



**Idaho State Department of Agriculture**

**Ground Water Program Annual Report**

**For 2007**





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## Acknowledgements

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Special thanks go to private well owners who have given permission and access to their property to conduct monitoring activities. We greatly appreciate their participation. Over 90 percent of ISDA monitoring activities can be attributed to testing of privately owned domestic wells. The ISDA Ground Water Program monitoring network would not exist if not for their assistance.

We would like to express great appreciation to the various Idaho Soil Conservation Districts who contributed to our efforts. The list of participating districts is many, but we would like to give special recognition to those who are actively involved with specific ground water quality projects including the: Weiser River Soil Conservation District, Yellowstone Soil Conservation District, Lewis Soil Conservation District, Gooding Soil Conservation District, and West Cassia Soil and Water Conservation District.

Thanks to the various ISDA staff outside the water program who contribute daily to the efforts of our program. Staff persons from the ISDA Animal Industries Division and Agricultural Resources Division provide the majority of these efforts.

ISDA Ground Water Program staff would like to acknowledge various federal, state, and local agencies and entities that have provided assistance throughout 2007 including the: University of Idaho Analytical Sciences Laboratory, Idaho Health and Welfare Laboratory, Idaho Department of Environmental Quality, Idaho Department of Water Resources, Idaho Department of Health and Welfare, Idaho Soil Conservation Commission, Idaho Association of Soil Conservation Districts, Natural Resources Conservation Service, Environmental Protection Agency, University of Idaho, Boise State University, United States Geological Survey, Bureau of Reclamation, and a variety of County Planning and Zoning Commissions who assist in State CAFO siting activities.

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 goal of this program is to evaluate ground water quality in areas that may be impacted by agriculture and determine appropriate measures to prevent future ground water degradation. 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 2007, the ISDA Ground Water Program implemented 27 distinct monitoring projects. Thirteen of these projects were regional projects, eight were dairy or confined animal feeding operation (CAFO) projects, two were local nitrate or pesticide projects, three were Pesticide Management Plan related projects, and one was an Environmental Protection Agency (EPA) funded, discretionary pesticide monitoring project. Water quality findings from these 27 active projects indicated a varying degree of impacts to ground water with nitrate being the most common constituent of concern.

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). Fifty nine wells or 10 percent of 621 regional project wells sampled by the ISDA Ground Water Program in 2007 exceed the EPA MCL. Twelve of the thirteen active regional projects have mean nitrate concentrations above 2 mg/L suggesting some anthropogenic impacts. Similarly, dairy and CAFO project monitoring show all the eight active projects have mean concentrations above 2 mg/L in 2007.

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. Seven sites tested in 2007 show levels that exceeded 20 percent of a health standard requiring additional response activities. These sites are located in Fremont, Owyhee, Nez Perce, Idaho 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 30 educational workshops and outreach meetings 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 14 site assessments for new or expanding CAFOs with 12 low risk determinations, one moderate risk determination, and one high risk determination.

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# Introduction

## Scope

The purpose of this document is to report 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 2007. 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 (MCL), dairy and beef CAFO detections for nitrate above the MCL 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. Monitoring at dairy CAFOs is implemented jointly by the Dairy Bureau and the Division of Agricultural Resources Water Quality Program. ISDA's Dairy Bureau 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.

## *Best Management Practice (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 agrichemicals from leaching beyond the root zone. In areas where there are concerns, 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 within the Nitrate Priority Areas. The SCDs and supporting agencies are developing projects through Clean Water Act 319 grants, NRCS programs, and ISCC funds. These are cooperative 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 discusses 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.

### **Design**

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

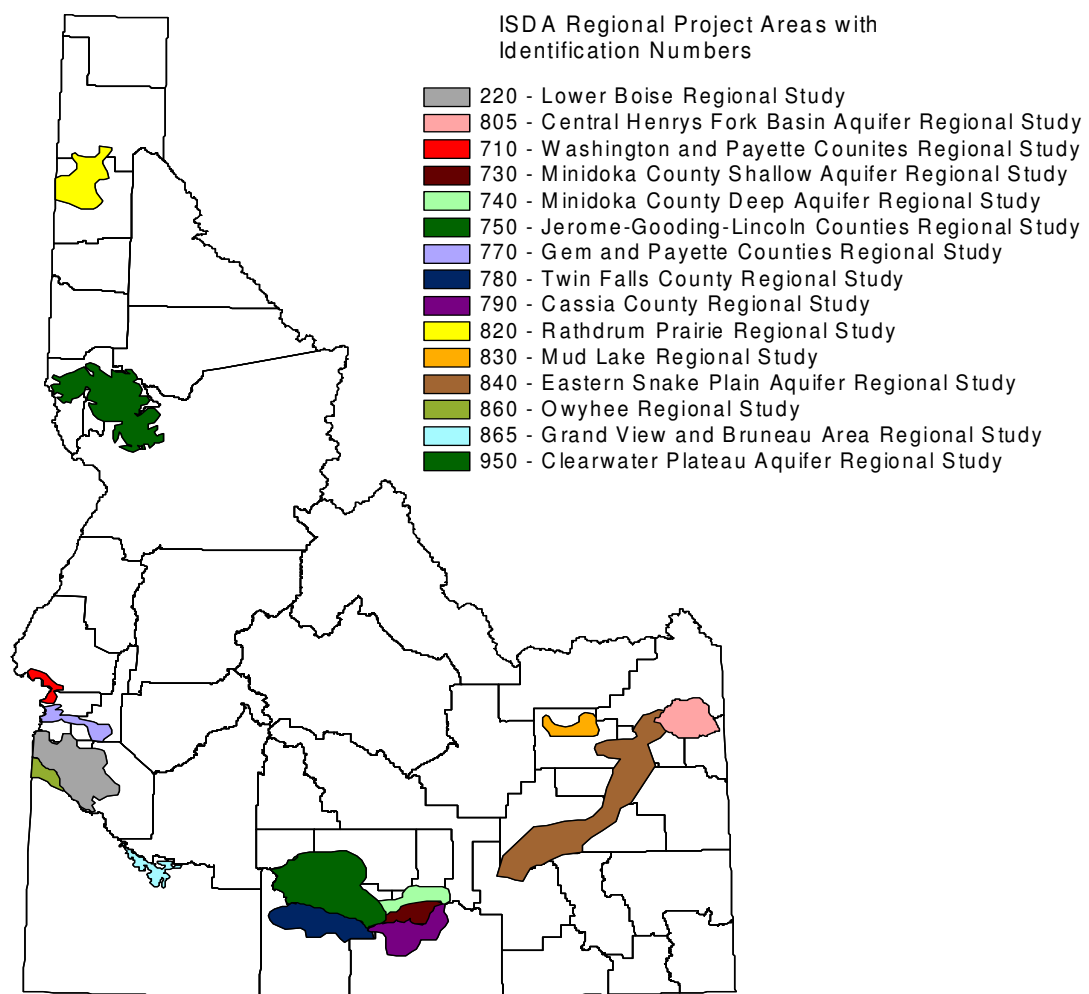
Each regional project is designed to be sampled for five years on an annual basis for nutrients, common ions, and pesticides. Pesticide results from the first year are evaluated to determine the extent of future pesticide monitoring. If there are limited detections the first year, further monitoring 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 (health standard) 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 2007. Projects are named relative to their respective regional part of the state and are assigned distinct project numbers for tracking purposes. Regional projects have been started at a variety of times over the last 12 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 621 wells sampled in 2007 as part of the overall regional sampling effort (Table 3). The Eastern Snake River Plain Project and Rathdrum Prairie Project were not sampled in 2007 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.

**Table 2.** ISDA regional project general monitoring information for 2007.

<b>Project No.</b>	<b>Project Name</b>	<b>Start Year</b>	<b>Status (2007)</b>	<b>Inorganics Testing (All wells-2007)</b>	<b>Pesticide Testing (2007)</b>	<b>Wells Monitored (2007)</b>
220	Lower Boise Basin Regional Study	2003	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	all wells	58
710	Washington and Payette Counties Regional Study	1996	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	all wells	52
730	Minidoka County Shallow Aquifer Regional Study	1997	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	none	41
740	Minidoka County Deep Aquifer Regional Study	1997	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	none	49
750	Jerome-Gooding-Lincoln Counties Regional Study	1997	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	all wells	71
770	Gem and Payette Counties Regional Study	1998	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	follow-up (1 well)	40
780	Twin Falls County Regional Study	1998	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	none	73
790	Cassia County Regional Study	1998	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	none	45
805	Central Henry's Fork Basin Aquifer Regional Study	2003	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	follow-up (3 wells)	45
820	Rathdrum Prairie Regional Study	1998	inactive	none	none	0
830	Mud Lake Regional Study	1998	active	nitrate, nitrite, chloride sulfate, bromide, fluoride, orthophosphorus	none	29
840	Eastern Snake Plain Aquifer Regional Study	1998	inactive	none	none	0
860	Owyhee Regional Study	1999	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	follow-up (1 well)	25
865	Grand View and Bruneau Area Regional Study	2006	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	follow-up (1 well)	25
950	Clearwater Plateau Aquifer Regional Study	2001	active	nitrate, nitrite, ammonia, chloride sulfate, bromide, fluoride, orthophosphorus	all wells	68

## Water Quality Findings

### *Nitrate*

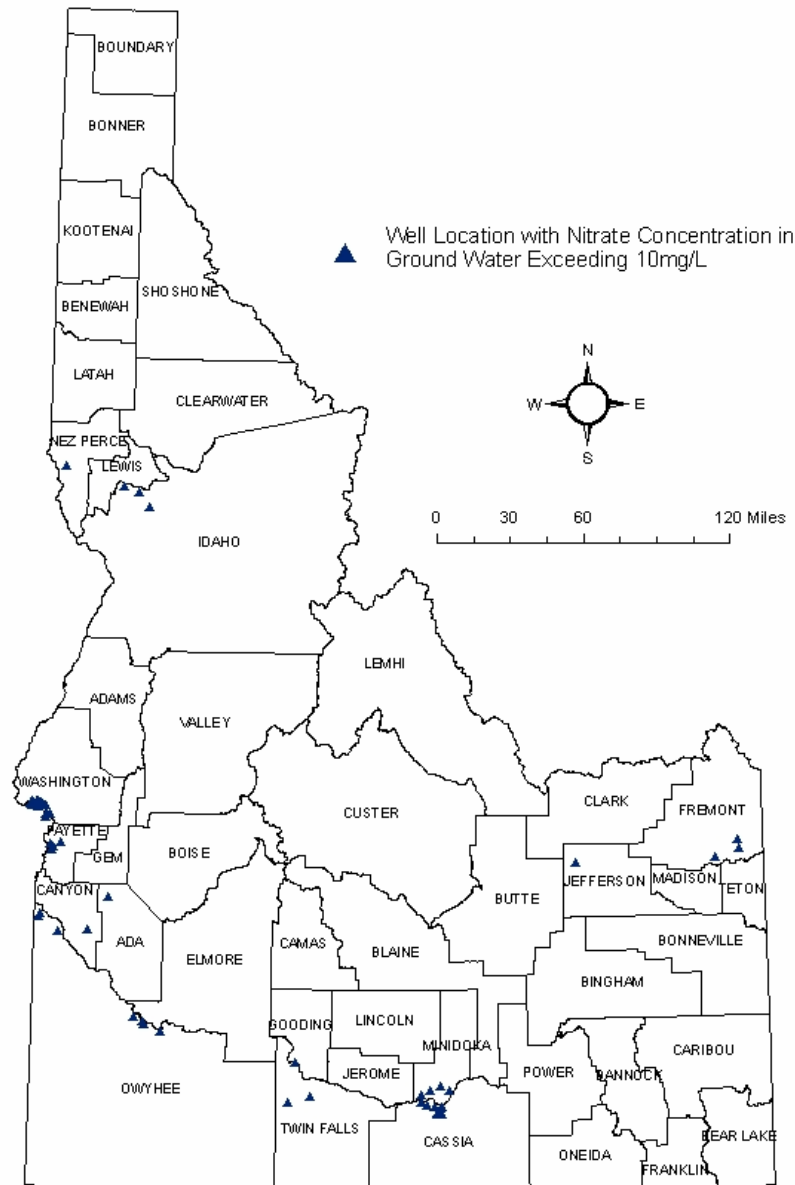
Many of the projects established were developed in response to nitrate problem areas known or believed to exist in the state. As a result, many of the projects have served to better define the extent, possible sources, and overall severity of the problems in terms of median or mean levels, and MCL exceedances. 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 2007 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 that many areas in the state have elevated nitrate concentrations in ground water. Numerous wells tested during regional monitoring are found to be above background nitrate concentrations of 2 mg/L suggesting some anthropogenic influences on ground water quality (Neely, 2004). All mean ground water nitrate concentrations per project, with the exception of the Owyhee Regional Study, exceed the 2 mg/L level (Table 3). Median ground water nitrate concentrations per project equal or exceed the 2 mg/L level in 9 of the 13 active regional projects (Table 3). Wells located in the Washington and Payette Regional Study have the highest mean and median values, 9.3 mg/L and 8.1 mg/L, respectively. Other projects having comparatively high mean and/or median concentrations in ground water are the Cassia County Regional Study (mean - 5.6 mg/L, median - 4.1 mg/L), the Central Henry's Fork Basin Regional Aquifer Study (mean - 5.0 mg/L, median - 4.3 mg/L), and the Grand View and Bruneau Regional Study (mean - 8.0 mg/L) (Table 3).

