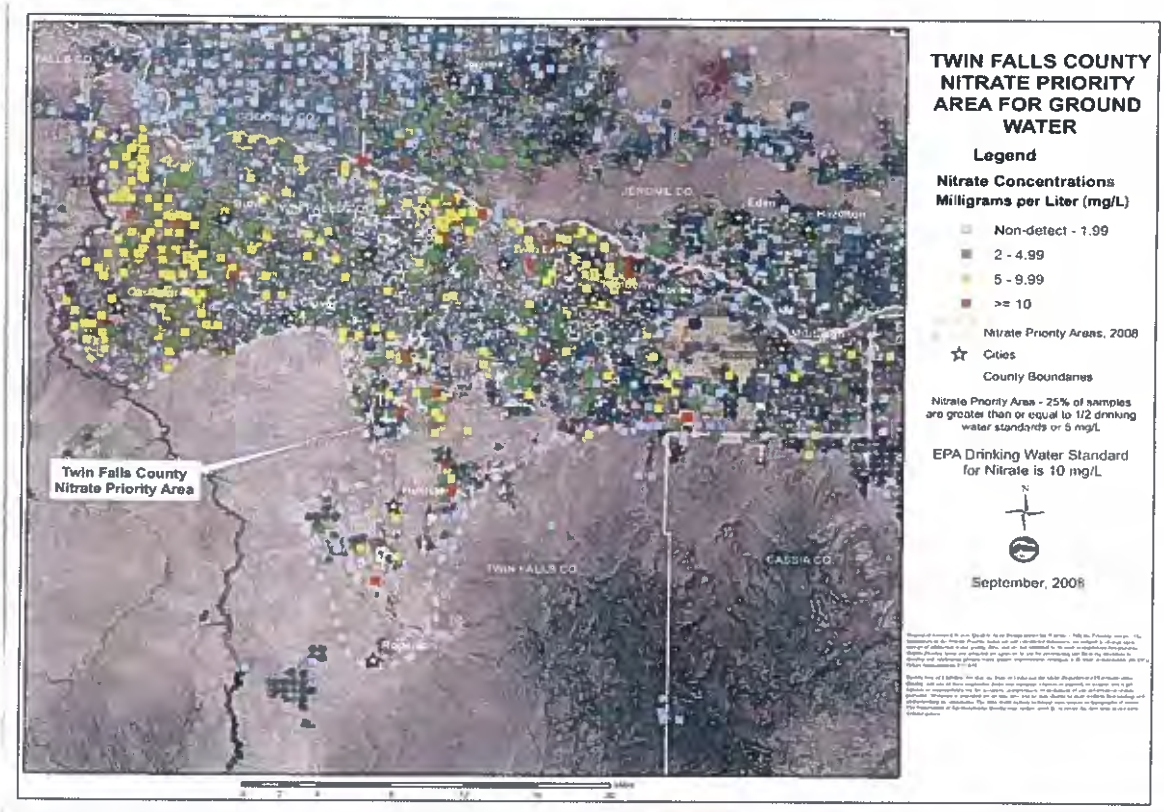
Twin Falls County
Ground Water Quality
Advisory Committee

Ground Water Quality Improvement Plan
Update and Current Project Status



Fall 2009

EXECUTIVE SUMMARY

In 2001, the Idaho Department of Environmental Quality (DEQ) ranked the Twin Falls Nitrate Priority Area as having the state's second most degraded ground water in regards to nitrate.

In response to this issue, the DEQ formed the Twin Falls County Ground Water Quality Advisory Committee. The goal of the committee was to provide direction and guidance to the community to prevent future nitrate level increases. The group published a management plan in 2001 and released this updated version in fall/spring 2009.

Of the 400 samples evaluated in 2001 in the Twin Falls NPA 48% of the sites had nitrate equal to or greater than 5 milligrams per liter (mg/L). Of the 605 samples evaluated in 2008 53% of the samples had nitrate concentrations equal to or greater than 5 mg/l.

In the fall of 2006, DEQ again collected and compiled nitrate results and well location data from the numerous agencies monitoring ground water in Idaho. Utilizing this up-dated data, DEQ re-evaluated the 2001 nitrate priority area delineations and rankings in the report "2008 Nitrate Priority Area Delineation and Ranking Process", Department of Environmental Quality, August 2008. This report identified 32 Priority 1 Nitrate Priority Areas (NPAs) statewide as compared to the 25 previously identified in 2001 and elevated the Twin Falls NPA ranking to #1 in the state showing an increasing trend (at an 89% confidence level) in nitrate contamination of ground water. Major changes were also made to the delineation boundaries (see Appendix D)

High levels of nitrates in the ground water have been linked to various health problems, including: blue baby syndrome; non-Hodgkin lymphoma; and cancer.

The voluntary nature of these management plans is in lieu of new regulatory requirements. It is intended to complement water quality rules, regulations and permitting requirements. However, if the voluntary approach does not result in satisfactory progress towards reducing nitrate levels in the ground water, mandatory requirements may be considered. The area's economy must be considered when making these decisions.

The first part of this document provides recommendations and technical assistance for three land use activities:

- Agriculture
- Residential
- Livestock Operations

The second portion of this document discusses current project status and governmental rule/policy changes.

TABLE OF CONTENTS

Twin Falls County
Ground Water Quality Management Plan
2009 Update and Current Project Status

Section I Ground Water Contamination Concerns

The committee initially identified five land use activities that could affect ground water nitrate levels. The group has since decided that wastewater land application and ground water recharge projects are well-regulated and no further voluntary recommendations are suggested. The group does have concerns and advice for the following three land uses:

- Agriculture
- Residential
- Livestock Operations

Section II Agriculture

A. Introduction

Irrigated agriculture is the dominant land use in the county with approximately 245,200 acres under cultivation (2005 Ag Census). This is about 20% fewer acres than what was reported in 1997. This acreage decrease is attributed to residential development and dairies/feed lots.

Both irrigation and nutrient management must be considered to address the nitrate leaching concerns in irrigated agriculture. Due to their inherent connection, recommendations for these activities are combined.

B. Irrigation Management

1. Over the years, many irrigation methods have been used in Twin Falls County. Today, the predominant system is by sprinkler.

2. Lack of adequate information sometimes results in over-application of water.

3. All irrigation systems have the potential to contribute to nitrate loading of ground water.

4. Proper application of water, regardless of irrigation method, requires considerable knowledge. Education in the following areas is essential: crop demand; infiltration rate; soil characteristics; frequency of

application; application rate; mechanics of the irrigation system; and evaporation rate.

C. Nutrient Management

Nitrogen not utilized by plant growth is stored in the soil and can be leached to ground water as nitrate if sufficient water is available to move it through the soil profile

The major sources of nitrate from agricultural activities are:

- Legumes.
- All types of fertilizer.
- Mineralization of organic matter.

D. Recommended Irrigation and Nutrient Management Practices

Today's growers have more information and testing opportunities to enable them to increase crop yields and quality while considering economics and ground water quality.

Using the following practices could benefit irrigated agriculture and ground water quality. No single practice will completely resolve the contamination problem. Therefore, these practices should be implemented in combination to reduce further leaching of nitrates to the ground water.

