

# APPENDIX 1: SUMMARY OF SOUTHERN WILLAMETTE VALLEY GROUNDWATER STUDIES

## DEQ Groundwater Studies

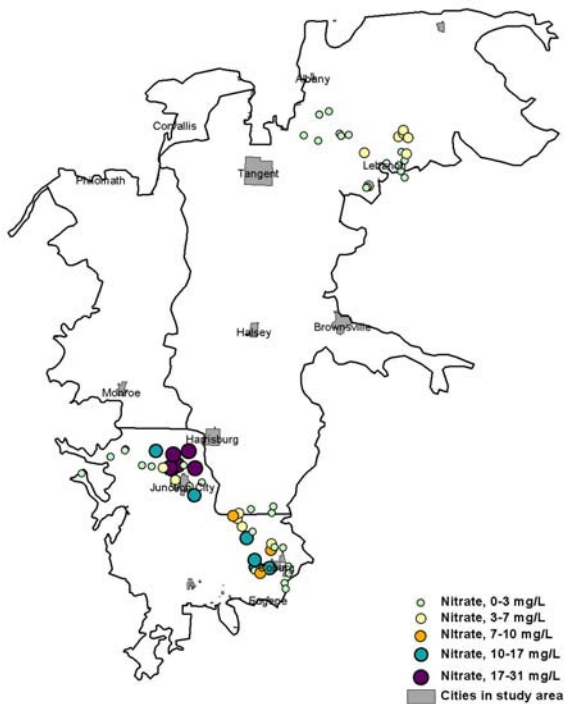
### 1985-1987 Studies

As part of a statewide assessment of shallow groundwater contamination from agricultural chemicals (including nitrates), DEQ collaborated with local, state, and federal agencies in the mid 1980s in sampling groundwater from 45 shallow wells in Lane and Linn Counties (DEQ, 1988). The nitrate data from this study have a high level of quality control including strict field sampling techniques by experienced professionals, laboratory analysis using EPA-specified protocols and a rigorous Quality Assurance/Quality Control program. Of the 16 wells tested in the Coburg Area, 9 wells had nitrate concentrations ranging between 3.0 and 7.0 mg/L; the remaining Coburg wells had nitrate levels lower than 3.0 mg/L. Of the 29 wells sampled in the North Albany area, 8 samples had nitrate levels greater than 5.0 mg/L. None of the samples exceeded the 10.0 mg/L MCL for nitrate.

### 1993-1994 Studies

DEQ initiated the Statewide Groundwater Quality Monitoring Program in 1993 (DEQ,

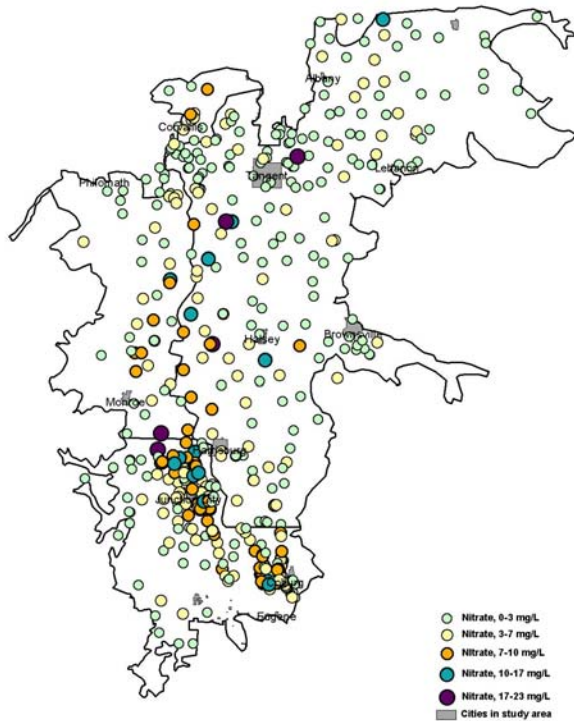
1993a) to assess the impact of various sources on the quality of Oregon's groundwater resources. Based on known or suspected area-wide contamination and concerns about groundwater vulnerability, DEQ prioritized 32 areas within the state for assessment, including three areas (DEQ 1993b, 1994a, and 1994b) within the Southern Willamette Valley (Coburg, Junction City, and the Albany-Lebanon Plain). Between 1993 & 1994, three separate assessments were conducted around the Coburg area, the Junction City area, and the Albany-Lebanon Plains area. Groundwater samples were collected from about 60 wells, and nitrate levels above 7.0 mg/l were reported in the vicinity of the Coburg and Junction City areas (see Figure A-1). The highest nitrate value for the Albany-Lebanon Plains was 6.5 mg/L.