Of the 621 wells tested, 20% or 140 wells had nitrate concentrations between 5 to 10 mg/L and 10% or 59 wells in the regional network exceeded the EPA MCL of 10 mg/L for nitrate (Table 3 and Figure 2). Twelve 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) Cassia County Regional Study (17%) and (3) Grand View and Bruneau Area Regional Study (16%) (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 2007 to have no wells with nitrate above the EPA MCL (Table 3).

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

Project No.	Project Name	Nitrate Findings (2007)					
		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	58	3.2	2.0	16	11 (19%)	2 (3%)
710	Washington and Payette Counties Regional Study	52	9.3	8.1	44	8 (15 %)	23 (44%)
730	Minidoka County Shallow Aquifer Regional Study	41	4.8	3.8	25	11 (26%)	4 (10%)
740	Minidoka County Deep Aquifer Regional Study	49	3.9	3.5	8.6	20 (41%)	0
750	Jerome-Gooding-Lincoln Counties Regional Study	71	2.3	2.0	15	4 (6%)	1 (1%)
770	Gem and Payette Counties Regional Study	40	2.9	1.4	14	4 (10%)	4 (10%)
780	Twin Falls County Regional Study	73	4.1	3.8	15	21 (29%)	2 (3%)
790	Cassia County Regional Study	45	5.6	4.1	17	12 (27%)	8 (17%)
805	Central Henry's Fork Basin Aquifer Regional Study	45	5.0	4.3	44	14 (31%)	3 (7%)
820	Rathdrum Prairie Regional Study	0	-	-	-	-	-
830	Mud Lake Regional Study	29	2.6	2.1	11	4 (13%)	1 (3%)
840	Eastern Snake Plain Aquifer Regional Study	0	-	-	-	-	-
860	Owyhee Regional Study	25	1.7	0.03	11	0 (0%)	3 (12%)
865	Grand View and Bruneau Area Regional Study	25	8.0	0.76	110	4 (16%)	4 (16%)
950	Clearwater Plateau Aquifer Regional Study	68	3.4	1.4	39	13 (19%)	4 (6%)
<b>All Active Regional Projects Combined</b>		<b>621</b>	<b>4.4</b>	<b>2.9</b>	<b>110</b>	<b>140 (20%)</b>	<b>59 (10%)</b>



**Figure 2.** Map showing nitrate detections in ground water from 2007 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 2007, the number of wells sampled, and the type of pesticide analysis performed. A total of 278 wells were tested for various pesticides in the regional project areas in 2007. Wells with historic, elevated pesticide concentrations were sampled in two projects (805 and 865). All wells were sampled in five projects (220, 710, 750, 860, and 950).

**Table 4.** Summary of 2007 pesticide sampling in ISDA regional projects.

Project Number and Name	Number of Wells Sampled	Analysis (EPA Method Number)
220: Lower Boise Regional Project	58	507, 508, 515.2, 632
710: Southern Washington and Northern Payette County Regional Project	52	507, 508, 515.2, 632
750: Gooding, Jerome, and Lincoln County Regional Project	71	507, 508, 515.2, 632
805: North Henry's Central Basin Regional Project	3	507, 508, 515.2, 632
860: Northern Owyhee County Regional Project	25	507, 508, 515.2, 632
865: GrandView Regional Project	1	507, 508, 515.2, 632
950: Clearwater Plateau Regional Project	68	507, 508, 515.2, 632

There were 97 positive pesticide detections in 62 wells during the 2007 regional project pesticide sampling, as seen on Table 5. Fourteen different types of pesticides were detected (Table 5).

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 (PMP Rule). 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 Rule 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.

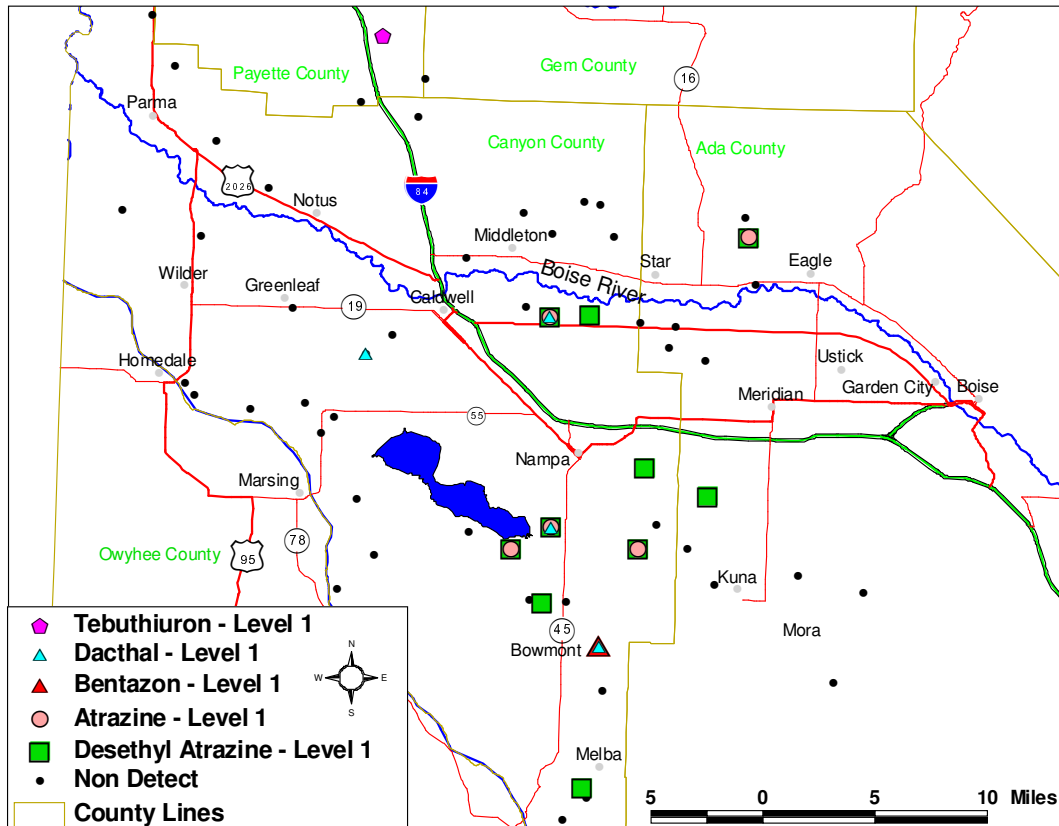
**Table 5.** Summary of pesticide detections from ISDA regional project areas in 2007.

Pesticide	Number of Detections	Range (µg/L)	Mean (µg/L)	Median (µg/L)	Reference Point (µg/L)	County of Detection
Atrazine	21	0.027 - 0.95	0.10	0.05	3 (MCL) <sup>1</sup>	Ada (1) Canyon (4) Fremont (1) Jerome (2) Lincoln (1) Nez Perce (1) Owyhee (1) Washington (10)
Bentazon	1	0.88	----	----	200 (HAL) <sup>2</sup>	Canyon
Bromacil	1	0.19	----	----	70 (HAL)	Gooding
Dacthal (DCPA)	17	0.088 - 21	4.2	2.7	70 (HAL)	Canyon (4) Gooding (1) Owyhee (9) Washington (3)
Deisopropyl Atrazine	3	0.028 - 0.46	0.18	0.037	---- <sup>3</sup>	Nez Perce (2) Washington (1)
Desethyl Atrazine	38	0.025 - 1.2	0.12	0.089	---- <sup>3</sup>	Ada (2) Canyon (8) Fremont (1) Gooding (5) Lincoln (1) Nez Perce (2) Owyhee (1) Washington (18)
Dicamba	2	0.54 - 3.30	1.9	1.9	4000 (HAL)	Owyhee
Dinoseb	3	0.72 - 15	7.9	8.0	7 (MCL)	Fremont (1) Owyhee (2)
Diuron	2	0.029 - 0.19	0.11	0.011	21 (RfD) <sup>4</sup>	Gooding (1) Nez Perce (1)
Hexazinone	2	0.065 - 0.15	0.11	0.11	400 (HAL)	Washington
Monuron	1	0.032	----	----	---- <sup>5</sup>	Fremont
Picloram	2	0.16 - 0.46	0.31	0.31	500 (MCL)	Owyhee (1) Nez Perce (1)
Tebuthiuron	2	0.075 - 0.24	0.16	0.16	500 (HAL)	Washington (1) Canyon (1)
Triallate	2	0.16 - 0.73	0.45	0.45	0.45 (DWLOC) <sup>6</sup>	Fremont (1) Idaho (1)

<sup>1</sup>MCL – EPA Maximum Contaminant Level<sup>2</sup>HAL – EPA Lifetime Health Advisory Level<sup>3</sup>No reference point available. MCL of 3 mg/L is used.<sup>4</sup>RfD – EPA Reference Dose<sup>5</sup>No reference point available.<sup>6</sup>DWLOC – EPA Drinking Water Level of Comparison

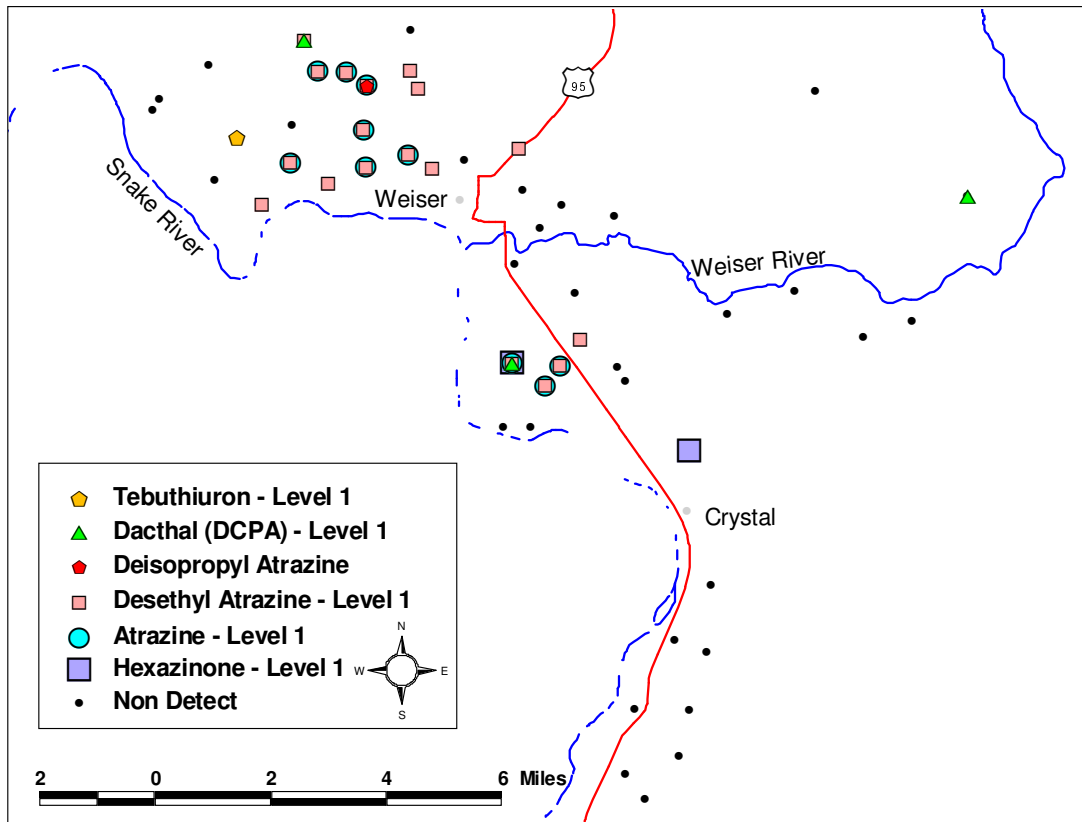
Figure 3 shows the pesticide detections for the Lower Boise Regional Project. A total of 58 wells were sampled for pesticides; thirteen wells had one or more pesticides detected within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 10 wells. Atrazine was detected in five wells; dacthal was detected in four wells, and bentazon and tebuthiuron 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 Rule.