1. Education: Information is readily available on this well-researched subject.

2. Irrigation and nutrient scheduling: Balance applications with crop needs and soil characteristics throughout the growing season.

3. Plant tissue and soil testing: Properly time fertilizer application based upon crop demands as determined by plant tissue and soil testing.

4. Precision farming: Balance nutrient and irrigation applications to crop requirements according to soil variations within a field to whatever degree practical by use of precision irrigation systems.

5. Manage inputs for all crops: Management activities and strategies identified in this plan should be followed regardless of the crop value.

6. Nutrient removal by proper crop rotation: Consider crop rotations that will salvage residual nutrients, including those from previous nitrogen-fixing crops.

7. Nutrient value of compost and manure: Account for the nutrient value of any compost and manure spread on a field before adding additional fertilizer. If these nutrients have not been taken into account, over-fertilization becomes more likely.

8. Maintain irrigation equipment: Develop operation and maintenance schedules for irrigation equipment to ensure water is applied at correct rates.

E. Technical Assistance for Irrigation and Nutrient Management

1. Education: A wide variety of information is available through agricultural service providers and associations, colleges and universities, and governmental agencies. Goals of current studies include:

   - Promote an increased understanding of the variation in practices and nutrient requirements across agricultural fields.
   - Identify practices that reduce or eliminate nitrate loading to the ground water.
   - Determine whether recommended practices are being used and applied correctly.
   - Evaluate whether there are certain times of the year when nutrients leach out of the soil profile.
   - Determine the nutrient requirements for each stage and given yields of the major crops being grown in the county.

2. Publicity: Presentations on ground water quality protection should be developed and presented at appropriate local forums.

3. Funding: Target grant applications and other assistance funds.

Section III Residential

A. Introduction

Several activities associated with residential development are possible contributors to nitrate ground water problems. In low-density settings, the impact to the ground water is low because of dilution by the ground water and the small volume of discharge spread over a large area. As the housing density increases, the combined discharge volume increases, thus overcoming the soil's ability to treat the wastes and the ground water's ability to dilute the volume.

The combination of the listed activities below makes residential areas a potentially important localized source of ground water nitrate contamination.

- Septic systems.
- Well construction and location.
- Landscaping, lawns and gardens:
  - Excessive or improperly-timed fertilization.
  - Over-watering.
- Small Acreage.
  - Improper management of small acreage agricultural/livestock operations.

B. Septic Systems

1. Introduction

The standard household septic system is not designed to effectively treat wastewater for nitrates. Annual mass nitrate loading is approximately 30 pounds per household septic system.

In some areas of Twin Falls County, the density of septic systems exceeds the dilution capabilities of the ground water and higher levels of nitrate are found.

2. Recommended Management Practices for Septic Systems

a) <u>New housing developments:</u>

- Developers and South Central Public Health District should continue to evaluate and improve the current Nutrient-Pathogen Study requirements.
- Growth should be encouraged in areas adjacent to municipal sewer access.
- Organizations should be formed within the development to oversee the maintenance of septic systems.

b) Existing housing developments:

- Governmental departments are encouraged to review the impacts on area ground water impacts and to require mitigation where necessary.

- Individuals should routinely inspect replace or upgrade their systems per South Central Public Health District current standards and/or their septic service provider.

3. Technical Assistance for Septic Systems

a) South Central Public Health District distributes septic tank maintenance handouts to extend the useful life of the system and minimize ground water impacts.

b) South Central Public Health District personnel continue to work with developers to improve the Nutrient-Pathogen study process.

c) City and county departments are in the process of developing a long-term municipal sewer system plan.

C. Wells – Construction, location and contamination

1. Introduction

Contaminated water moving down a well casing from the land surface to ground water or moving between aquifers via well bores could contribute to the nitrate contamination problem. Many individual wells in the county were constructed before current requirements came into effect. Improperly sealed wells can facilitate water movement, possibly carrying contaminants from the land surface to the ground water or between aquifer units.

Locating a septic system or other contamination source too close or up gradient from a poorly sealed well may cause the well to capture contaminated water and allow contaminated water to move further into the aquifer or between aquifers.

2. Recommended Practices for well construction, location and contamination

a) Owners of existing wells:

- Inspect the well casing and seals to ensure that no leakage is occurring.

- Improve the construction if the well has an inadequate seal or casing.

- Test the well water annually for fecal coliform, E. coli and nitrate.

- Store liquid and solid contaminates at least 50 feet away from wellheads or provide barriers to prevent well contamination.

- When using chemigation, provide back-flow prevention devices to prevent contamination of the well and ground water through back siphoning of chemigation tanks.

b) Owners of new wells:

- Case and seal the well a minimum of 50 feet, at least through the first clay or water-bearing strata, with a solid casing (not slotted pipe or screens).

c) Local officials:

- Pass regulations that will require all wells to comply with current guidelines.

3. Technical Assistance for Well Construction, Location and Contamination

Idaho Department of Water Resources and South Central Public Health District are both involved in the following tasks:

- Develop and distribute information to well drillers and the public about the ground water contamination concerns.

- Outline the need to construct and repair wells to prevent possible contamination from the surface.

- Highlight the need to repair wells that are connecting aquifers so cross-contamination of aquifers does not occur.

D. Landscaping, Lawns and Gardens

1. Introduction

People need to understand the nature of their landscape, lawn or garden problem before attempting to solve the problem. To do this, they should seek help, advice and information from knowledgeable professionals. In many cases, applying additional fertilizer or water will not solve the plant health problem, but may deliver additional nitrate to the ground water.

2. Recommended Management Practices for Lawns and Gardens

a) Residents:

- Apply fertilizers per label instructions. Fertilizers applied at greater than recommended rates can lead to a nitrogen build-up and/or imbalance of nutrients in the soil profile. Given enough water, these nutrients are then available to leach to ground water.

- Provide only that amount of water needed to maintain a healthy landscape, lawn or garden. Over-watering tends to drive available nutrients below plant roots. These nutrients easily find their way to ground water as additional water is applied or precipitation occurs. This situation also leads residents to use additional fertilizer to replace the nutrients washed below the root zone.

- Apply fertilizer and water in amounts and at times which do not contribute to nitrate leaching. Over-watering right after certain fertilizer applications can immediately wash nutrients past the root zone making them unavailable for plant uptake and a threat to ground water quality.

b) Developers:

- Whenever possible, supply pressurized canal irrigation systems for landscaping use.

3. Technical Assistance for Landscaping, Lawn and Garden

a) Home*A*Syst program, coordinated by the Idaho Association of Soil Conservation Districts, provides information on environmental and health issues around the home.

b) Master Gardener program, coordinated by the University of Idaho Cooperative Extension system, organizes and develops information to properly maintain landscaping, lawns and gardens to prevent leaching nutrients to the ground water.

E. Small Acreage

1. Introduction

The generic term "livestock operation" refers to any lot or facility which contains animals. Idaho Statute (section 67-6529c, Idaho Code), boards of county commissioners and other governmental agencies determine whether a site is to be categorized as:

- "Confined Animal Feeding Operation" (CAFO).
- "Animal Feeding Operation" (AFO).
- "Small Acreage"

"Small Acreage" and smaller "animal feeding operations" are not subject to as high a level of regulation as CAFOs. It is the owner's responsibility to learn what requirements apply to their particular situation.