**Figure A-1: Nitrate values from the 1993-1994 DEQ Study**

DEQ's Water Quality Program, in consultation with Oregon Health Division (OHD), Oregon Water Resources Division (WRD), Oregon State University Extension Service (OSU), Oregon Department of Agriculture (ODA), and the United States Geological Survey (USGS) completed this groundwater survey (DEQ, 2003a). During 2000-2001, DEQ completed an area-wide survey of private water well quality, gathering nitrate data from

476 wells. Approximately 100 of these wells indicated nitrate present at concentrations exceeding 7.0 mg/L (see Figure A-2). The greatest concentration of wells exceeding 7.0 mg/L was in areas close to Coburg, Junction City, Corvallis, Shedd, and Monroe.

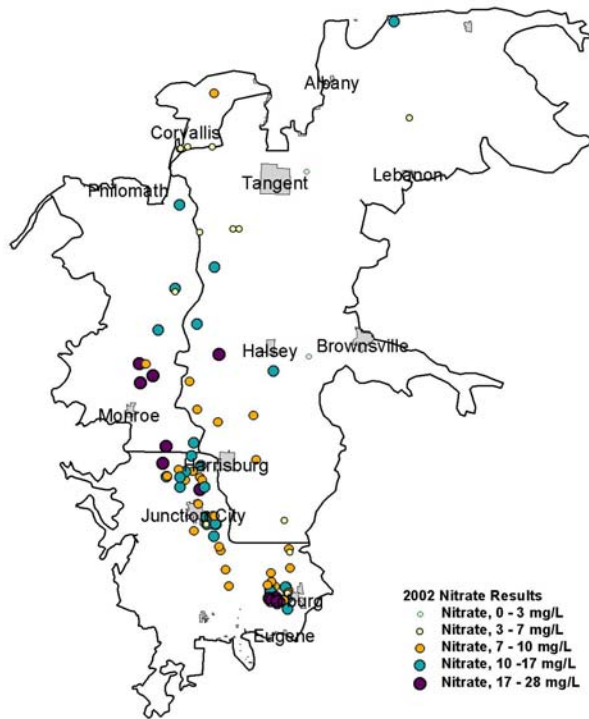


Although the primary objective of this study was to determine the magnitude and extent of nitrate contamination in the shallow alluvial aquifer from non-point sources, an important secondary objective was to perform outreach to the rural residents, farmers, and local government officials about groundwater quality and protection from non-point sources in the Valley. Outreach activities included radio interviews, open houses, and neighborhood meetings where free nitrate testing was offered to the residents.

**Figure A-2: Nitrate values from the 2000-2001 DEQ Study**

### 2002 Southern Willamette Valley Study

This groundwater assessment was undertaken as a Western Region Regional Environmental Solutions and Groundwater Program initiative, in consultation with Oregon State University Extension Service, Oregon Department of Human Services (DHS, formerly OHD), and Oregon Water Resources Division (DEQ 2003b). During this study, DEQ resampled most of the 100 wells with nitrate levels above 7.0 mg/L from the 2000-2001 assessment. Analyses were conducted for nitrate, pesticides, caffeine, iron, bacteria and common anions and cations. Caffeine analyses were included as a potential indicator of influences from septic systems.