**Figure 3.** Pesticide results from ISDA 2007 sampling of Project 220: Lower Boise Regional Monitoring Project.

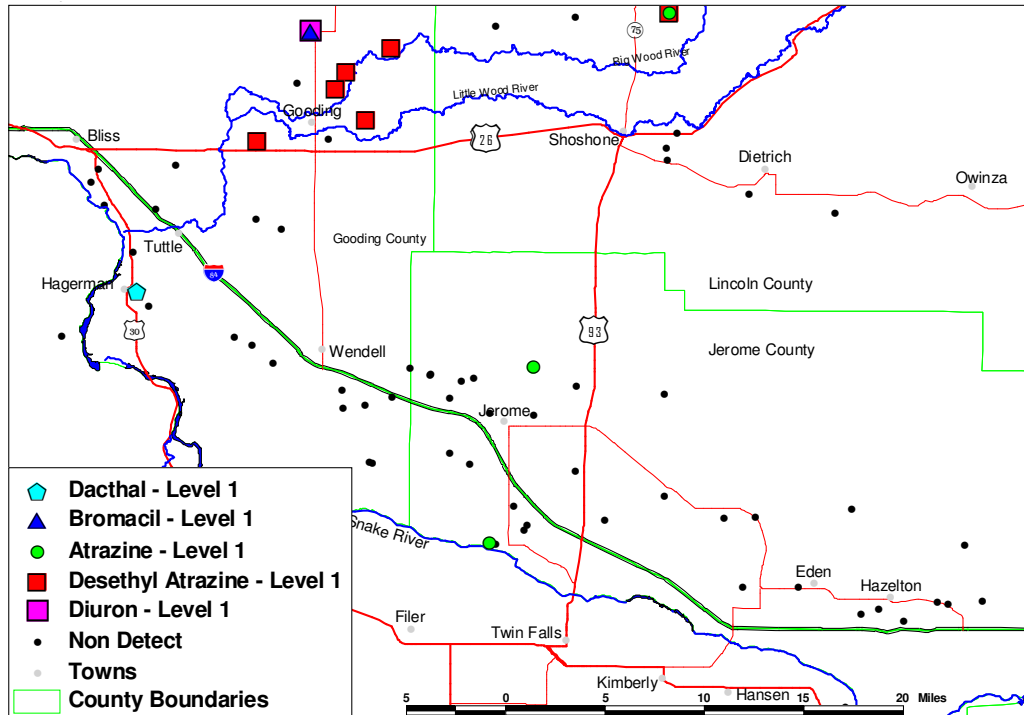
Figure 4 shows the pesticide detections for the Southern Washington and Northern Payette County Regional Project. A total of 52 wells were sampled for pesticides; 21 wells had one or more pesticides detected within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in 18 wells. Atrazine was detected in 10 wells; dacthal was detected in three wells; hexazinone was detected in two wells; and desisopropyl atrazine (a breakdown product of atrazine) and tebuthiuron 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 Rule.



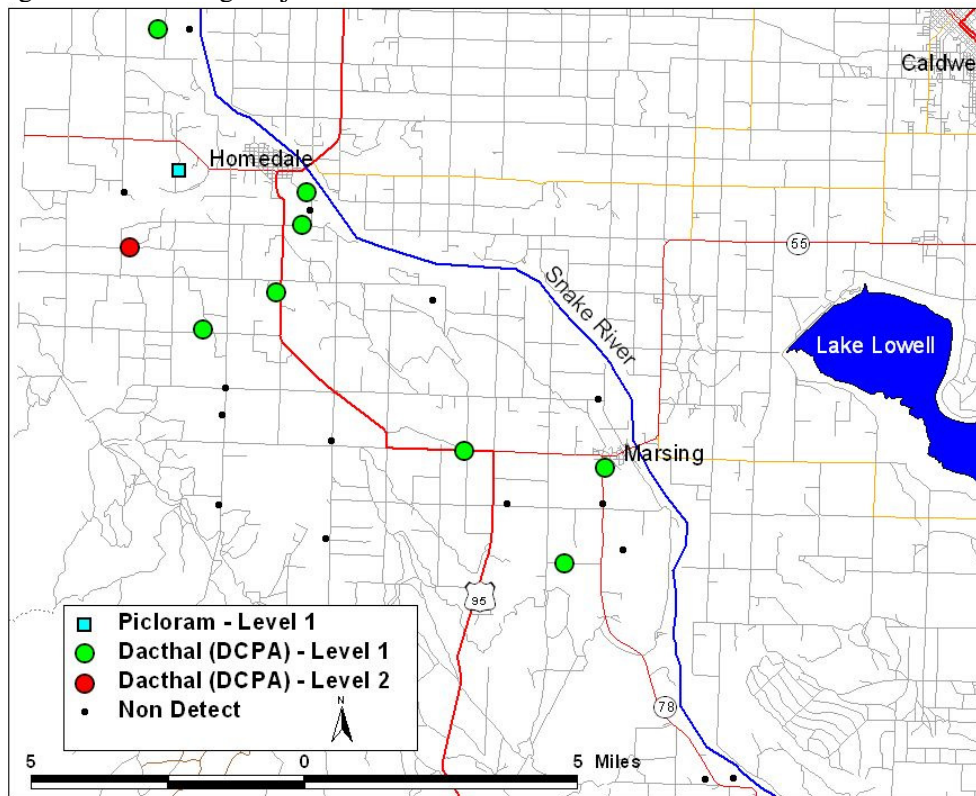
**Figure 4.** Pesticide results from ISDA 2007 sampling of Project 710: Southern Washington and Northern Payette County Regional Monitoring Project.

Figure 5 shows the pesticide detections for the Gooding, Jerome, and Lincoln County regional Project. A total of 71 wells were sampled for pesticides; 10 wells had one or more pesticides detected within the ground water. Desethyl atrazine, a breakdown product of the pesticide atrazine, was detected in six wells. Atrazine was detected in three wells; and the following pesticides were detected in one well each: bromacil, dacthal, and diuron. 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 Rule.

Figure 6 shows the pesticide detections for the Northern Owyhee Regional Project. A total of 25 wells were sampled for pesticides; 10 wells had pesticide detection(s). Dacthal was detected in nine wells and picloram 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, except for a Level 2 detection of dacthal in a well located approximately three miles south east of Homedale (Figure 6). ISDA has developed a Dacthal Pesticide Management Plan for this area as prescribed in the PMP Rule.



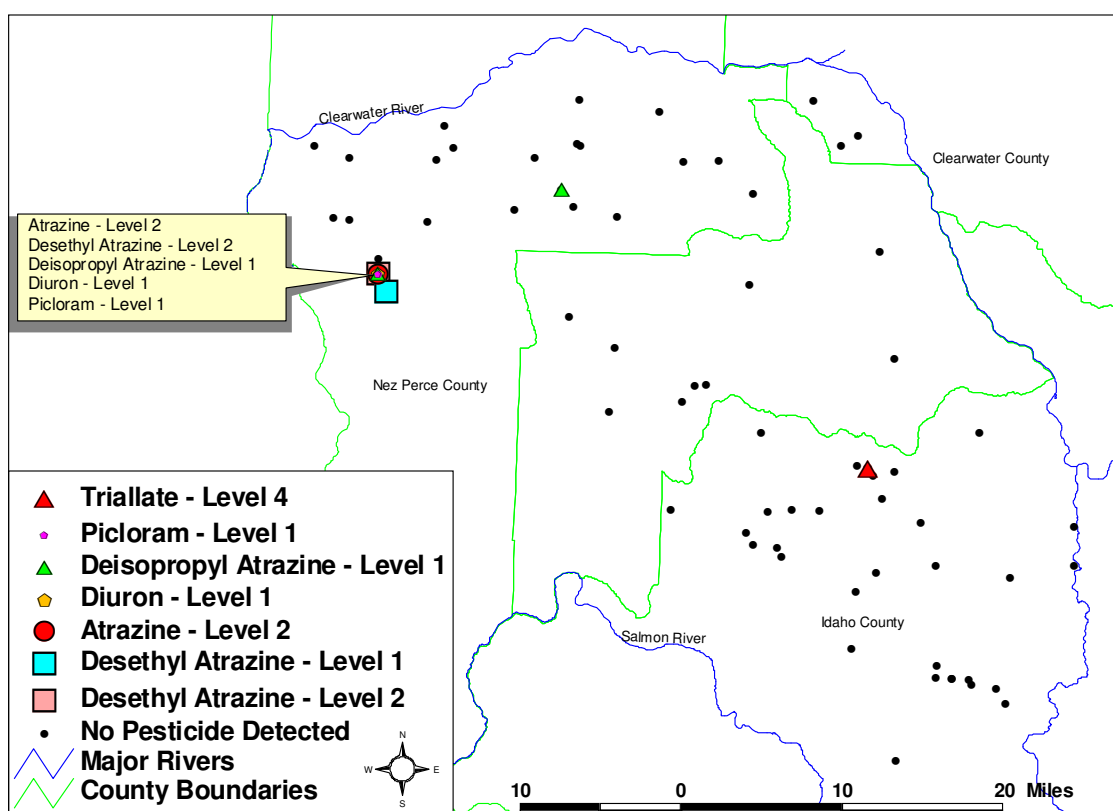
**Figure 5.** Pesticide results from ISDA 2007 sampling of Project 750: Gooding, Jerome, and Lincoln County Regional Monitoring Project.



**Figure 6.** Pesticide results from ISDA 2007 sampling of Project 860: Northern Owyhee Regional Monitoring Project.

Figure 7 shows the pesticide detections for the Clearwater Plateau Regional Project. A total of 68 wells were sampled for pesticides; four wells had one or more pesticides detected within the ground water. Desethyl atrazine and deisopropyl atrazine, both breakdown products of the pesticide atrazine, were each detected in two wells. Atrazine, diuron, picloram, and triallate were each detected in one well. All detections were below any health standards set by the EPA or the state of Idaho, except for the triallate detection. The triallate detection exceeded the EPA Food Quality Protection Act (FQPA) Drinking Water Level of Comparison (DWLOC) of 0.45 µg/L. ISDA is planning a follow up project and will sample wells in the area to determine the extent of the triallate contamination in the ground water.