Regardless of the category, the result may be a surplus of manure in a pasture. When irrigation or precipitation occurs, nutrients accumulated on the surface may leach through the soil to the ground water. This is especially likely to happen when ground is:

- Low-lying.
- Frozen.

Regardless of size, all pastures have their own unique "carrying capacity" (the number of animals the acreage can support). Exceeding the carrying capacity of a pasture can enable animals to over graze grasses. This reduces the plant's ability to utilize manure for growth and increases the risk of leaching.

2. Recommended Practices and Technical Assistance for Small Acreage

Refer to "Section IV Livestock Operations"

Section IV Livestock Operations

A. Introduction

The term "livestock operation" used in this document refers to any lot or facility which contains animals. Idaho Statute (section 67-6529c, Idaho Code), boards of county commissioners and other governmental agencies:

- Determine whether a site is a "confined animal feeding operation" (CAFO), an "animal feeding operation", or a "Small Acreage."
- Review Nutrient Management Plans. (At the time of this document, only dairies were required to submit this information.)
- Issue construction and operation requirements.
- Limit the number of animals allowed to be kept on-site.

B. Storm Water Runoff and Wastewater

1. Introduction

Twin Falls County provides a good location for livestock operations due to its low annual precipitation. On occasion, heavy rainfall or snow events can generate enough runoff water to cause a problem.

Lagoons and water conveyance systems are an important part of a livestock operation. These facilities allow the capture, treatment (if needed) and disposal of:

- Storm water runoff.
- Wastewater:
  - Corral water.
  - Process water.
  - Any waters that have come into contact with manure or stored feed products.

2. Recommended Management Practices for Storm Water Runoff and Wastewater

a) Runoff:

- Careful grading and/or berms should divert runoff from clean surfaces to prevent contact with manure and stored feed products.
- Clean water can be handled as:
  - Per the National Pollution Discharge Elimination System (NPDES) permit, if applicable.
  - Irrigation water.
- If clean water contacts manure or feed, it must be routed to a lagoon and treated as wastewater.

b) New Lagoons:

- New lagoons and wastewater conveyance facilities should be designed and constructed in accordance with state standards to minimize leakage of stored wastewater.

c) Existing Lagoons:

- Redesign or modification may be required on existing systems in order to meet state standards.

d) Application of wastewater:

- Routinely analyze lagoon water to determine:
  - Nutrient levels.
  - Effectiveness of treatment.
- Apply wastewater to provide both a hydraulic balance and proper nutrient uptake.
- Follow the most current applicable regulations.

e) Lagoon sediments:

- Best Management Practices (BMPs), or applicable regulations, should also be followed when cleaning out sediments from lagoons and holding ponds to prevent damage to the seals or structures that could result in leakage.
- Sediments should be managed as per recommendations in the Solid Manure portion of this document.

C. Solid Manure

1. Introduction

Solid manure should be managed as a valuable nutrient source for growing crops. If regulations are not applicable, Best Management Practices (BMPs) should be followed.

2. Recommended Practices for Solid Manure

a) Store manure in a manner that minimizes impact to ground water.

b) Routinely analyze manure for nutrient value and by-products that may impact crop application rates.

c) Annual soil testing should be performed to determine current soil nutrient status and application requirements.

d) Consider composting of solids as a method of managing the nutrients. Benefits include:

- Stabilization of nutrients.
- Lower salt index.
- A more consistent product.
- Pathogen and weed seed destruction.
- Cheaper transportation costs due to lower water content.

D. Feedlot Surfaces

1) Introduction

Concentrating animals in a small area produces a surface seal of compacted organic matter and soil that inhibits movement of water and contaminants through the seal. Anaerobic conditions can also be created in the seal that will assist in the denitrification process (conversion of nitrate to nitrogen gas).

2) Recommended Practices for Feedlot Surfaces

a) Direct all waters to appropriate locations via gravity, berms or piping systems.

b) Maintain the surface seal while removing manure and scraping the feedlot pens.

c) Maintain grades to provide drainage and prevent ponding.

d) Upgrade existing facilities to meet accepted Best Management Practices (BMPs).

E. Technical Assistance for Livestock Operations

The website of the Idaho State Department of Agriculture is an excellent starting point for research (www.agri.idaho.gov).

Section V Current Project Status and Rule/Policy Changes and Implementation Progress

A. Current Project Status

- **"2008 Nitrate Priority Area Delineation and Ranking Process, Idaho Department of Environmental Quality, December 2008:**

  Updated nitrate priority area for Twin Falls modifying area delineation and assigned Twin Falls as the #1 Nitrate Priority Area in the state.

- **Trend Analyses for Idaho's Nitrate Priority Areas, 1994-2007, Idaho Department of Water Resources Planning & Technical Services, Water Information Bulletin, No. 50, Part 7, September 2008**

  The Idaho Department of Water Resources prepared this Trend Analysis at the request of the Idaho Department of Environmental Quality. The analysis shows an increasing trend in median nitrate values for Twin Falls at the 89% confidence level.

  (Refer to Appendix D)

- **Idaho Department of Environmental Quality (DEQ):**

- The original goal of the December 2001 Twin Falls County Ground water Quality Management Plan was to reduce the ground water nitrate levels so that the county was no longer on the statewide priority list. However, the DEQ has found that a statistically valid confirmation is not possible.

  The department is now focusing its efforts on "hot spots."

  An Environmental Monitoring Information System (EMIS) is being developed. It will serve as a data base for all agencies.

B. Rule/Policy Changes:

- Idaho State Department of Agriculture:

In July 2001, the "Site Advisory Determination Act" became law, requiring dairies to submit and operate under an approved Nutrient Management Plan. Some of the purposes of this paperwork are to limit the effect the dairy has on surface and ground water. As of April 2005, 16,600 acres were managed under one of these plans.

- South Central Public Health District:

  Residential developers must submit a Nutrient Pathogen Study prior to construction within delineated Nitrate Priority Areas. The department inputs the data into a flow chart to determine whether or not the development is required to provide further data.

- Idaho Department of Water Resources:

  - IDAPA 37.03.09. Well Construction Standards. Updated 2009

- Twin Falls County Ground water Quality Management Plan:

  The 2001 plan was incorporated by reference into documents by:

  - Twin Falls County Planning and Zoning.
  - The cities of Buhl, Filer and Twin Falls.

C. Implementation Progress:

- 2008 Delineation and Ranking Process showed that 89% of the 605 wells sampled were above the accepted background level of 2mg/L .
- Nutrient Management plans are now required by the Idaho State Department of Agriculture for dairies.
- Nutrient Pathogen Studies for residential developments must be approved by South Central Public Health District before construction.
- Twin Falls Drainage Tunnels GIS Coverage Project. Identifies areas venerable to ground water contamination and potentially fish hatcheries that utilize the water.
- USGS Graphical Modeling Tool for Evaluating Nitrogen Loading to and Nitrate Transportation in Ground Water in the Mid-Snake Region, South-Central Idaho
- Production of the educational video "Five Acres on Rock Creek", Protecting Water Quality in Small Acreage Subdivisions.
- First Annual Twin Falls Water Quality Fair, spring 2009.
- Water Quality Booth At Twin Falls County Fair 2006 and 2007.
- Development and distribution of "Mid-Snake Placemat" depicting the mid-snake aquifer, NPAs and including educational materials about the aquifer (approximately 20,000 copies distributed over a 6 county region).

