CAFO sitings since 2001 have come from four counties: Jerome 22 (28%), Cassia 11 (14%), Gooding 11 (14%), and Twin Falls 9 (11%).



Figure 13. Idaho State CAFO Siting Team Assessments per Year

County	Total	Low Risk	Moderate Risk	High Risk
Jerome	22	16	6	0
Cassia	11	9	2	0
Gooding	11	9	2	0
Twin Falls	9	8	0	1
Minidoka	6	5	1	0
Elmore	5	3	2	0
Owyhee	4	1	3	0
Canyon	3	3	0	0
Lincoln	3	2	1	0
Payette	3	1	2	0
Ada	2	2	0	0
Jefferson	1	1	0	0
Total	80	60	19	1

Table 13. CAFO Suitability Assessments by County Since 2001.

Seven counties requested suitability determinations in 2006 (Table 6). Approximately 62% of the 21 CAFO sitings in 2006 came from two counties: 8 (38%) in Cassia and 5 (24%) in Gooding. CAFO sitings were conducted for the first time in 2006 in Ada and Jefferson Counties.

County	Total	Low Risk	Moderate Risk	High Risk
Cassia	8	7	1	0
Gooding	5	4	1	0
Ada	2	2	0	0
Jerome	2	1	1	0
Twin Falls	2	2	0	0
Jefferson	1	1	0	0
Minidoka	1	0	1	0
Total	21	17	4	0

Table 14. CAFO Suitability Assessments by County in 2006.

The Idaho State CAFO Siting Team conducted 21 site assessments in 2006 and 80 total assessments since 2001. A majority of suitability ratings since 2001 have been low risk (75%), approximately a quarter have been moderate risk (24%), and one site was high risk (1%). Four counties (Jerome, Cassia, Gooding, and Twin Falls) account for two-thirds of the assessments since the inception of the Site Advisory Suitability Determination Act in 2001. The number of sitings has increased each year from 2004 through 2006, with more than 20 assessments requested for the first time in 2006. This trend suggests that the number of CAFO siting requests will increase in 2007.

Pesticide Management Plan Projects

Overview

In response to elevated pesticide detections from the 2005 regional project area sampling, Pesticide Management Plan (PMP) monitoring projects were established. Additional wells surrounding the original elevated pesticide detection were sampled to determine the extent of the pesticide contamination. The projects were designed to gain a better understanding of contaminant contributions from potential pollutant sources. The information will be used to implement the Rules Governing Pesticide Management Plans for Ground Water Protection (IDAPA 02.03.01).

Water Quality Findings

Nitrate

Owyhee County

In 2006, 13 wells were analyzed quarterly for nitrate in the ISDA PMP project located approximately two miles south of Homedale along Succor Creek Road. The most recent data from the November 2006 sampling is shown in Figure 14. There was one well (or 8% of wells tested) with a concentration over the EPA's MCL of 10 mg/L for nitrate (Figure 14).



Figure 14. Nitrate results from ISDA November 2006 sampling of Project 310: Owyhee County Dacthal PMP response.

Table 15 presents statistics for the 11 wells that were consistently sampled quarterly during 2006 for the Owyhee County PMP project. More than 11 wells were sampled per event, however only the 11 wells that were sampled during each quarter are used for the statistics in Table 15. One well was over the EPA MCL for nitrate for each of the four sampling events during 2006. The maximum nitrate detection was 17 mg/L during the February sampling event. The median value ranged from 0.17 mg/L in May to 0.52 mg/L in August, while the mean value ranged from 2.2 mg/L in November to 3.0 mg/L in February.

Concentration Range (mg/L)	Number of Wells February 2006	Number of Wells May 2006	Number of Wells August 2006	Number of Wells November 2006
< LDL (0.033)	3	5	5	4
LDL to < 2.0	4	3	3	5
2.0 to < 5.0	1	1	1	0
5.0 to < 10.0	2	1	1	1
> 10.0	1	1	1	1
Mean (mg/L)	0.37	0.17	0.52	0.38
Median (mg/L)	3.0	2.4	2.6	2.2
Maximum (mg/L)	17	16	14	15

 Table 15.
 Summary of nitrate concentrations from Project 310.