A well located approximately six miles south of Lewiston had Level 2 atrazine and desethyl atrazine detections (Figure 7). This well has historically had elevated detections of atrazine and desethyl atrazine. ISDA is currently sampling several additional wells in the area to study the atrazine contamination of the ground water. ISDA is also currently working with the Pesticide Management Plan Advisory Committee to determine what actions to take in the area to implement the PMP Rule.



**Figure 7.** Pesticide results from ISDA 2007 sampling of Project 950: Clearwater Plateau 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 discusses 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**

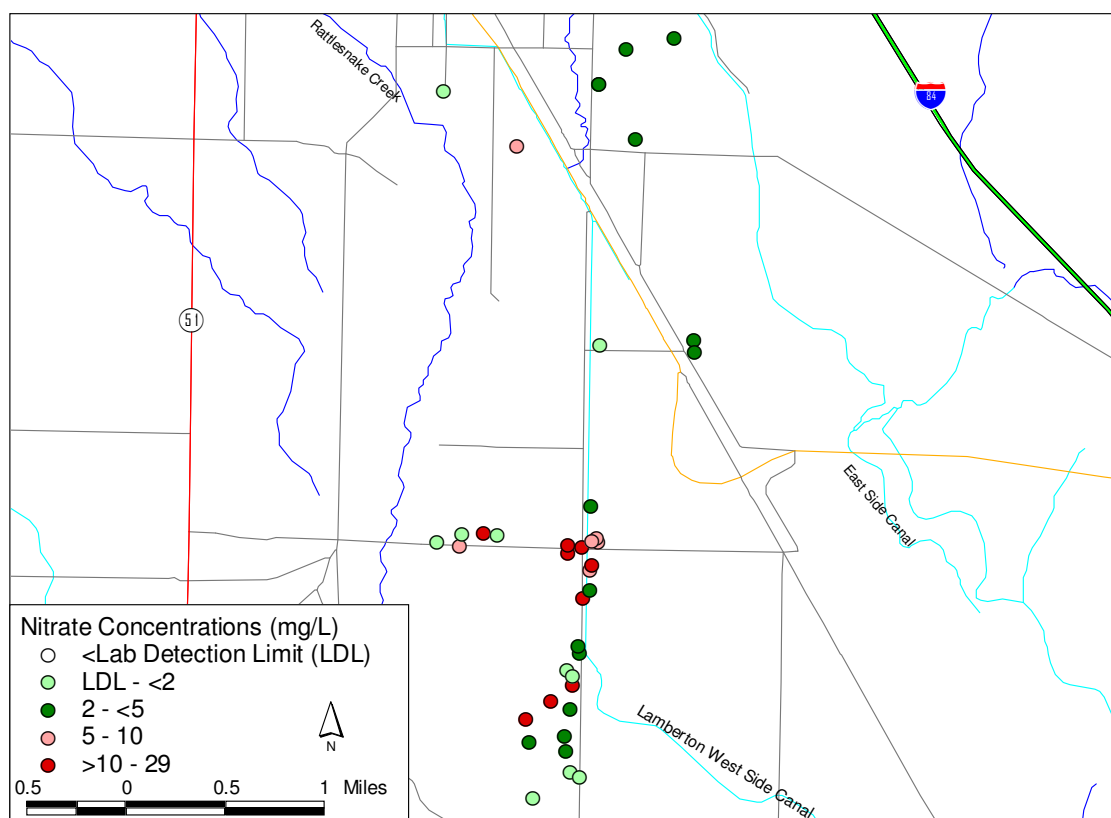
Although ISDA Ground Water Program staff sample a number of projects that fit the criteria of less than 10 square miles, only those not related to beef CAFOs or dairies are presented in this section. Beef CAFO and dairy related projects are presented in the Dairy and Confined Animal Feeding Operation Water Quality Projects section of this document. In 2007, 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

Forty one wells were analyzed for nitrate in the ISDA Elmore County Local Project, located approximately three miles south of downtown Mountain Home (Figure 8). There were nine wells (or 22% of wells tested) with concentrations exceeding 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 2007 sampling of Project 810: Elmore County Local Project.

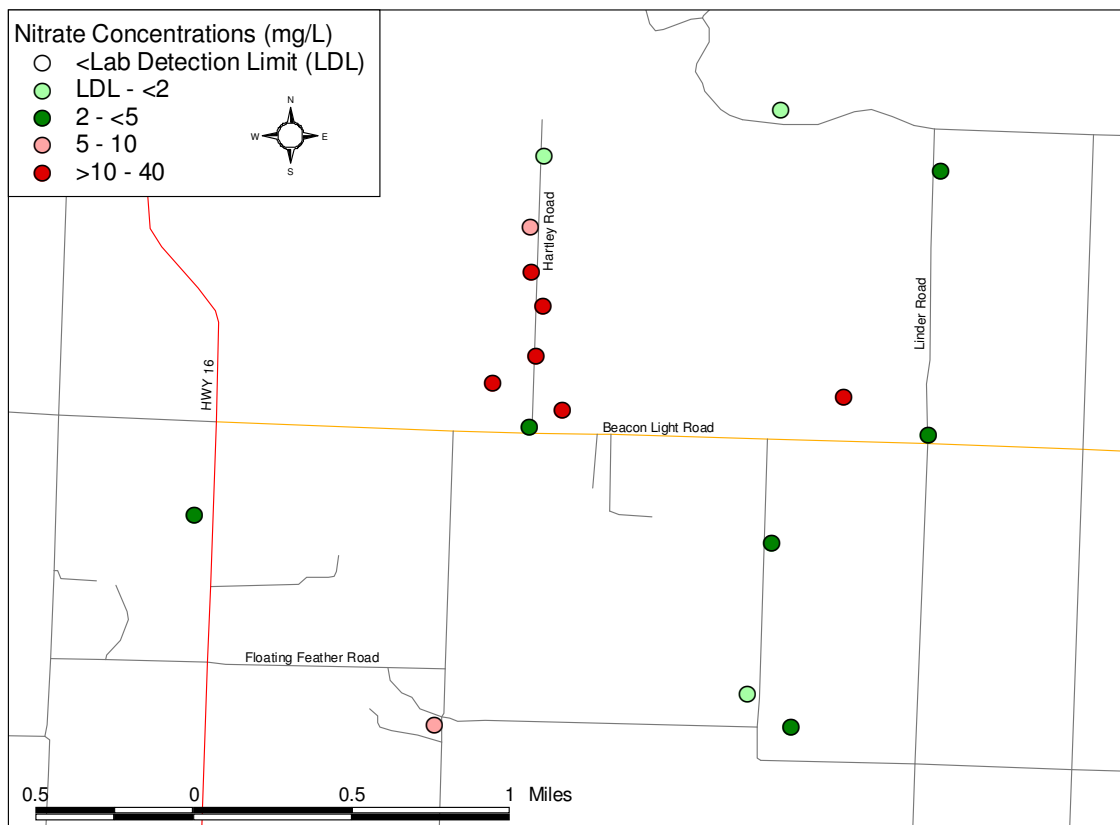
Table 6 presents statistics for the 41 wells sampled for the Elmore County local project. All wells tested had nitrate detections that were greater than the laboratory detection limit of 0.05 mg/L. Nine wells, or 22% of the wells sampled, were over the EPA MCL for nitrate. Fifteen wells, or 37%, had nitrate concentrations ranging from 2 mg/L to less than 5 mg/L. The maximum detection was 29 mg/L. The median concentration was 4.3 mg/L, while the mean concentration was 7.2 mg/L. Sampling of this project will continue on a yearly basis indefinitely.

**Table 6.** Summary of nitrate concentrations from Project 810.

Concentration Range (mg/L)	Number of Wells
<Lab Detection Limit (LDL) (0.05)	0
LDL to <2.0	10 (24%)
2.0 to <5.0	15 (37%)
5.0 to 10	7 (17%)
>10	9 (22%)
Median Value (mg/L)	4.3
Mean Value (mg/L)	7.2
Maximum Value (mg/L)	29

### Eagle Local Project

In 2007, 17 wells were analyzed for nitrate in the Eagle Local Project located approximately three miles northwest of Eagle along Beacon Light Road (Figure 7). There were six wells (or 35% of wells tested) with concentrations exceeding the EPA's MCL of 10 mg/L for nitrate (Figure 9).



**Figure 9.** Nitrate results from ISDA 2007 sampling of Project 530: Eagle Local Project.

Table 7 presents nitrate statistics for the 17 wells sampled for the Eagle local project. All wells tested had nitrate concentrations that were greater than the laboratory detection limit of 0.05 mg/L. Six wells, or 35% of the wells sampled, were over the EPA MCL for nitrate. The maximum detection was 39 mg/L. The median value was 4.6 mg/L, while the mean value was 12 mg/L. Sampling of this project will continue on a yearly basis indefinitely.

**Table 7.** Summary of nitrate concentrations from Project 530.

Concentration Range (mg/L)	Number of Wells
<Lab Detection Limit (LDL) (0.05)	0
LDL to <2.0	3 (18%)
2.0 to <5.0	6 (35%)
5.0 to 10	2 (12%)
>10	6 (35%)
Median Value (mg/L)	4.6
Mean Value (mg/L)	12
Maximum Value (mg/L)	39

### *Pesticides*

#### Eagle Local Project

Two wells were sampled for volatile organic compounds (VOCs) in the Eagle Local Project. Both wells are located along Hartley Road. The VOC 1,2,3-trichloropropane was detected in one well at 1.7 µg/L and in the other well at 1.8 µg/L. The EPA Lifetime Health Advisory Level for 1,2,3-trichloropropane is 40 µg/L. Both detections were within the Level 1 category established by the Idaho PMP Rule.

## **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 based on ground water protection priorities, enforcement, and response to complaints. ISDA's Dairy Bureau 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 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 relies 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 necessary 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 all 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 240 wells related to dairy and beef CAFO projects in 2007 (Table 8). Exceedances of the EPA MCL of 10 mg/L for nitrate varied between projects from 6% to 76%. Project locations, number of wells sampled, and nitrate statistics are listed in the table that follows. Constituents tested generally consist of (but are not limited to): nitrate, ammonia, chloride, sulfate, total coliform, E. coli, and N-15 isotopes.