Appendix A – Committee Members

Twin Falls County Ground Water Quality Advisory Committee Members

Phyllis Beard – Agriculture/Industry
Steven Bingham – U.S. Bank/Agriculture
Randy Clark – City of Buhl
Reagon Hatch – Animal Feeding Operations
Kathy Hieb – Engineering Consultant for Idaho Department of Environmental Quality
Jeff Lynn – Concerned Citizen
John O'Connor – Agriculture
Mike Schroeder – City of Twin Falls Water Department
Bob Templeman – Filer City Council

Technical Advisory Committee

Idaho Association of Soil Conservation Districts – Lance Holloway & Carolyn Firth

South Central Public Health District – Merl Egbert

Idaho State Department of Agriculture – Rick Carlson

Idaho Department of Environmental Quality –
Bill Allred, Dave Anderson, Joe Baldwin, Barry Burnell, John Bokor

Idaho Department of Water Resources – Nathan Erickson, Ken Neely

Middle Snake Regional Water Resources Commission – Bob Muffley

Paul Chemical and Fertilizer – Rex Schorzman

Natural Resource Conservation Service – Steve Schuyler

Appendix B – Authorities

1. The *Idaho Department of Environmental Quality (DEQ) is designated as the primary agency* to coordinate and administer ground water quality protection programs for the state (Ground Water Quality Protection Act of 1989, Idaho Code 39-120). Various state and local agencies have responsibilities for and are involved in implementing the Ground Water Quality Plan (adopted in 1992 and amended in 1996).

2. The *Ground water Quality Rule* (IDAPA 58.01.11.400.02 and IDAPA 58.01.11.400.03) sets forth a number of alternative actions that the DEQ may follow when a numerical ground water quality standard has been exceeded, as well as when one has not been exceeded but significant degradation of the ground water has been detected. The ground water quality standard addressed in this plan is the primary (health based) drinking water standard of 10 mg/L nitrate.

3. In March 2000, the *Policy for Addressing Degraded Ground Water Quality Areas (Policy No. PM00-04)* was published.

   - One of the purposes of this policy is to set forth a process to identify, designate, and delineate areas where ground water quality is significantly degraded as defined by rule.

   - Another purpose of *Policy Memo PM00-04* is to develop ground water quality management strategies for improving ground water quality in high priority areas based on current categorization and applicable standards with the use of local input. The Twin Falls County Ground water Quality Advisory Committee was formed as a pro-active measure to improve local ground water quality through the adoption of the recommendations in this plan.

4. In 2008, the Idaho Department of Environmental Quality re-evaluated the state's nitrate priority areas utilizing recent nitrate data results and incorporating two geostatistical methods, indicator kriging and ordinary kriging (see "2008 Nitrate Priority Area Delineation and Ranking Process", Department of Environmental Quality August 2008). This process yielded 32 Priority 1 NPAs statewide. These locations were then ranked to determine the severity of the problem. Ranking criteria consisted of population, existing water quality, water quality trends, and beneficial uses.

Twin Falls NPA was ranked as the #1 most degraded area in the state.

Of the 605 wells sampled in Twin Falls 2008:

- 89% had nitrate levels over the accepted background value of 2mg/L.
- 48% had nitrate levels greater than or equal to 5mg/L.

- 6% had nitrate levels greater than or equal to 10 mg/L exceeding the state and federal MCL for nitrate.
- The Idaho Department of Water Resources evaluated the nitrate data, using statistical methods, and determined that Twin Falls had an increasing nitrate trend at an 89% confidence level ("Trend Analysis for Idaho's Nitrate Priority Areas, 1994-2007", Water Information Bulletin, No 50, Part 7).

Appendix C – Resources

There are a number of governmental, university and local organizations that can provide information on ground water, agriculture or confined animal operations. New data, technologies and management practices are frequently updated.

- **Environmental Protection Agency**

  http://www.epa.gov

- **Farm*A*Syst**

  http://www.wisc.edu/farmasyst

- **Ground Water Foundation**

  http://ground water.org

- **Home*A*Syst**

  http://www.uwex.edu/homeasyst

- **Idaho Association of Soil and Water Conservation Districts (IASCD)**

  http://www.iascd.state.id.us

  Soil and/or Water Conservation Districts (SCD and/or SWCD) - local

  - Balanced Rock (SCD), Snake River (SWCD), Twin Falls (SWCD)

- **Idaho Cattle Association (ICA)**

  http://www.idbeef.org

- **Idaho Department of Environmental Quality (DEQ)**

  http://www.deq.state.id.us/

- **Idaho Department of Water Resources (IDWR)**

  http://www.idwr.idaho.gov

- **Idaho OnePlan**

  http://www.oneplan.org

- **Idaho Rural Water Association (IRWA)**

http://www.idahoruralwater.com

- **Idaho State Department of Agriculture (ISDA)**

  http://www.agri.idaho.gov

  - **Idaho Soil Conservation Commission (ISCC)**

    http://www.scc.idaho.gov

    - **Idaho Soil and/or Water Conservation Districts (SCD or SWCD) Balanced Rock, Snake River, and Twin Falls**