Payette County

There were 7 wells analyzed for nitrate in the ISDA PMP project located in Payette County (Figure 15). There were two wells (or 29% of wells tested) with a concentration over the EPA's MCL of 10 mg/L for nitrate (Figure 15).

Nez Perce County

There were three wells analyzed for nitrate in the ISDA PMP project located in Nez Perce County. Two of the wells (or 67% of wells tested) had a nitrate concentration over the EPA's MCL of 10 mg/L. The maximum detection was 13 mg/L. The median value was 9.33 mg/L, while the mean value was 11 mg/L.



Figure 15. Nitrate results from ISDA 2006 sampling of Project 340: Payette County Atrazine and DEA PMP response.

Table 16 presents statistics for the 7 wells sampled for the Payette County PMP project. Two wells, or 29% of the wells sampled, had nitrate concentrations over the EPA MCL. The maximum detection was 14 mg/L. The median value was 7.1 mg/L, while the mean value was 6.7 mg/L.

Table 16. Summary of nitrate concentrations from Project	340.
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Concentration Range (mg/L)	Number of Wells
<ldl (0.05)<="" td=""><td>0</td></ldl>	0
LDL to <2.0	2
2.0 to <5.0	1
5.0 to 10	2
>10	2
Median Value (mg/L)	7.1
Mean Value (mg/L)	6.7
Maximum Value (mg/L)	14

Pesticide Results

Owyhee County

In 2006, 13 wells were analyzed quarterly for dacthal, along with other pesticides, in the ISDA PMP project located approximately two miles south of Homedale along Succor Creek Road.

The dacthal concentrations from the 11 wells that were sampled each quarter are presented in Table 17. More than 11 wells were sampled per quarter, however only the wells sampled every quarter are used in the statistics of Table 17. In February, six wells had Level 1 dacthal detections, one well had a Level 2 dacthal detection, and one well had a Level 3 dacthal detection. In May, the number of wells with a Level 1 dacthal detection remained consistent with the February sampling, while the number of wells with a Level 3 detection increased to two. In August, the number of wells with a Level 2 detection decreased to five. In addition, there were two wells with a Level 2 detection of dacthal. In November, the number of Level 1 dacthal detections remained at five wells, and there was one well with a Level 2 dacthal detection, and one well with a Level 3 dacthal detection.

Table 17.	Summary	of	2006	dacthal	detections	from	Project	310:	Owyhee	County	Dacthal	PMP
response.												

Dacthal Detection Level (µg/L)	Number of Wells February 2006	Number of Wells May 2006	Number of Wells August 2006	Number of Wells November 2006
Less than Lab Detection Limit	3 (27%)	3 (27%)	4 (36.5%)	4 (36.5%)
Level 1 (0.08 – 14)	6 (55%)	6 (55%)	5 (45.5%)	5 (45.5%)
Level 2 (>14 – 35)	1 (9%)	0	2 (18%)	1 (9%)
Level 3 (>35 – 70)	1 (9%)	2 (18%)	0	1 (9%)
Level 4 (>70)	0	0	0	0
Mean Value	8.9	9.8	6.2	6.8
Median Value	0.18	0.16	0.13	0.15
Maximum Value	67	65	34	56

Figure 16 shows the pesticide results from the most recent sampling event in November 2006. A total of 14 wells were sampled in August for pesticides and nutrients. One well had a Level 3 dacthal detection, one well had a Level 2 dacthal detection, and five wells had a Level 1 dacthal detection. Six wells had no dacthal detected in the ground water.



Figure 16. Pesticide results from the November 2006 sampling of Project 310: Owyhee County Dacthal Response PMP Monitoring Project.

Payette County

Figure 17 shows the pesticide results from the follow up sampling in May 2006 for elevated atrazine and desethyl atrazine (DEA) detections in Payette County. A total of seven wells near the initial DEA detection were sampled for pesticides and nutrients. Three wells had Level 2 DEA detections, and three wells had Level 1 DEA detections. Two wells had Level 2 atrazine detections, and one well had a Level 1 atrazine detection. Two wells had Level 1 deisopropyl atrazine (DIA) detections. The remaining well had no detections of atrazine, DEA, or DIA. All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.

Nez Perce County

Three wells were sampled in Nez Perce County during August 2006 to follow up on an elevated atrazine and desethyl atrazine detection. One well had Level 2 atrazine and DEA detections, one well had Level 1 atrazine and DEA detections, and one well had a Level 1 DEA detection. The well with the Level 2 atrazine and DEA detections also had Level 1 detections of propazine, diuron, and picloram. All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.