**Table 8.** Distribution of 2007 sampling for dairy and beef CAFO related projects.

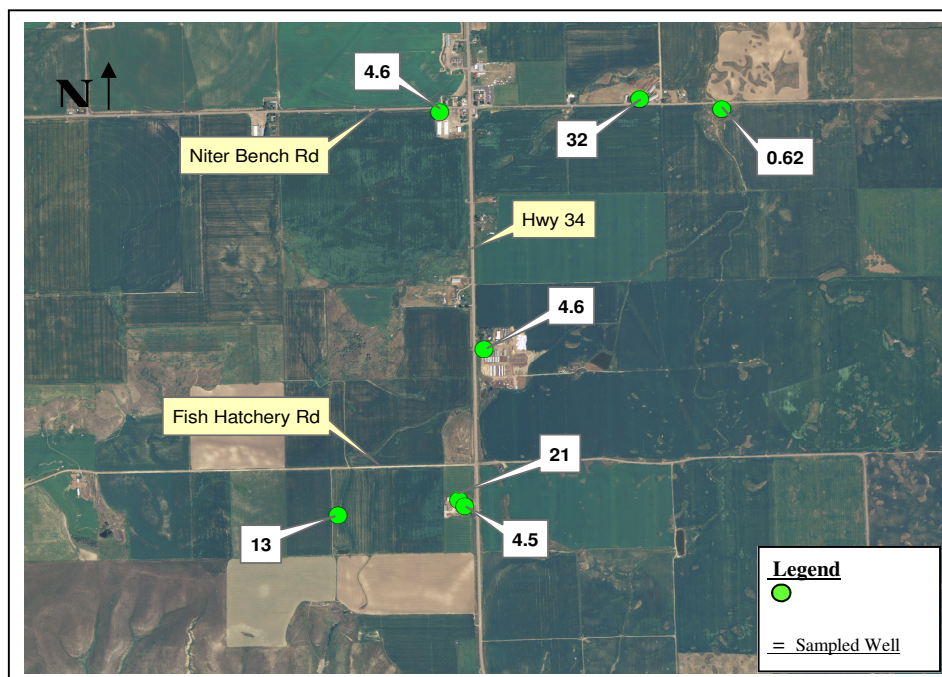
Project Name	Sample Month	# Wells Sampled	# Wells over 10 mg/L Nitrate	Mean Nitrate	Median Nitrate	Max Nitrate	County	Geographic Location
Bliss	January	14	1	5.3	5.9	12.0	Gooding	NW of Bliss
Marsing	April	17	13	20.4	12.0	53.0	Owyhee	NW of Marsing
Sunnyside	May	22	15	17.4	17.0	36.0	Washington	South of Weiser
Grace	June	7	3	11.5	4.6	32.0	Caribou	SE of Pocatello
Bliss	July	15	1	4.8	5.5	11.0	Gooding	NW of Bliss
Dry Lakes	July	7	3	10.3	7.1	34.0	Canyon	South of Lake Lowell
Cassia	July	53	16	8.6	7.6	21.0	Cassia	South of Burley
Buhl	August	34	2	5.6	5.6	12.0	Twin Falls	South of Buhl
Purple Sage	October	33	3	5.1	4.0	27.0	Canyon	North of Middleton
Marsing	October	16	10	19.8	11.0	74.0	Owyhee	NW of Marsing
Sunnyside	October	22	15	17.7	18.5	40.0	Washington	South of Weiser
<b>Total</b>	-	240	82	-	-	-	-	-

### Grace Local Project

Sampling of the Grace area monitoring project occurred in June 2007 as a result of concerns of possible ground water contamination and high nitrate concentrations detected south of Grace, Idaho. Seven wells were sampled for a variety of constituents, with a focus on nitrate (Figure 10). Well logs indicate static water levels range from approximately 30-90 feet below ground level. Typically, well

logs show top soil and a thin clay layer overlying deep basalts with occasional sand interbeds. Domestic wells are generally completed and cased open hole in the basalt aquifer.

In June 2007, three 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 8). Fecal coliform was not detected in any wells during this sampling event.



**Figure 10.** Grace Local Project Nitrate Concentrations, June 2007.

#### Bliss Local Project

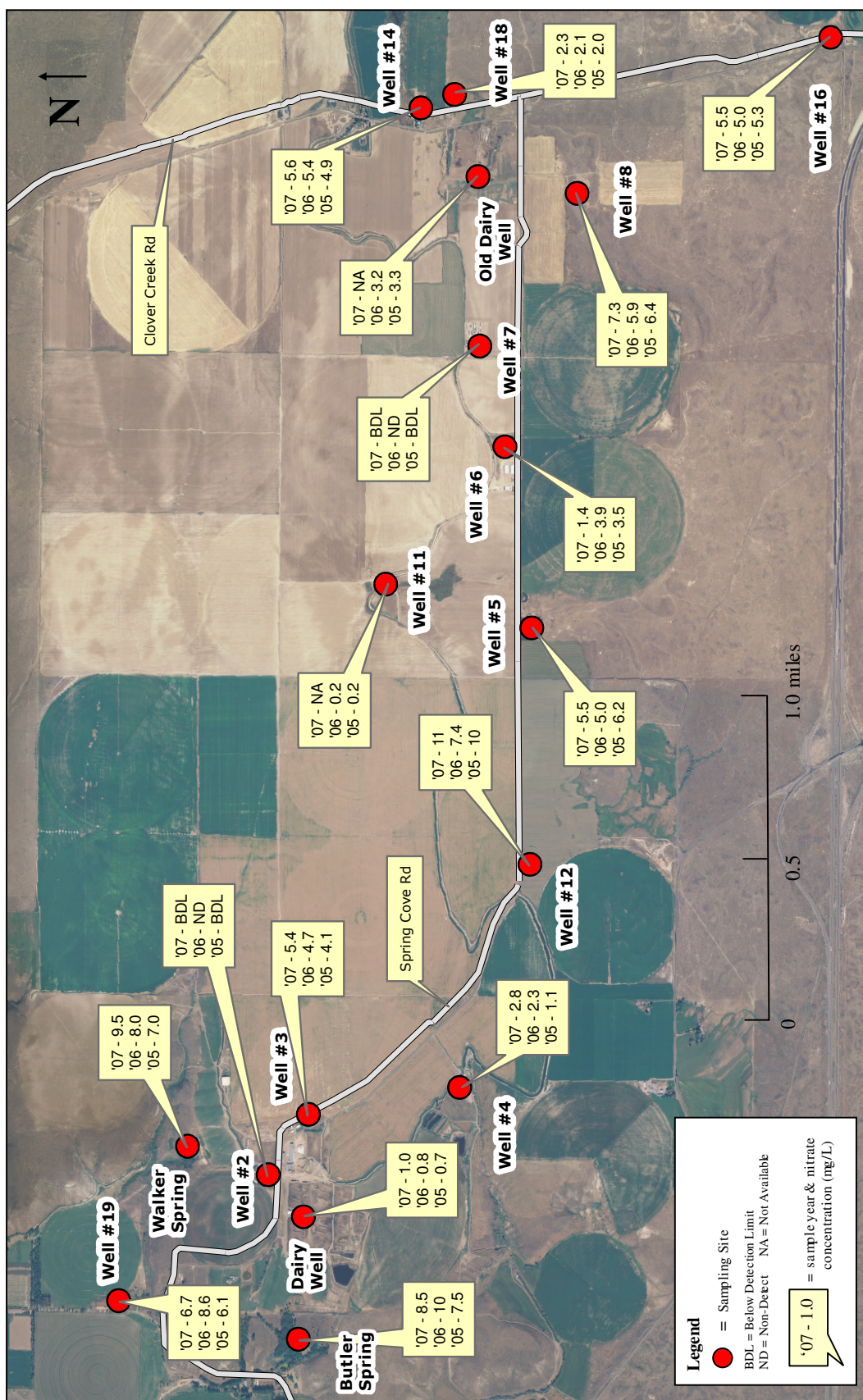
Ground water monitoring over an 8-year period indicates that nitrate has contaminated a shallow aquifer and several springs northwest of Bliss, Idaho (Figure 11). The EPA MCL of 10 mg/L for nitrate was exceeded six times in six years in domestic wells, 12 times in eight years at Butler Spring, and 23 times in eight years at Walker Spring. The median nitrate values for Butler Spring and Walker Spring over 8 years were 8.2 mg/L and 10.4 mg/L, respectively, while the 2007 median nitrate value for domestic wells was 5.4 mg/L.

Nitrogen isotope test results in Butler Spring suggest a fertilizer or mixed source of contamination; however, one sample in January 2006 suggested an animal or human waste source.  $\delta^{15}\text{N}$  values at Walker Spring suggest an organic or mixed source of nitrates. Nitrogen isotope values in domestic wells from July 2005 and July 2006 suggest a commercial fertilizer or mixed source of nitrate contamination.

Quarterly sampling of domestic wells indicated that wells with depth to water less than 100 feet had mean, median, and maximum nitrate concentrations that were higher during each sampling event than wells with depth to water greater than 100 feet. Nitrate concentrations were elevated above 5 mg/L, however, in several wells with depth to water greater than 100 feet.

ISDA began monitoring Butler Spring, Walker Spring, domestic wells, and dairy wells on a regular basis in November 1999. Monthly sampling at the springs and yearly sampling at the domestic wells will continue indefinitely. ISDA will continue monitoring to evaluate potential (current and historical) sources of contamination including commercial fertilization, dairy operations, and well construction.

The Gooding Soil Conservation District, in cooperation with ISDA, secured an EPA Non-point Source Management §319 Grant through IDEQ. This grant will allow improvement in nutrient and irrigation water management throughout the Bliss Nitrate Priority Area. Implementation of the grant has started and included the installation of dedicated monitoring wells to further evaluate the ground water.



**Figure 11.** Bliss project site map with Butler Spring, Walker Spring, and well sampling locations and IDs. Nitrate concentrations (mg/L) closest to July in each of the last three years are noted at each site.



## **Confined Animal Feeding Operation State Siting Team**

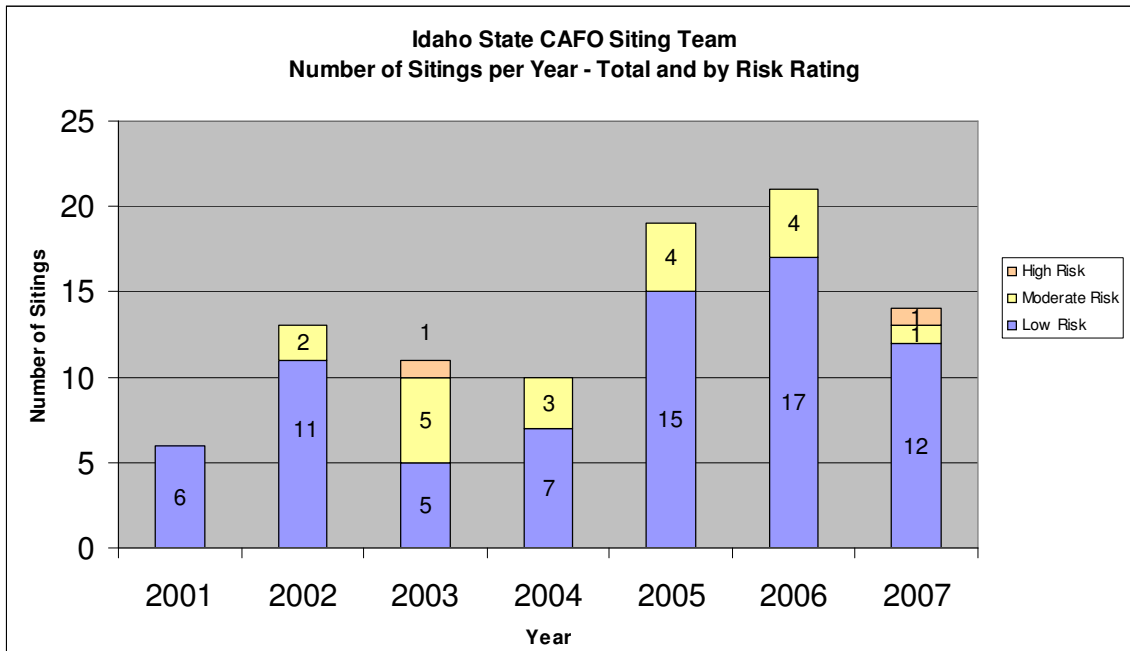
On July 1, 2001, the "Site Advisory Suitability Determination Act" became law creating a confined animal feeding operation (CAFO) site advisory team comprised of members from the Idaho State Department of Agriculture, Department of Water Resources, and the Department of Environmental Quality. The rules 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 conditional use or livestock confinement operation 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 for all proposed CAFO sites. 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.
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 94 site assessments since 2001 (Figure 12). The number of ratings by risk category are 72 low risks (77%), 20 moderate risks (21%), and 2 high risk (2%). Forty-five of the 94 assessments (48%) were conducted for proposed new facilities and 49 (52%) were conducted for proposed expansions. Twelve counties have requested suitability determinations since 2001 (Table 9). Over two-thirds of the 94 CAFO sitings since 2001 have come from four counties: Jerome 25 (27%), Gooding 16 (17%), Cassia 15 (16%), and Twin Falls 10 (11%).