- **National Sanitation Foundation**

  http://www.nsf.org

- **South Central Public Health District (SCDH)**

  http://www.phd5.idaho.gov

- **Twin Falls Canal Company**

  http://www.tfcanal.com

- **Twin Falls County Planning and Zoning (TFP&Z)**

- **Twin Falls County Soil and Water Conservation Districts (SWCD)**

- **United States Department of Agriculture (USDA)**

  - **Natural Resource Conservation Service (NRCS)**

    http://www.nrcs.usda.gov

    http://www.stormwatercenter.net

- **United Sates Geological Survey (USGS)**

  http://idaho.usgs.gov

- **University of Idaho (UI)**

  http://www.uidaho.edu

  - **Cooperative Extension System**

    http://extension.ag.uidaho/twinfalls

- **Idaho Water Resource Research Institute (IWRRI)**

  http://www.boise.uidaho.edu/iwrri

Appendix D - Attachments

2008 Nitrate Priority Areas and Ratings

2008 Nitrate Priority Areas

AREA NAME	DEQ Region	Acres	Square Miles	Population	Total Samples*	Max NO3	Mean NO3	Median	#>=2.0	%>=2.0	#>= 5.0	%>=5.0	#>=10.0	%>=10.0	#PWS/SWA	TREND	SCORE	RANK
TWIN FALLS	TFRO	379520	593	63354	605	41.0	5.20	4.90	536	89	288	48	34	6	88	Increase	24.78	1
ADA CANYON	BRO	211200	330	121063	933	55.9	5.27	4.10	701	75	383	41	108	12	213	Increase	24.75	2
WEISER	BRO	25600	40	7258	99	43.5	12.26	12.00	86	87	78	79	58	59	25	No Change	24.59	3
FORT HALL	PRO	23680	37	1763	8	24.1	14.79	14.80	8	100	7	88	7	88	7	No Change	24.20	4
NE STAR	BRO	2560	4	166	63	48.0	11.14	7.68	42	67	35	56	27	43	1	Increase	23.44	5
MARSING	BRO	5760	9	521	33	37.0	9.57	7.90	21	64	19	56	13	39	12	Increase	21.98	6
GRAND VIEW	BRO	5760	9	510	22	121.0	15.33	9.60	22	100	20	91	11	50	2	No Change	20.55	7
HAGERMAN	TFRO	1280	2	877	8	19.6	9.92	11.00	8	100	5	63	5	63	4	Insufficient	20.45	8
CASSIA CO.	TFRO	193280	302	17525	384	40.0	6.34	5.74	331	86	224	58	65	17	48	No Change	20.32	9
BRUNEAU	BRO	11520	18	23	4	110.0	43.40	31.70	3	75	3	75	3	75	0	Insufficient	19.80	10
LOWER PAYETTE	BRO	26880	42	6718	119	28.0	6.05	4.74	83	70	57	48	22	19	25	No Change	17.70	11
MINIDOKA	TFRO	147200	230	18395	319	83.0	5.35	4.32	224	70	131	41	27	8	56	No Change	17.25	12
ASHTON/DRUMMOND	IFRO	162560	254	2484	179	48.0	7.03	6.00	159	89	124	69	28	16	18	No Change	16.83	13
MOUNTAIN HOME AFB	BRO	8960	14	8903	36	28.9	7.00	5.41	29	81	20	56	8	22	8	No Change	16.62	14
MOUNTAIN HOME	BRO	1280	2	100	35	40.0	9.96	5.80	29	83	19	54	10	29	4	No Change	16.26	15
CLEARWATER PLATEAU	LRO	359040	561	4236	183	77.1	6.79	3.70	119	65	68	37	39	21	22	No Change	16.25	16
GLENNS FERRY	BRO	20480	32	1868	11	32.2	9.07	5.72	9	82	8	73	3	27	4	No Change	15.99	17
GRACE/SODA SPRINGS	PRO	317440	496	8042	96	37.2	4.62	3.21	64	67	28	29	8	8	45	No Change	15.59	18
PRESTON	PRO	106880	167	8178	59	30.8	5.15	4.19	40	68	24	41	6	10	23	No Change	15.41	19
BLACKFOOT	PRO	15360	24	1100	15	16.0	6.98	5.64	15	100	9	60	3	20	13	No Change	15.00	20
PURPLE SAGE	BRO	14080	22	2835	87	22.7	5.26	4.61	66	76	38	44	9	10	25	No Change	14.72	21
LINDSAY CREEK	LRO	28160	44	1273	45	18.6	4.74	3.80	25	56	18	40	9	20	16	No Change	14.12	22
MINK CREEK	PRO	1920	3	1478	40	21.0	4.57	2.42	24	60	13	33	8	20	11	No Change	13.85	23
LAPWAI CREEK	LRO	33920	53	1026	16	18.7	5.63	5.19	13	81	9	56	2	13	8	No Change	13.72	24
NOTUS	BRO	2560	4	135	6	10.2	5.76	6.93	5	83	4	67	1	17	0	Insufficient	13.71	25
PARMA	BRO	7040	11	890	17	15.0	4.83	5.36	10	59	9	53	3	18	3	No Change	13.63	26
ST. ANTHONY	IFRO	7680	12	666	14	42.6	9.46	3.29	9	64	5	36	3	21	5	No Change	13.18	27
MUD LAKE	IFRO	81280	127	1309	52	20.0	3.90	2.89	33	63	14	27	4	8	11	No Change	12.41	28
EMMETT NORTH BENCH	BRO	10880	17	887	27	17.0	4.65	3.69	19	70	9	33	3	11	3	No Change	12.15	29
NORTH POCATELLO	PRO	1920	3	4464	11	8.9	4.62	3.80	11	100	3	27	0	0	11	No Change	10.35	30
BLISS	TFRO	7040	11	76	24	8.6	3.19	3.11	16	67	7	29	0	0	0	No Change	8.79	31
HOMEDALE	BRO	5760	9	387	24	16.0	4.67	1.54	12	50	9	38	5	20	1	Decrease	7.90	32
TOTALS		2228480	3482	288510	3574				2772		1688		532		712			

*Number of sample sites within nitrate priority area

TABLE 1. 2008 Ranked Nitrate Priority Areas with Score Components

1/26/2009

Trend Analyses for Idaho's Nitrate Priority Areas
1994-2007

Kenneth W. Neely
Technical Hydrogeologist
Idaho Department of Water Resources
Planning & Technical Services Division
322 E. Front Street
Boise, ID 87320
208-287-4800
www.idwr.idaho.gov/

Prepared for the Idaho Department of Environmental Quality
Water Information Bulletin, No. 50, Part 7

- September 2008

Complete document available at:
http://www.idwr.idaho.gov/hydrologic/info/pubs/wib/wib50p7_nitrate_trend_analyses.pdf

In 1998, the Idaho Department of Environmental Quality (IDEQ), in cooperation with the Ground Water Monitoring Technical Committee (GWMTC), delineated 33 Nitrate Priority Areas (NPA) based on several existing data sources. The NPAs were ranked on the basis of several factors including the presence or absence of trends. In 2000, the U.S. Geological Survey (USGS) was contracted to determine if nitrate trends had occurred for the NPAs.

The USGS conducted their analyses by compiling nitrate data from multiple sources and performing statistical analyses on these data for the NPAs. As part of their approach, the USGS added a one-mile buffer around each NPA, which resulted in the overlapping of several NPAs. The overlapping NPAs were grouped together, and the result was the reduction of NPAs from 33 to 25. The USGS examined a total of 8,465 nitrate analyses from 2,931 wells with dates ranging from June 1961 to February 2001. The USGS analyses revealed that long-term increasing trends (over 10-year time periods) occurred at 6 NPAs, long-term decreasing trends occurred at 4 NPAs, short-term increasing trends (over 4-year time periods) occurred at 7 NPAs and short –term decreasing trends occurred at only 1 NPA. These results were based on the 95% confidence level. The USGS published their findings in a Water Resources Investigations Report 02-4056 in 2002.

In 2007 and 2008 IDEQ compiled nitrate results from ground water quality monitoring conducted since the last NPA ranking in 2002. IDEQ, in conjunction with the GWMTC, used the data to identify and delineate 32 NPAs. The criteria for a NPA remains unchanged from 2002 (at least 25% of the wells tested had nitrate concentrations at or above 5 milligrams per liter).