Figure 17. Atrazine, DEA , and DIA results from ISDA 2006 sampling of Project 340: Payette County Atrazine and Desethyl Atrazine Response PMP Monitoring Project.

In addition to the atrazine, DEA, and DIA detections, three wells had dacthal (DCPA) detections and one well had a bromacil detection. The detections of dacthal (DCPA) and bromacil were all Level 1 detections. Table 18 presents the summary information for the pesticide detections.

Table 18. Summary of pesticide detections from Project 340.

Pesticide	Number of Detections (7 Wells)	Range (µg/L)	Reference Point (µg/L)
Atrazine	3	0.39 - 0.85	$3 (MCL)^1$
Bromacil	1	0.14	90 $(HAL)^2$
Dacthal (DCPA)	3	0.33 - 1.30	$70 (HAL)^2$
Deisopropyl Atrazine	2	0.039 - 0.047	3
Desethyl Atrazine	6	0.025 - 0.82	³

¹MCL – EPA Maximum Contaminant Level ²HAL – EPA Health Advisory Level ³Breakdown product of Atrazine

Discretionary Pesticide Projects

Overview

The ISDA Ground Water Program submits discretionary grant proposals to the EPA each year to acquire funding to complete pesticide related projects and activities. Typically, the Ground Water Program receives one grant each year to conduct additional pesticide related monitoring in the state. The monitoring grant allowed for testing of approximately 23 wells and focused on testing in agricultural areas where little testing has been done in the past. Four wells in the Salmon area and 19 wells in the southeastern portion of the state were tested as part of the discretionary project.

Discretionary grants are implemented by fiscal year, so the grant awarded and discussed in this report covers fiscal year 2007 (July 1, 2006 through June 30, 2007). Typically, ISDA also conducts nitrate testing at each site using general operating funds. Nitrate findings also are presented in the following subsections.

Water Quality Findings

Nitrate

Lemhi County

There were four wells analyzed for nitrate in Lemhi County, near Salmon (Figure 18). No wells exceeded the EPA's MCL of 10 mg/L for nitrate (Figure 18).



Figure 18. Nitrate results from ISDA 2006 sampling of Project 305: Salmon Discretionary Project.

Table 19 presents statistics for the four wells sampled for the Salmon Discretionary Project. One well, or 25% of the wells sampled, had nitrate detections below the laboratory detection limit. Three wells, or 75% of the wells sampled, had nitrate concentrations of less than 2 mg/L. The maximum detection was 0.92 mg/L. The median value was 0.35 mg/L, while the mean value was 0.41 mg/L.

Concentration Range (mg/L)	Number of Wells
< LDL (0.033)	1 (25%)
LDL - < 2.0	3 (75%)
2.0 - < 5.0	0
5.0 - 10	0
> 10	0
Median Value	0.35
Mean Value	0.41
Maximum Value	0.92

 Table 19.
 Summary of nitrate concentrations from Project 305: Salmon Discretionary Project.

Bannock County

Six wells were sampled for nitrate in Bannock County (Figure 19 and Table 20). The maximum concentration was 4.8 mg/L. Three wells, or 50%, had nitrate concentrations between 2 and 5 mg/L. The median nitrate concentration was 1.7 mg/L (Table 20).

Oneida County

Ten wells were sampled for nitrate in Oneida County (Figure 19 and Table 20). The maximum concentration was 4.1 mg/L. Seven wells, or 70%, had nitrate concentrations between the lab detection limit of 0.033 mg/L and 2 mg/L. The median nitrate concentration was 0.91 mg/L (Table 20).

Power County

Three wells were sampled for nitrate in Power County (Figure 19 and Table 20). The maximum concentration was 22 mg/L, which exceeded the EPA Maximum Contaminant Level (MCL) for nitrate of 10 mg/L. The other two wells had nitrate concentrations less than 5 mg/L. The median nitrate concentration was 2.0 mg/L (Table 20).



Figure 19. Nitrate results from ISDA 2006 sampling of Project 305: Southeastern Idaho Discretionary Project.

 Table 20.
 Summary of nitrate concentrations from Project 305: Southeastern Idaho Discretionary

 Project.
 Project.