**Figure 12.** Idaho State CAFO Siting Team Assessments per Year

**Table 9.** CAFO Suitability Assessments by County Since 2001.

County	Total	Low Risk	Moderate Risk	High Risk
Jerome	25	19	6	0
Gooding	16	14	2	0
Cassia	15	12	3	0
Twin Falls	10	9	0	1
Minidoka	6	5	1	0
Elmore	5	3	2	0
Owyhee	5	1	3	1
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
<b>Total</b>	<b>94</b>	<b>72</b>	<b>20</b>	<b>2</b>

Five counties requested suitability determinations in 2007 (Table 10). Approximately 64% of the 14 CAFO sitings in 2007 came from two counties: 5 (36%) in Gooding and 4 (29%) in Cassia. These two counties, Gooding and Cassia, also had the most requests in 2006, with 5 and 8 respectively.

The Idaho State CAFO Siting Team conducted 14 site assessments in 2007 and 94 total assessments since 2001. A majority of suitability ratings since 2001 have been low risk (77%), approximately a fifth have been moderate risk (21%), and two sites were high risk (2%). Four counties (Jerome, Gooding, Cassia, and Twin Falls) account for over 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 reversed with a decrease in the number of CAFO sitings to 14 in 2007.

**Table 10.** CAFO Suitability Assessments by County in 2007.

County	Total	Low Risk	Moderate Risk	High Risk
Gooding	5	5	0	0
Cassia	4	3	1	0
Jerome	3	3	0	0
Owyhee	1	0	0	1
Twin Falls	1	1	0	0
<b>Total</b>	<b>14</b>	<b>12</b>	<b>1</b>	<b>1</b>

## Pesticide Management Plan Projects

### Overview

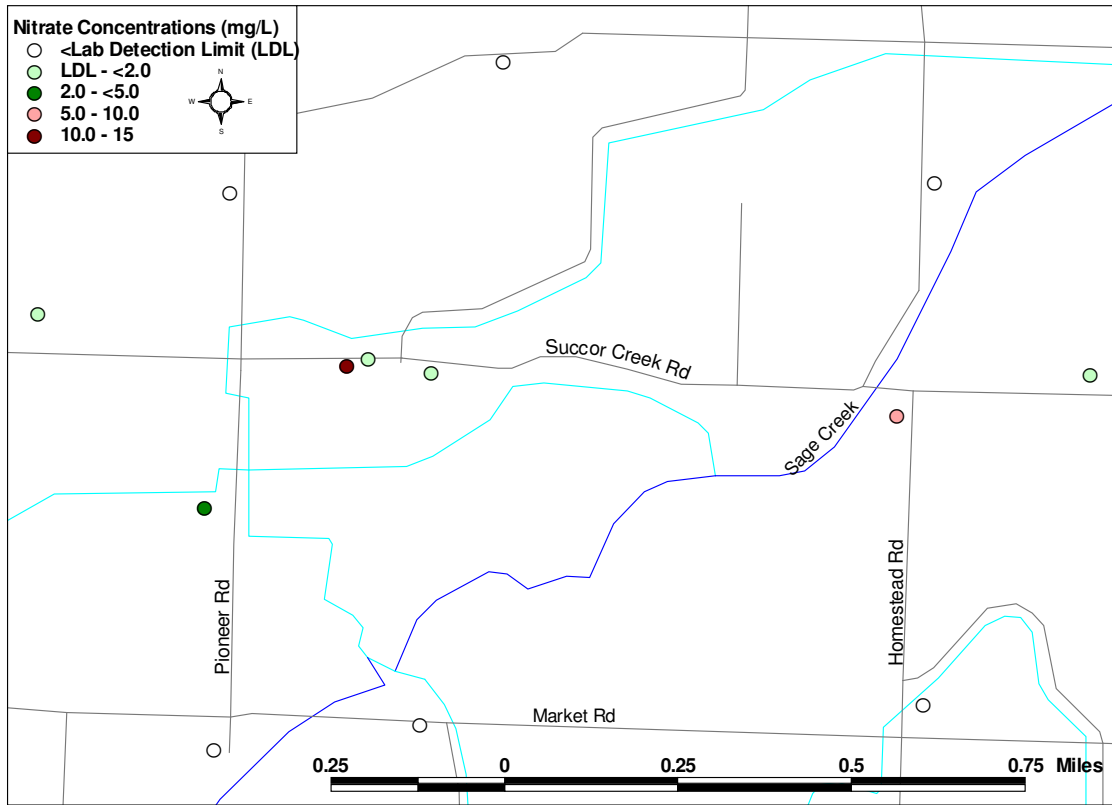
In response to elevated pesticide detections from the 2005 regional project area sampling, Pesticide Management Plan (PMP) monitoring projects were established. Additional wells surrounding the original elevated pesticide detection were sampled to determine the extent of the pesticide contamination. The projects were designed to gain a better understanding of the pesticide plume in the ground water and the relative 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 2007, 13 wells were analyzed for nitrate in the ISDA Owyhee County Dacthal PMP Project located approximately two miles south of Homedale along Succor Creek Road (Figure 13). Of the 13 wells that were sampled during 2007 for the Owyhee County Dacthal PMP project, one well (7.7% of the wells sampled) exceeded the MCL for nitrate (Figure 13 and Table 11). The high nitrate detection was 11 mg/L. The median value was 0.09 mg/L, and the mean value was 1.6 mg/L (Table 11).



**Figure 13.** Nitrate results from ISDA 2007 sampling of Project 310: Owyhee County Dacthal PMP response.

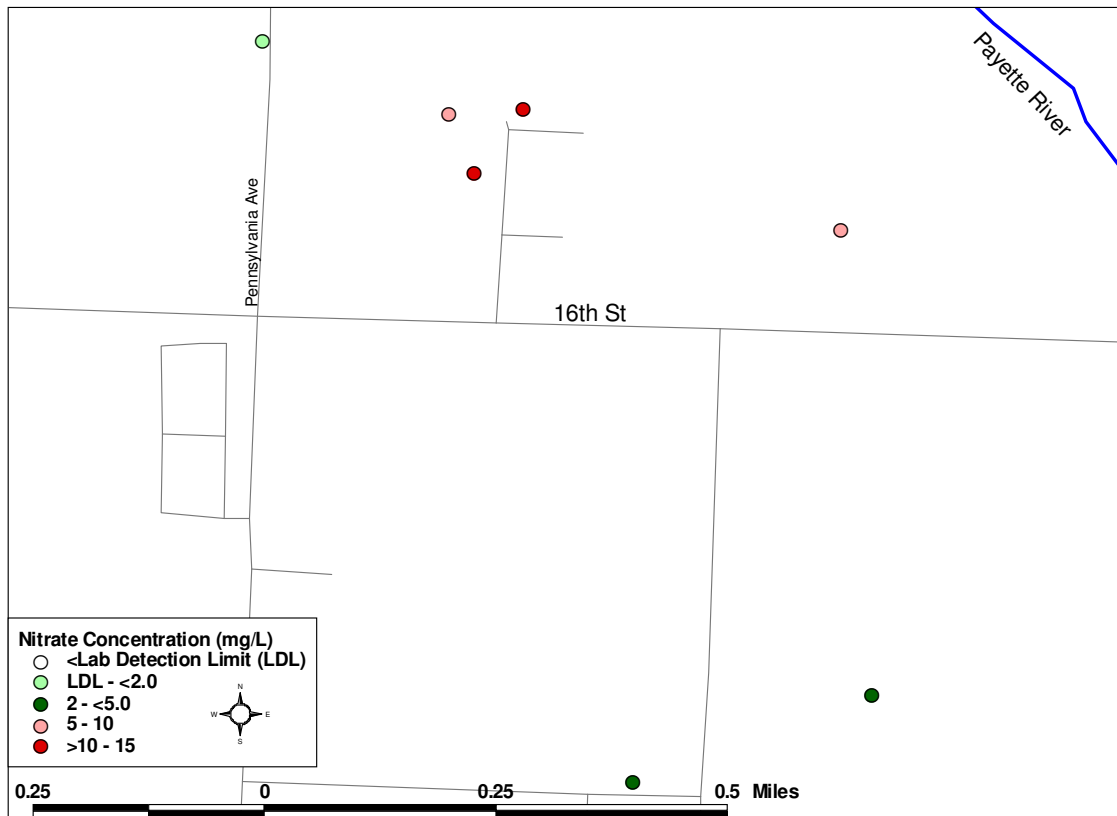
**Table 11.** Summary of nitrate concentrations from Project 310.

Concentration Range (mg/L)	Number of Wells
<Lab Detection Limit (LDL) (0.05)	6 (46.1%)
LDL to <2.0	4 (30.8)
2.0 to <5.0	1 (7.7)
5.0 to 10	1 (7.7)
>10	1 (7.7)
Median Value (mg/L)	0.09
Mean Value (mg/L)	1.6
Maximum Value (mg/L)	11

#### Payette County

Seven wells were analyzed for nitrate in the ISDA Payette County Atrazine and Desethyl Atrazine PMP Project located in Fruitland (Figure 14). Two wells, or 28.6% of the wells sampled, had nitrate concentrations exceeding the EPA MCL (Figure 14 and Table 12). The maximum detection was 12 mg/L. The median value was 7.1 mg/L, while the mean value was 6.9 mg/L (Table 12).





**Figure 14.** Nitrate results from ISDA 2007 sampling of Project 340: Payette County Atrazine and Desethyl Atrazine PMP response.

**Table 12.** Summary of nitrate concentrations from Project 340.

Concentration Range (mg/L)	Number of Wells
<Lab Detection Limit (LDL) (0.05)	0
LDL to <2.0	1 (14.2%)
2.0 to <5.0	2 (28.6%)
5.0 to 10	2 (28.6%)
>10	2 (28.6%)
Median Value (mg/L)	7.1
Mean Value (mg/L)	6.9
Maximum Value (mg/L)	12

#### Nez Perce County

There were three wells analyzed for nitrate in the ISDA Nez Perce County Atrazine and Desethyl Atrazine PMP Project located approximately six miles south of Lewiston. One of the wells had a nitrate concentration that exceeded the EPA's MCL of 10 mg/L. The maximum detection was 12 mg/L. The median value was 10 mg/L, while the mean value was 8.7 mg/L.

## Pesticides

### Owyhee County

In 2007, 13 wells were analyzed for dacthal, along with other pesticides, in the ISDA Owyhee County Dacthal PMP project located approximately two miles south of Homedale along Succor Creek Road. The pesticide detections from the 13 wells that were sampled are presented in Table 13. Six wells, or 46% of wells sampled, had dacthal detections; two wells, or 15% of wells sampled, had desethyl atrazine detections; and one well had an atrazine detection.

**Table 13.** Summary of 2007 pesticide detections from Project 310: Owyhee County Dacthal PMP response.

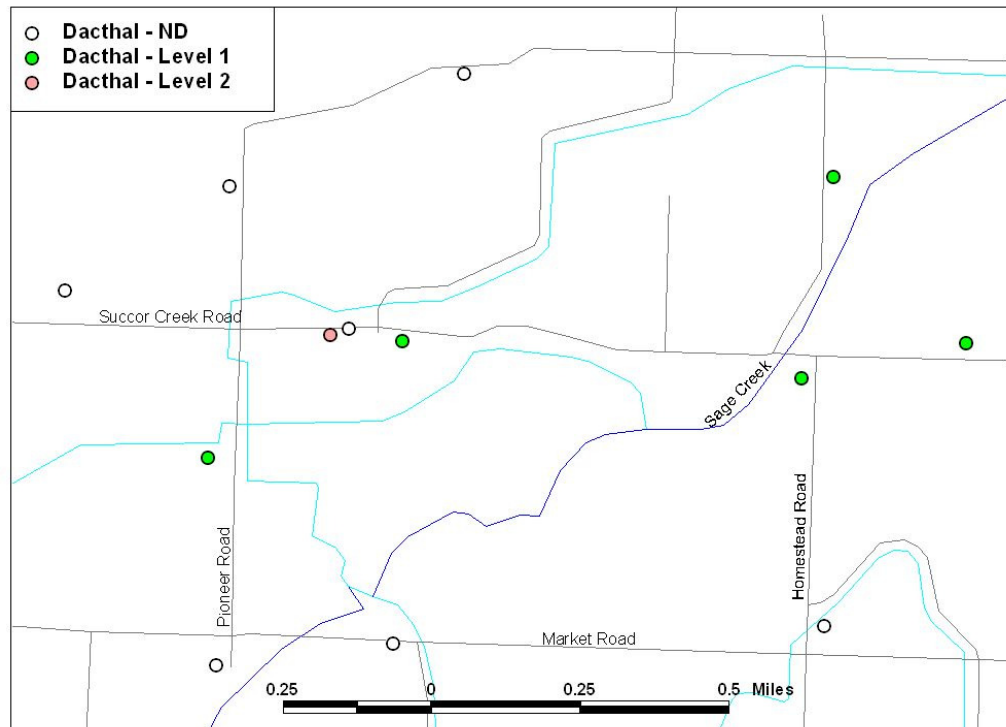
Pesticide	No. of Detections (13 wells)	Range (µg/L)	Reference point (µg/L)
Atrazine	1	0.027	3 (MCL) <sup>1</sup>
Dacthal	6	0.092 - 21	70 (HAL) <sup>2</sup>
Desethyl Atrazine	2	0.039 - 0.042	---- <sup>3</sup>

<sup>1</sup>MCL – EPA Maximum Contaminant Level

<sup>2</sup>HAL – EPA Lifetime Health Advisory Level

<sup>3</sup>Breakdown product of Atrazine, MCL of 3 µg/L for atrazine is used.