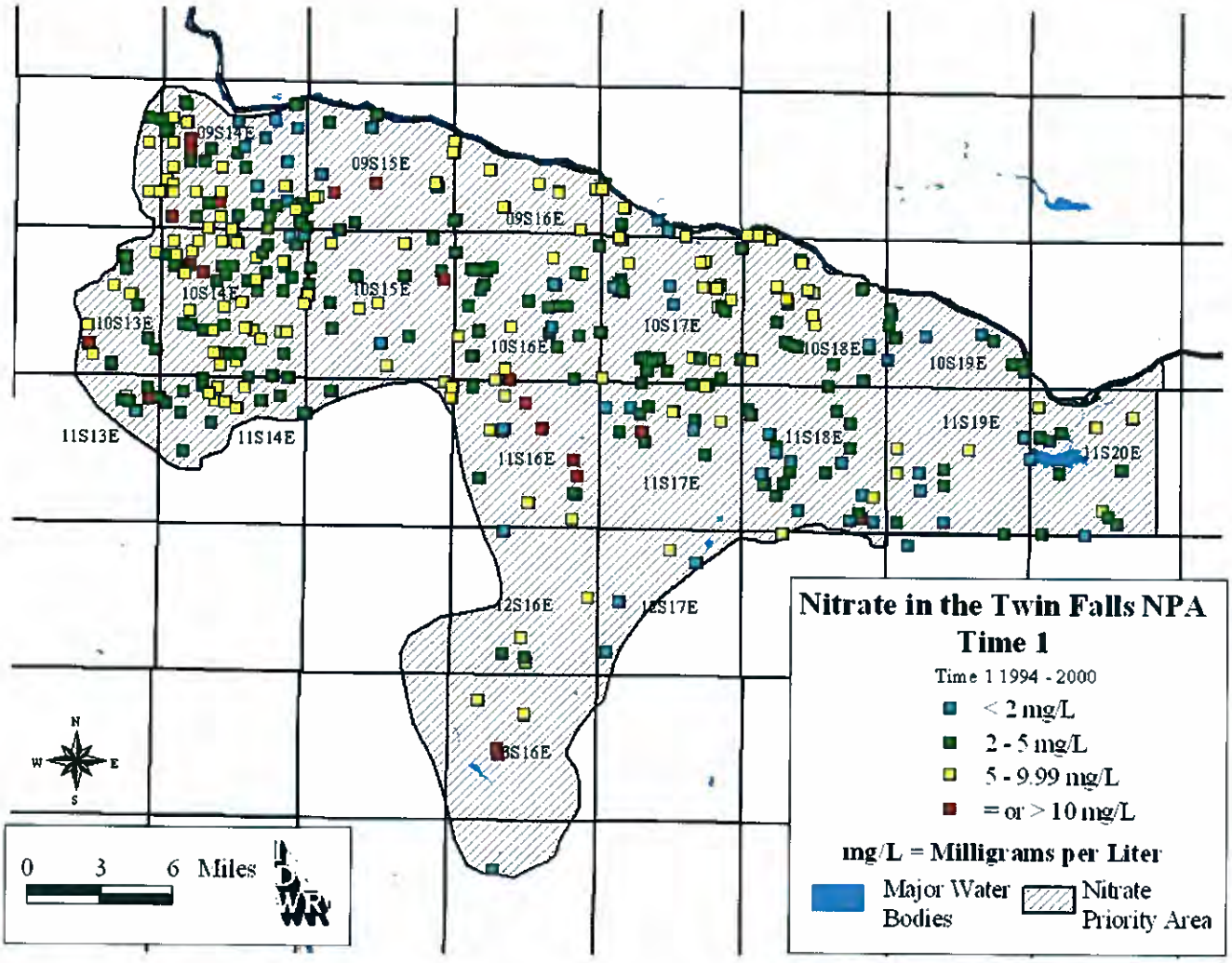
Recently, the IDEQ desired to know the trends in nitrate concentrations since the analyses conducted by the USGS. The IDEQ contracted with the Idaho Department of Water Resources to perform statistical analyses for trends using the same overall ranking process that was done by the USGS in 2002. IDEQ and IDWR determined that two Time Periods would be examined, with both encompassing seven years. Time Period 1 (Time 1) is the analyses conducted from 1994 to 2000. Time Period 2 (Time 2) included the

analyses done from 2001 to July 2007.

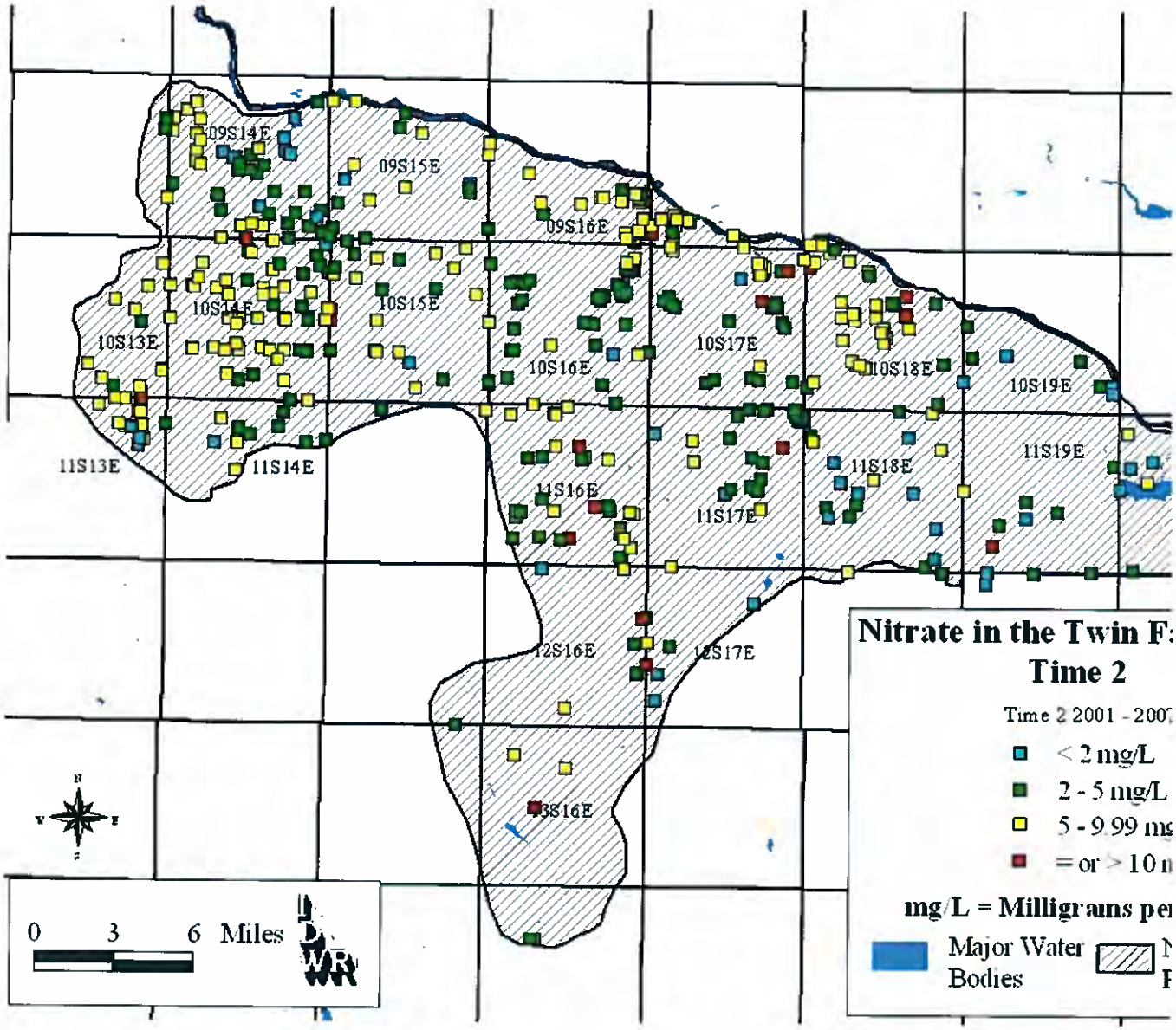
The IDWR received two databases from the IDEQ which contained a total of 74,000 records. The IDWR also received a draft GIS coverage that contained revised NPAs based on probability mapping and regional factors. Since the original 2001 NPA coverage, several NPAs had been dropped, some had been added, and the boundaries of many had been changed slightly to significantly. The IDWR sorted the nitrate data for each NPA according to Time 1 and Time 2, selected the maximum nitrate value for each site, and eliminated duplicate sites between the two databases. After accomplishing this, it was discovered that three NPAs did not have enough data for statistical analyses. For the other 29 NPAs, the number of nitrate results used in the analyses was 2,343 in Time 1 and 2,473 in Time 2. Some of these results are "paired" data meaning that the same site was sampled in both time periods; others were sites that were sampled in either Time 1 or Time 2.