Concentration	Lemhi County	Bannock County	Oneida County	Power County
Range (mg/L)	(4 wells)	(6 wells)	(10 wells)	(3 wells)
< LDL (0.033)	1 (25%)	2 (33%)	1 (10%)	0
LDL - < 2.0	3 (75%)	1 (17%)	7 (70%)	1 (33%)
2.0 - < 5.0	0	3 (50%)	2 (20%)	1 (33%)
5.0 - 10	0	0	0	0
> 10	0	0	0	1 (33%)
Median Value	0.35	1.7	0.91	2.0
Mean Value	0.41	2.0	1.3	8.4
Maximum Value	0.92	4.8	4.1	22

Pesticides

Lemhi County

Four wells were sampled for pesticides in Lemhi County (Figure 20). No pesticides were detected in any of the wells.



Figure 20. Pesticide results from ISDA 2006 sampling of Project 305: Salmon Discretionary Project.

Bannock County

Six wells were sampled for pesticides in Bannock County (Figure 21). One well had a detection of linuron (Figure 21 and Table 21). The detection was at a Level 1 concentration, less than 20% of the reference point.

Oneida County

Ten wells were sampled for pesticides in Oneida County (Figure 21). One well had a 2,4 dichlorobenzoic acid (2,4 DCBA) detection. Currently there is no EPA health standard for this chemical. ISDA is working with EPA to determine what the appropriate reference point is for 2,3 DCBA.

Power County

Three wells were sampled for pesticides in Power County (Figure 21). One well had diuron and desethyl atrazine detections (Figure 21 and Table 21). Desethyl atrazine is a breakdown product of the herbicide atrazine. Both the diuron and desethyl atrazine detections were at Level 1 concentrations, less than 20% of the reference point.



Figure 21. Pesticide results from ISDA 2006 sampling of Project 305: Southeast Idaho Discretionary Project.

Table 21. Summary of pesticide detections from Project 5

Pesticide	Trade Name	Quantity (µg/L)	Reference Point (µg/L)	County of Detection
Linuron	Linex, Lorox	0.08	$14 (RfD)^{1}$	Bannock
Diuron	Diuron, Karmex, Krovar	0.034	$10 (HAL)^2$	Power
Desethyl Atrazine	3	0.037	4	Power
2,4-DCBA	5	9.7	6	Oneida

Ground Water Quality Protection Activities

ISDA is the lead for implementing policy II-B of the Idaho Ground Water Quality Plan which was specifically written to prevent ground water contamination from agricultural practices. Prevention activities include implementation of the Information and Education (I & E) Strategy, implementation of the Best Management Practices (BMP) Strategy, and implementation of the Regulatory Strategy when pollution sources cannot be controlled by BMPs. ISDA's strategy for implementing I & E includes coordination of the Information and Education Subcommittee of the Agriculture Ground Water Coordination Committee, development and distribution of education materials, and facilitation of educational workshops.

The main objective of the I & E Subcommittee is to coordinate a common educational strategy through multiple state and federal agencies. The subcommittee meets quarterly and reports its activities to the Agriculture Ground Water Coordination Committee. The I & E subcommittee met twice in 2006; once in August and once in December. During these meetings, the committee established its goal and outlined several activities it would like to accomplish, including updating the I & E plan and the Idaho Home*A*Syst Project (HAS) materials.

Ground water quality protection activities in 2006 included: updating the overall I & E Statewide Implementation Plan, updating the HAS materials, and participating in several pesticide recertification workshops. These workshops were designed specifically for pesticide applicators and growers (Table 22). Material presented included: pesticide and nutrient ground water quality data, information on proper safety, storage, and handling of pesticides and fertilizers with respect to the domestic well, best management practices for in field use of pesticides and fertilizers, and information on the State Pesticide Management Plan. ISDA plans on conducting additional workshops in 2007, with the goal of surpassing the attendance number in 2006.