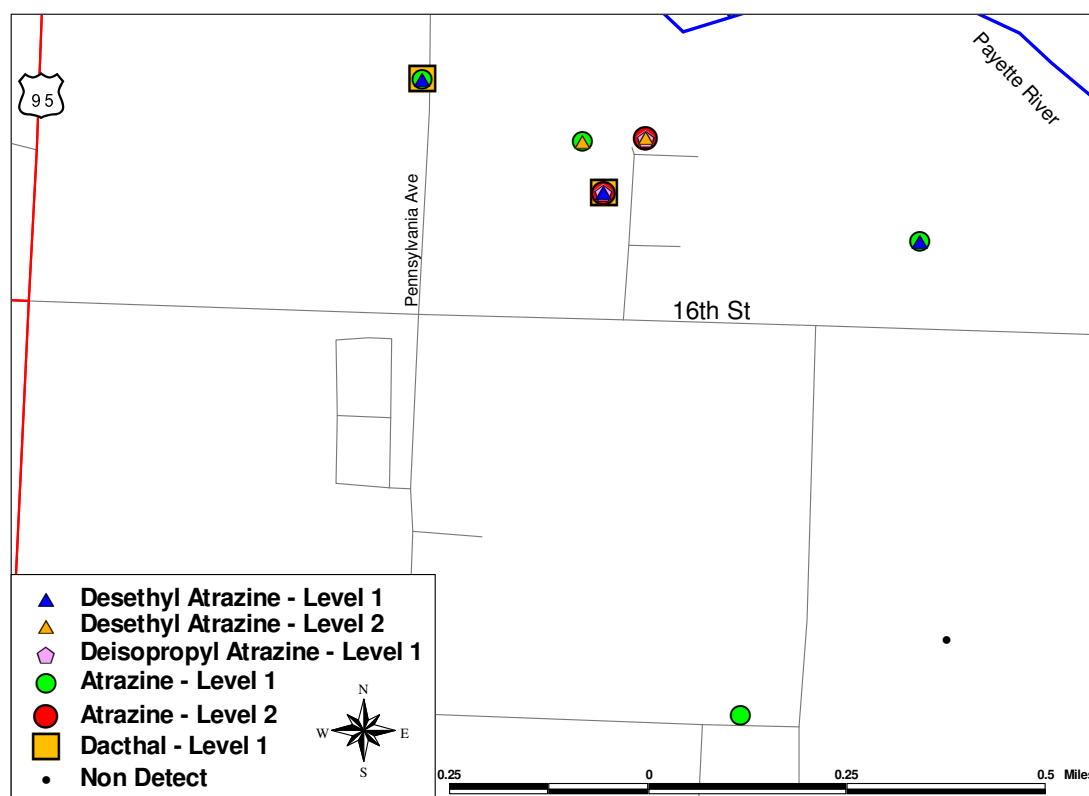
The dacthal results from the 2007 sampling event are shown in Figure 15. One well had a Level 2 dacthal detection, and five wells had a Level 1 dacthal detection. Seven wells had no dacthal detected in the ground water.



**Figure 15.** Dacthal testing results from the 2007 sampling of Project 310: Owyhee County Dacthal Response PMP Monitoring Project.

## Payette County

Figure 16 shows the pesticide results from the follow up sampling in 2007 for the Payette County Atrazine and Desethyl Atrazine (DEA) PMP Project. A total of seven wells near the initial DEA detection were sampled for pesticides. Two wells had Level 2 DEA detections, and three wells had Level 1 DEA detections. Two wells had Level 2 atrazine detections, and four wells had Level 1 atrazine detections. Two wells had Level 1 deisopropyl atrazine (DIA) detections. One well had no detections of atrazine, DEA, or DIA. In addition to the atrazine detections, two wells had Level 1 dacthal detections. All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.



**Figure 16.** Pesticide results from ISDA 2007 sampling of Project 340: Payette County Atrazine and Desethyl Atrazine Response PMP Monitoring Project.

Table 14 presents the summary information for the pesticide detections for the Payette County Atrazine and Desethyl Atrazine PMP Project. Atrazine was detected in six wells, or 86% of wells sampled; DEA was detected in five wells, or 71% of wells sampled.

**Table 14.** Summary of pesticide detections from Project 340.

Pesticide	No. of Detections (7 wells)	Range (µg/L)	Reference Point (µg/L)
Atrazine	6 (86%)	0.04 - 0.86	3 (MCL) <sup>1</sup>
Dacthal	2 (29%)	0.28 - 0.39	70 (HAL) <sup>2</sup>
Deisopropyl Atrazine	2 (29%)	0.04 - 0.05	---- <sup>3</sup>
Desethyl Atrazine	5 (71%)	0.03 - 0.86	---- <sup>3</sup>

<sup>1</sup>MCL – EPA Maximum Contaminant Level

<sup>2</sup>HAL – EPA Health Advisory Level

<sup>3</sup>Breakdown product of Atrazine

### Nez Perce County

Three wells were sampled in Nez Perce County during August 2007 to follow up on an elevated atrazine and DEA detection. The results of the 2007 sampling were 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 deisopropyl atrazine, diuron, and picloram. All pesticide detections in the follow up sampling were below any health standards set by EPA or the state of Idaho.

## **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 20 wells and focused on testing in areas where little testing has been done in the past.

Historical ground water quality monitoring efforts in Idaho by the ISDA have focused on areas where the dominant land use is agricultural. In response to the numerous detections of pesticides in urban ground water reported in the United States Geological Survey NAWQA report (Gilliom et al., 2006) ISDA decided to expand pesticide sampling efforts to include urban areas, starting with a pilot project in the Boise urban area.

The primary goal of this project was to collect current ground water data for pesticide and herbicide analysis in the shallow ground water in the Boise urban area. The data will be used to make regulatory and/or voluntary practice changes on land contributing to the contamination and to implement IDAPA 02.03.01 Rules Governing Pesticide Management Plans for Ground Water Protection (PMP Rule).

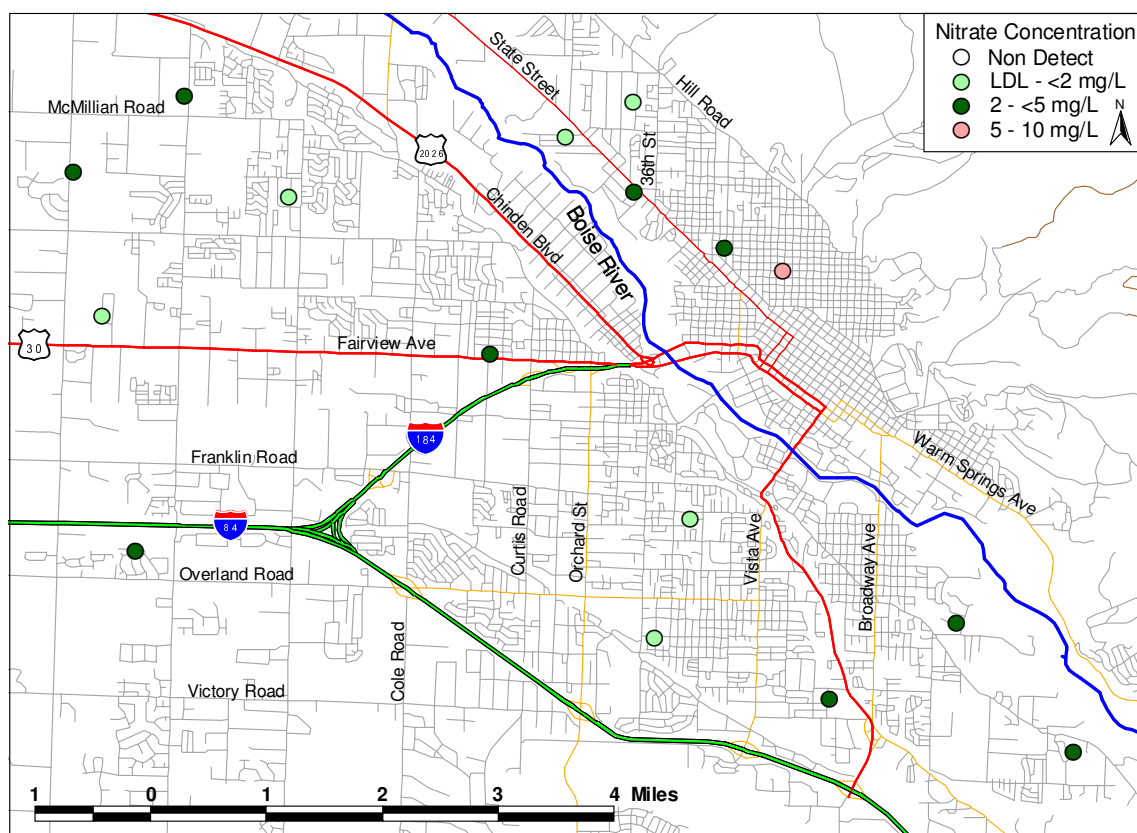
ISDA sampled 16 wells in the Boise urban area in November 2007. Additional wells in Boise will be sampled in April 2008, with the focus being on parks across the city of Boise.

## Water Quality Findings

### *Nitrate*

#### City of Boise

There were 16 wells analyzed for nitrate in the city of Boise (Figure 17). No wells exceeded the EPA's MCL of 10 mg/L for nitrate (Figure 17).



**Figure 17.** Nitrate results from ISDA 2007 sampling of Project 350: Boise Urban Discretionary Project.

Table 15 presents statistics for the 16 wells sampled for the Boise Urban Discretionary Project. Six wells, or 38% of the wells sampled, had nitrate detections between the laboratory detection limit (0.05 mg/L) and less than 2 mg/L. Nine wells, or 56% of the wells sampled, had nitrate concentrations between 2 mg/L and less than 5 mg/L. The maximum detection was 7.9 mg/L. The median value was 2.2 mg/L, while the mean value was 2.8 mg/L.