**Figure A-3: Nitrate values from the 2002 DEQ Study**

Groundwater samples were collected from the targeted wells over a three-month period, from May to July 2002. Several residents from the previous study indicated they had installed new wells or had deepened their existing wells based upon their receipt of the 2000-2001 sampling results. In the instance when a deeper well was installed and the shallower well was still available, samples were collected from both wells.

The high levels of nitrate (i.e., greater than 7.0 mg/l) found in the 2000-2001 study were confirmed (see Figure A-3). Most of the high nitrate values were associated with the Younger Upper Sedimentary Unit, which is primarily an alluvial material.

No other analyzed constituents were found at levels that would exceed 50% of their respective MCL. There were no detections of pesticides at levels greater than one-third of a MCL or Drinking Water Standard. The

highest pesticide detection was 776 parts per trillion (ug/L). There was one detection of caffeine, at a very low concentration.

### **Oregon State University Extension Volunteer Testing**

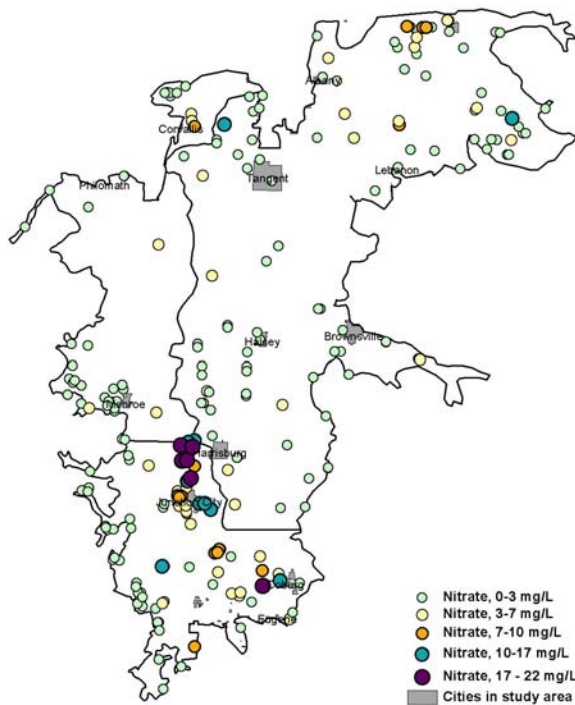
During 1995-1997, staff of the Lane County office of the Oregon State University (OSU) Extension Service surveyed approximately 500 domestic well owners in northern Lane County, including Junction City and Coburg areas, to increase awareness about groundwater quality protection. Nitrate concentrations generally ranged up to 34.0 mg/L, and one sample had a nitrate concentration of 233 mg/L. There were exceedances of the 10.0 mg/L MCL in 167 wells. Nitrate concentrations ranged between 3.0 and 10.0 mg/L in 191 wells. These data are useful in showing approximate distribution of nitrate in the groundwater; however the methods used for these analyses are not comparable to those employed by DEQ and USGS. It would be inappropriate to assume all data sets are interchangeable.

Wells with elevated nitrate tended to be located near Coburg and Junction City, and within the younger alluvium near the Willamette River between these two cities. Another

significant number of wells with high nitrate levels occurred west of Harrisburg near the floodplain of Ferguson Creek.

### Real Estate Transaction Testing

Since 1989, Oregon has required sellers of residential property with domestic wells to have their well water sampled and analyzed for nitrate and bacteria. Property sellers routinely submit nitrate testing data to the Oregon Department of Human Services. Results submitted more recently than 1996 are not currently in an organized format.



**Figure A-4: Nitrate results from real estate transactions 1989-1996**

these wells occurred in the Junction City area (19), north Eugene-Coburg area (4), and the Albany-Lebanon Plain area (7).