Pesticides and Water Quality Education Project – Workshops						
Date	Location	Event Name	Attendance			
01/10/06	Jackpot, NV	Far West Winter Conference	109			
01/20/06	Boise	Idaho Horticulture Expo	48			
01/31/06	Caldwell	Western Idaho Agriculture Show	48			
02/02/06	Nampa	Idaho Weed Conference	25			
02/07/06	Lewiston	Extension Cereal School	24			
02/08/06	Moscow	Latah County Cereal School	39			
02/09/06	Greencreek	Prairie Area Cereal School	96			
02/17/06	Ontario, OR	Chemical Fruit Fair	53			
02/23/06	Weiser	Applicator Seminar	32			
03/03/06	Lewiston	Pesticide Applicator Recertification Workshop	30			
03/20/06	St. Anthony	Water Quality Pesticide Recertification Workshop	21			
03/21/06	Ashton	Water Quality Pesticide Recertification Workshop	29			
03/22/06	Fort Hall	Water Quality Pesticide Recertification Workshop	7			
03/22/06	Blackfoot	Water Quality Pesticide Recertification Workshop	16			
03/29/06	Bonners Ferry	Pesticide Applicator Recertification Workshop	27			
03/29/06	Sandpoint	Pesticide Applicator Recertification Workshop	31			
05/05/06	Challis	Pesticide Applicator Recertification Workshop	42			
10/02/06	Grand View	#1 Grand View/ Bruneau G. W. Q.* Open House	15			
11/06/06	Grand View	#2 Grand View/ Bruneau G. W. Q. Open House	25			
12/06/06	Grand View	#3 Grand View/ Bruneau G. W. Q. Open House	5			
12/14/06	Marsing	Owyhee County Farmer's Appreciation Day	25			
12/19/06	Caldwell	Pesticide Applicator Recertification Workshop	105			
Total Attendance						

 Table 22.
 Pesticide Recertification Education workshops.

* G.W.Q. – Ground Water Quality

The water program at ISDA has been active in the development of data summaries of monitoring projects and agricultural specific educational materials that are distributed throughout Idaho's agricultural community. Data summaries include information on the quality of ground water and recommendations for remediation of contamination concerns identified through the monitoring.

Once ISDA determines that BMPs will be needed to mitigate ground water contamination, it relies on its partnership with the Idaho Soil Conservation Commission (ISCC) and the local Soil and Water Conservation District (SCD) to implement its Best Management Practices Strategy. This strategy includes research, development and application of BMPs, development of area-wide and site specific water quality management plans, and identification of funding sources for BMPs. In 2006, ISDA assisted the West Cassia SCD, Weiser River SCD, the Gooding SCD, the Lewis SCD, and the Yellowstone SCD, with the implementation of their EPA Clean Water Act 319 Grants.

The Weiser River SCD 319 project is focused on agricultural practices within the number one nitrate priority area in the state. The project includes implementation of alternative irrigation systems, development of nutrient management plans, and an extensive BMP effectiveness evaluation program. ISDA continues to conduct ground water monitoring and has been involved in the evaluation of the effectiveness of the project.

The Gooding SCD 319 project is located in a DEQ designated nitrate priority area. The Bliss ground water improvement project encompasses the 6,800 acre Bliss Nitrate Priority Area and focuses on implementing better nutrient management planning through soils and plant tissue analyses and evaluating irrigation systems for better management. ISDA is monitoring ground water quality in the Bliss area to evaluate the effectiveness of the 319 project.

The Lewis SCD 319 project is located on the Camas Prairie and within the number five nitrate priority area in the state. This nutrient management planning project is being implemented by the ISCC with dry farmers near the cities of Craigmont and Nez Perce. ISDA is monitoring ground water quality in association with the 319 project to evaluate the effectiveness of the nutrient management BMPs on dry farms.

The Yellowstone SCD 319 project is located in Fremont County near the town of Ashton and is the number eight nitrate priority area in Idaho. The Yellowstone SCD is analyzing soils and developing nutrient recommendations for farmers. Through the efforts of the Yellowstone SCD, farmers have reduced their nitrogen applications up to 11 lbs per acre and are meeting or exceeding their expected crop yields. ISDA is monitoring ground water quality in the region to evaluate whether the reduction in nitrogen applications will also reduce the nitrate levels in domestic wells.

The West Cassia Soil and Water Conservation District 319 project is located in the third highest nitrate priority area in the state. The 319 funds are used to provide cost-share assistance to farmers who implement nutrient and irrigation water management BMPs. The ISDA is monitoring ground water quality in the Burley area and will continue to do so to evaluate the effectiveness of the 319 Project.