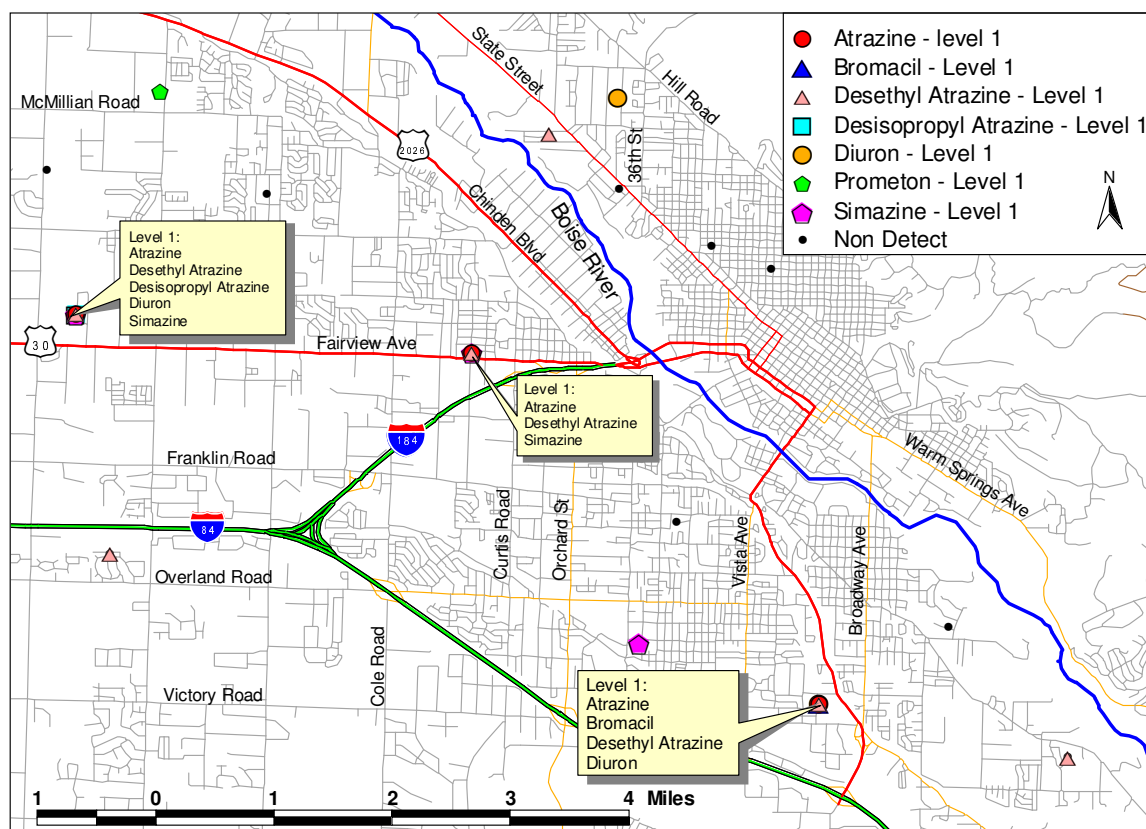
**Table 15.** Summary of nitrate concentrations from Project 350: Boise Urban Discretionary Project.

Concentration Range (mg/L)	Number of Wells
<Lab Detection Limit (LDL)	0
LDL to <2.0	6 (38%)
2.0 to <5.0	9 (56%)
5.0 to 10	1 (6%)
>10	0
Median Value	2.2
Mean Value	2.8
Maximum Value	7.9

## Pesticides

### City of Boise

Sixteen wells were sampled for pesticides in the city of Boise (Figure 18). Nine wells, or 56% of wells sampled, had one or more pesticide detected in the ground water.



**Figure 18.** Pesticide results from ISDA 2007 sampling of Project 350: Boise Urban Discretionary Project.

The results of the pesticide analysis from the 2007 sampling in the city of Boise are presented in Table 16. Desethyl atrazine, a breakdown product of atrazine, was detected in six wells, or in 38% of the wells sampled. Atrazine, diuron, and simazine were each detected in three wells, or 19% of the

wells sampled. Bromacil, deisopropyl atrazine, and prometon were each detected in one well. All detections were below any Idaho or EPA health standards. All detections were within the Level 1 category established by the Idaho PMP Rule.

**Table 16.** Summary of pesticide detections from Project 350.

Pesticide	No. of Detections (16 wells)	Range (µg/L)	Reference point (µg/L)
Atrazine	3 (19%)	0.064 - 0.084	3 (MCL) <sup>1</sup>
Bromacil	1 (6%)	0.39	70 (HAL) <sup>2</sup>
Deisopropyl Atrazine	1 (6%)	0.031	---- <sup>3</sup>
Desethyl Atrazine	6 (38%)	0.035 - 0.093	---- <sup>3</sup>
Diuron	3 (19%)	0.051 - 0.17	21 (RfD) <sup>4</sup>
Prometon	1 (6%)	0.3	100 (HAL)
Simazine	3 (19%)	0.025 - 0.059	4 (MCL)

<sup>1</sup>MCL – EPA Maximum Contaminant Level

<sup>2</sup>HAL – EPA Lifetime Health Advisory Level

<sup>3</sup>Breakdown product of Atrazine, MCL of 3 mg/L for atrazine is used.

<sup>4</sup>RfD – EPA Reference Dose

## Ground Water Quality Protection Activities

ISDA is the lead agency 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 regularly and reports its activities to the Agriculture Ground Water Coordination Committee. The I & E subcommittee met twice in 2007; once in April and once in October. During these meetings, the committee outlined several activities it would like to accomplish, including updating the I & E plan and the Idaho Home\*A\*Syst Project (HAS) materials. The committee successfully reviewed the HAS documents and the documents are currently being updated. The committee also was instrumental in identifying potential workshops and commodity school meetings for educational outreach efforts around the state.

Ground water quality protection activities in 2007 included: beginning updating the overall I & E Statewide Implementation Plan, updating the HAS materials, disseminating fact sheets and brochures, promoting HAS through workshops and a targeted mailing (with the help of the North Side Canal Company) and participating in several pesticide recertification workshops and other outreach efforts. The pesticide recertification workshops were designed specifically for pesticide applicators and growers (Table 17). Presented material included: pesticide and nitrate ground water quality data, information on proper safety, storage, and handling of pesticides and fertilizers with respect to domestic wells, best management practices for field use of pesticides and fertilizers, and information on the State Pesticide Management Plan and the recent (pending) DCPA (Dacthal) legislation.

ISDA plans on conducting additional workshops in 2008, with the goal of surpassing the attendance number in 2007.

**Table 17.** Pesticide recertification education workshops and outreach efforts.

Date	Location	Event Name	Attendance
1/8/2007	Jackpot, NV	Far West Winter Conference	174
1/25/2007	Boise	Idaho Water Users Association Annual Conference	85
1/30/2007	Caldwell	Western Idaho Agriculture Show	53
2/6/2007	Burley	Burley Nitrate Ground Water Project - Public Meeting	10
2/15/2007	Weiser	Weiser Weed District - Pesticide Recert. Workshop	29
2/21/2007	New Plymouth	Payette Co. Pesticide Recertification Workshop	50
2/21/2007	Driggs	Pesticide Recertification Workshop	8
2/21/2007	St. Anthony	Pesticide Recertification Workshop	14
2/22/2007	Ft. Hall	Pesticide Recertification Workshop	16
2/23/2007	Blackfoot	Pesticide Recertification Workshop	22
2/28/2007	Burley	Idaho Water Users Association Ditch Riders Workshop	54
3/1/2007	Lewiston	Extension Pesticide Recertification Workshop	40
3/1/2007	Jerome	Idaho Water Users Association Ditch Riders Workshop	22
3/2/2007	Nampa	Idaho Water Users Association Ditch Riders Workshop	50
3/23/2007	McCall	Valley County Master Gardener Workshop	20
3/31/2007	Rupert	Rupert/Minidoka Nitrate Testing Open House	500
5/30/2007	Boise	Ada Co. Advanced Master Gardener Workshop	35
8/17-26/07	Garden City	Western Idaho Fair - Agriculture Expo (*G.W.Q. Booth)	--
8/28-31/07	Blackfoot	Eastern Idaho Fair - Agriculture Expo (*G.W.Q. Booth)	--
11/2/07	Boise	Project WET workshop	30
11/13/07	Lewiston	Soil and Water Update for Fieldmen & Crop Consultants	25
11/29/07	Emmett	Pesticide Applicator Recertification Workshop	26
12/6/07	Twin Falls	Pesticide Applicator Recertification Workshop	75
12/10/07	Marsing	Owyhee County Workshop	21
12/11/07	Caldwell	Canyon Co. SWCD Pesticide Recertification Workshop	13
12/11/07	Rupert	SWCD's Legislative Luncheon	35
12/12/07	Mt. Home	Elmore Co. Pesticide Applicator Recertification Workshop	67
12/14/04	Twin Falls	Twin Falls Pesticide Applicator Recertification Workshop	31
12/18/07	Caldwell	Pesticide Applicator Recertification Workshop	84
12/20/07	Riggins	Pesticide Applicator Recertification Workshop	9
Total Attendance for Water Quality Education in 2007			1598

\* 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 or BMPs 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 2007, ISDA assisted the Weiser River SCD, the Gooding SCD, the Lewis SCD, the Yellowstone SCD and the West Cassia 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 monthly ground water monitoring and has been involved in the evaluation of the effectiveness of the project.

The Gooding SCD 319 project is located in an IDEQ designated nitrate priority area. The Bliss ground water improvement project encompasses the 6,800 acre Bliss Nitrate Priority Area (NPA) and focuses on implementing better nutrient management planning through soils and plant tissue analyses and evaluating irrigation systems for better management. In 2007, the Gooding SCD had three monitoring wells installed within the NPA in order to enhance ground water monitoring of the shallow ground water to better characterize the source(s) of nitrate. ISDA is continuing to monitor the ground water quality in the Bliss area to evaluate ground water quality in the area.

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 continuing to monitor the 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 still are meeting or exceeding their expected crop yields. ISDA is continuing to monitor the 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 continuing to monitor the ground water quality in the Burley area and will continue to do so to evaluate the effectiveness of the 319 Project.

ISDA is currently working with various state agencies and the Lower Boise/Canyon County Ground Water Advisory Committee to implement the Lower Boise/Canyon County Ground Water Management Plan. The plan was completed in 2005 and ISDA is working toward implementing BMPs.

ISDA is also assisting IDEQ and others with developing Ground Water Management Plans for the Grand View/Bruneau NPA, the Minidoka NPA and the Ashton-Drummond NPA.

## 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 1,033 homeowner result letters and well analysis reports were mailed in 2007.

## 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 site address is:

<http://www.agri.idaho.gov/Categories/Environment/water/indexwater.php>

Information on CAFO siting can also be found on the ISDA website at the following address:

<http://www.agri.idaho.gov/Categories/Environment/cafoSiting/indexsitingTeam.php>

## 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 2007. The monitoring efforts in 2007 focused on areas in the state that have either showed past impacts from nitrate pollution or to a lesser extent pesticides. ISDA currently has 27 distinct and active ground water projects across the state. Thirteen of these projects were regional based projects, 8 were dairy or confined animal feeding operation (CAFO) related projects, two were local projects, three were Pesticide Management Plan related projects, and one was an EPA funded discretionary 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. Thirty 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 14 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. Fifty nine wells or ten percent of 621 regional wells sampled by the ISDA Ground Water Program in 2007 exceed the EPA MCL for nitrate. Twelve 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 for nitrate, 9.3 mg/L and 8.1 mg/L, respectively. Other projects having comparatively high mean and/or median concentrations of nitrate in ground water are the Cassia County Regional Study (mean - 5.6 mg/L, median - 4.1 mg/L), the Central Henry's Fork Basin Regional Aquifer Study (mean - 5.0 mg/L, median - 4.3 mg/L), and the Grand View and Bruneau Regional Study (mean - 8.0 mg/L).

The eight dairy and beef CAFO monitoring projects indicate significant nitrate impacts to ground water. Four 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 eight active projects having mean concentrations above 2 mg/L in 2007.

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. Seven detections in 2007 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 and Nez Perce Counties; dacthal and dinoseb in Owyhee County; and triallate in Fremont and Idaho Counties.

The Ground Water Program facilitated or participated in a record number (30) 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 14 CAFO siting evaluations. Twelve new or expanding CAFO sites were determined to be of low risk, one site moderate risk, and one site high risk as related to environmental or human health considerations.

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