In July, 2008, the GWMTC decided to use a confidence level of 85% as the cutoff between No Trend and Significant Trend. The results from this study showed that six NPAs had nitrate trends at a greater than 85% confidence level. Five NPAs (Ada/Canyon, Marsing, NE Star, Twin Falls and Weiser) had increasing nitrate trends; one NPA (Homedale) had a decreasing nitrate trend. Only NE Star had an increasing nitrate trend at a greater than 95% confidence level. Nineteen NPAs had increases in median values ranging from 0.1 mg/L to 6.7 mg/L. Nine NPAs had decreases in median values ranging from 0.1 mg/L to 13.0 mg/L. One area showed no change in median values. Because five NPAs showed increasing nitrate trends, significant at a greater than 85% confidence level, and because twice as many NPAs had increases in median values than decreases, IDWR recommends that trend analyses be conducted every five to seven years.

Twin Falls. The median nitrate value increased from 4.8 to 5.2 mg/L, which is significant at the 89% confidence level. A visual inspection of the two Time periods indicates that an area encompassing parts of 9S 16E, 9S 17E, 10S 17E, and 10S 18E had more sites with elevated nitrate concentrations in Time 2 than in Time 1 (Figures 12 and 13). The number of samples in Time 1 was 400 and in Time 2 was 523. Forty-eight percent of the sites in Time 1 had nitrate equal to or greater than 5 mg/L. In Time 2, 53% of the samples had nitrate concentrations equal to or greater than 5 mg/L.



Nitrate concentrations for Time 1 in the Twin Falls NPA, 2008.