Database

The ISDA Ground Water Program database is used to store all sampling data from ISDA regional, local, and special projects. Projects and data are tracked in the ISDA Ground Water Program

database. Information regarding the location of the well, well construction, well owner, and geology are also stored in the database.

The database is used to produce homeowner result letters and well analysis reports. Homeowners that participate in ISDA's ground water monitoring program receive a result letter and well analysis report after data is entered. Approximately 1,000 homeowner result letters and well analysis reports were mailed in 2006.

ISDA Water Program Website

The ISDA water program maintains a web site for internal and external use to easily access reports, data, and information. The site provides our goals and objectives, as well as general water quality information. Project maps, data summaries, and reports are also posted. The website can be accessed at <u>http://www.agri.idaho.gov/Categories/Environment/water/indexwater.php.</u>

Summary

The ISDA Ground Water Program implemented a wide variety of ground water monitoring projects and protection activities related to agriculture for the state of Idaho in 2006. The monitoring efforts in 2006 mainly focused on areas in the state that have either showed past impacts from nitrate pollution or to a lesser extent pesticides. ISDA currently has 31 distinct and active ground water projects across the state. Thirteen of these projects were regional based projects, 12 were dairy or confined animal feeding operation (CAFO) related projects, five were local projects, and one was an EPA funded special pesticide monitoring project. As part of the ISDA Ground Water Program prevention efforts, technical assistance was given to various SCDs that are implementing measures to help improve and protect ground water quality from these chemicals. Twenty two educational workshops were conducted across the state to help inform the farming community of ground water quality problems and efforts that can be used to protect overall ground water quality. Additionally, ISDA Ground Water Program staff participated in 21 CAFO siting evaluations.

Results of ground water quality monitoring on a regional scale indicate a number of aquifers across the state have significant nitrate impacts with numerous wells exceeding the EPA MCL of 10 mg/L. Sixty-three wells or ten percent of 622 regional wells sampled by the ISDA Ground Water Program in 2006 exceed the EPA MCL for nitrate. All of the 13 active regional projects show mean ground water nitrate concentrations above 2 mg/L suggesting anthropogenic impacts. Overall ground water quality statistics for the Washington and Payette Regional Study have the highest calculated mean and median values, 7.6 mg/L and 6.9 mg/L, respectively. The Central Henrys Regional Study is second with a mean value of 5.6 mg/L and a median value of 4.9 mg/L. The Cassia County Regional Study is third with a mean value of 5.5 mg/L and a median value of 4.7 mg/L. The Twin Falls County Regional Study is fourth with a mean value of 4.6 mg/L and a median value of 4.5 mg/L. The Minidoka County Regional Study is fifth with a mean value of 4.5 mg/L and a median value of 4.2 mg/L.

The 12 Dairy and Beef CAFO monitoring projects indicate significant nitrate impacts to ground water. Five of these active dairy or CAFO projects have mean nitrate concentrations that exceed the EPA MCL of 10 mg/L. In addition, dairy and CAFO project monitoring show all twelve active projects having mean concentrations above 2 mg/L in 2006. Ground water testing by the ISDA Dairy Bureau of 657 dairies in 2006 indicates 40 (6.1%) locations exceed the MCL for nitrate.

Testing of regional, local, and discretionary type projects returned detections of pesticides in ground water. However, most detections are less than 20 percent of health standard concentrations. Five project areas tested in 2006 had one or more well with levels that exceeded 20 percent of a health standard requiring additional response activities. The pesticides detected over 20 percent of a health standard were atrazine and desethyl atrazine in Payette, Nez Perce, and Fremont Counties; dacthal, dicamba and 2,4-D in Owyhee County; and triallate and dinoseb in Fremont County.

ISDA Ground Water Program staff participated, initiated, or provided technical assistance in many ground water protection activities. Staff are implementing the PMP Rules entitled "02.03.01 - Rules Governing Pesticide Management Plans for Ground Water Protection". Water Section staff began additional rule making related to the Dacthal PMP. The Ground Water Program facilitated or participated in a record number of educational workshops across the state and provided technical assistance to SCDs with implementation of field projects to help improve Idaho ground water quality in high priority areas. In addition, ISDA Ground Water Program staff participated in 21 CAFO siting evaluations. Seventeen new or expanding CAFO sites were determined to be of low risk and four of moderate risk as related to environmental or human health considerations.

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