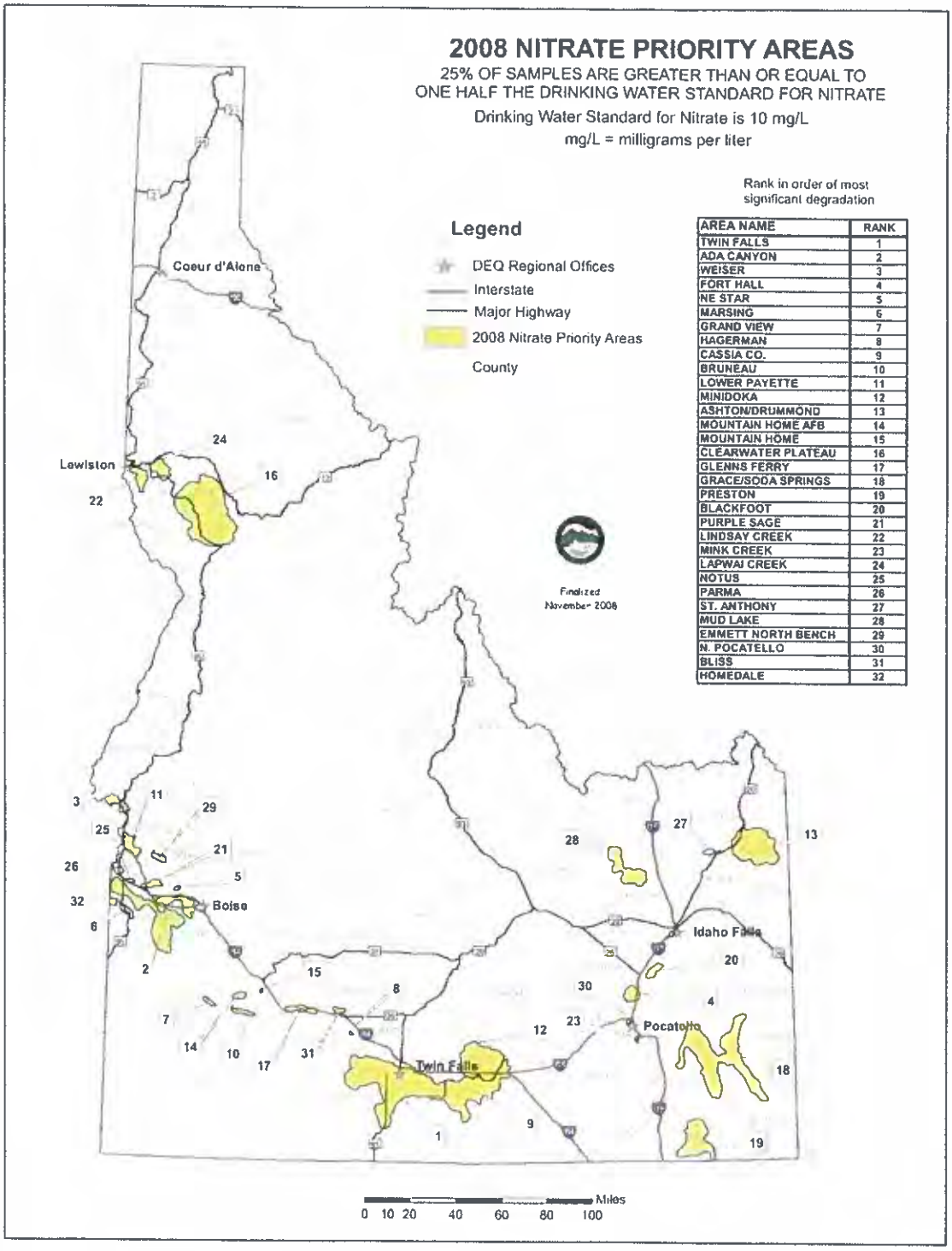


Nitrate concentrations for Time 2 in the Twin Falls NPA, 2008

Twin Falls 2008 NPA Score Sheet

Priority Area Number: 1		Priority Area Name: Twin Falls		
Ranking Criteria			**Score**	**Comments**
1) POPULATION				
	Points	**Select One**		
a) Within Degraded Area				
<5000	1			
5000 to 50,000	2			
>50,000	3	x	3	63,354
		Subtotal	**3**	
b) Source Water Protection Areas or Public Water System wells in Priority Area				
0	0			
1 to 20	1			
21 to 40	2			
>40	3	x	3	88
		Subtotal	**3**	
c) Number of Wells with NO_3 > 10 mg/l				
0	0			
1 to 5	1			
6 to 20	2			
21 to 40	3	x	3	34
>40	4			
		Subtotal	**3**	
		Population Score	**9**	
		Max Possible Score = 10		
2) WATER QUALITY				
	% wells	**Nitrate Concentration Criteria**		
Percent of wells with NO_3>2 mg/l	89%	2	1.78	
Percent of wells with NO_3>5 mg/l	48%	5	2.40	
Percent of wells with $NO_3 \geq 10$ mg/l	6%	10	0.60	
		Water Quality Total	**4.78**	
3) WATER QUALITY TRENDS				
		Select One		
Increasing	10	x	10	89% Confidence Level
No Discernable Trend	5			
Decreasing trend	0			
		Trend Score	**10**	
		Max Possible Score = 10		
4) OTHER BENEFICIAL USES				
Other beneficial uses are impaired	1	Yes=1 No = 0	1	
		Beneficial use score	**1**	
		Max Possible Score = 1		
		Total Score	**24.78**	

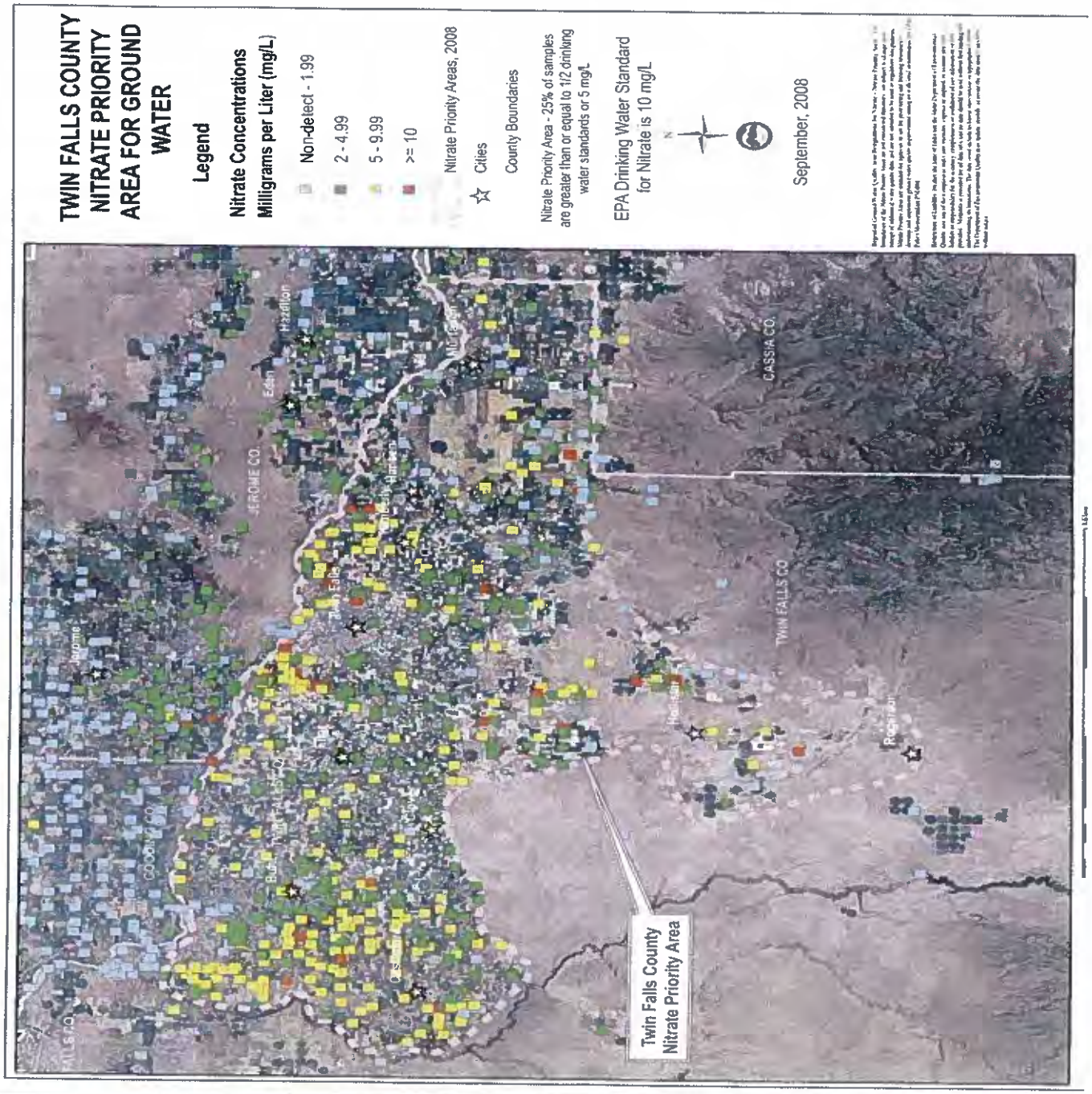
Map of State-Wide Nitrate Priority Areas 2008



AREA NAME	RANK
TWIN FALLS	1
ADA CANYON	2
WEISER	3
FORT HALL	4
NE STAR	5
MARSING	6
GRAND VIEW	7
HAGERMAN	8
CASSIA CO.	9
BRUNEAU	10
LOWER PAYETTE	11
MINIDOKA	12
ASHTON/DRUMMOND	13
MOUNTAIN HOME AFB	14
MOUNTAIN HOME	15
CLEARWATER PLATEAU	16
GLENNS FERRY	17
GRACE/SODA SPRINGS	18
PRESTON	19
BLACKFOOT	20
PURPLE SAGE	21
LINDSAY CREEK	22
MINK CREEK	23
LAPWAI CREEK	24
NOTUS	25
PARMA	26
ST. ANTHONY	27
MUD LAKE	28
EMMETT NORTH BENCH	29
N. POCATELLO	30
BLISS	31
HOMEDALE	32

Figure 2. 2008 Nitrate Priority Areas statewide with the ranked list.

Map of Twin Falls County Nitrate Priority Area



Appendix E References

Trend Analyses for Idaho's Nitrate Priority Areas, 1994-2007
Kenneth W. Neely
Technical Hydrogeologist

www.idwr.idaho.gov/
Prepared for the Idaho Department of Environmental Quality
Water Information Bulletin, No. 50, Part 7

- September 2008

http://www.idwr.idaho.gov/hydrologic/info/pubs/wib/wib50p7_nitrate_trend_analyses.pdf

2008 Nitrate Priority Area Delineation and Ranking Process
Idaho Department of Environmental Quality

http://www.deq.state.id.us/water/data_reports/ground_water/nitrate/ranking_2008.pdf

Twin Falls Ground Water Quality Management Plan
Idaho Department of Environmental Quality 2001

http://www.deq.state.id.us/water/data_reports/ground_water/twinfalls_county_mgmt_plan.pdf