- Nitrate ranged between 3.0 and 10.0 mg/L in 175 domestic wells. Many of these wells were located in the Albany-Lebanon Plain area (47), Corvallis (23), north Eugene-Coburg (27), Harrisburg (7), Junction City (39), and Scio (14).

Laboratory sample results from 964 wells sampled between 1989 and 1996 in the Counties of Linn, Lane, and Benton have been reported to OHD as a result of this program. DEQ considers these data to have a low level of quality control, given the absence of strict field sampling or laboratory analysis protocols. These data are still valuable in showing the approximate distribution of elevated nitrate concentrations.

Only a portion of the 964 domestic wells in these three counties were actually in the Southern Willamette Valley study area. Of this group, 564 wells had addresses that were recognized by the ArcView mapping program. The nitrate results from those recognizable addresses sampled in the project study area between 1989 and 1996 are presented in Figure A-4 and described below:

- Nitrate exceeded the 10.0 mg/L MCL in 34 wells. The majority of

## Public Drinking Water Supply Data

Pursuant to the Safe Drinking Water Act, the Oregon Department of Human Services requires testing of public drinking water supplies including restaurants, hotels, mobile home parks, and any drinking water supply regularly accessible to the public. DEQ staff reviewed these records and found at least 112 permitted public water supply systems dependent on a groundwater source within the study area. These systems are required to monitor water quality on a routine basis, including laboratory analysis for nitrate. These data are considered to have a mixed level of quality control, when compared to samples collected by experienced professionals and laboratory analysis conducted using EPA-specified protocols and a rigorous laboratory Quality Assurance/Quality Control program. Untrained individuals may have collected samples but the analyses were required to be completed by a laboratory certified for drinking water samples.

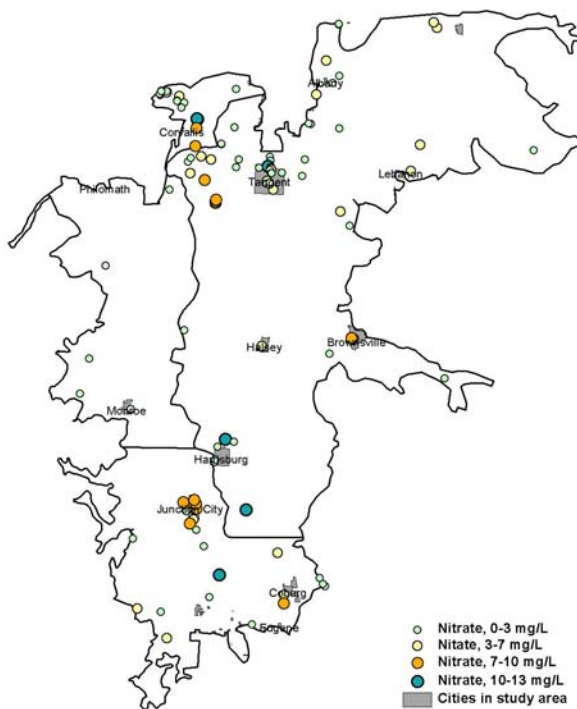


Figure A-5 shows the approximate locations of public water supply systems found in the project study area and the highest nitrate value ever reported at each individual public water supply. Nitrate levels of 3-10 mg/L were reported at least once in 27 systems, predominantly east of Corvallis, Tangent, Albany-Lebanon Plain area, Scio, Halsey, Harrisburg, and Junction City areas. Nitrate concentrations greater than the 10 mg/L MCL were reported at least once in 8 systems within the project study area, including systems near Coburg, Junction City, Harrisburg, Brownsville, Corvallis and Tangent.

## USGS Willamette Valley Groundwater Assessment

The United States Geological Survey studied groundwater quality in the

**FIGURE A-5: Historical highest nitrate value for individual public water supplies**

Willamette Valley (Hinkle, 1997), including laboratory analyses of nitrate in samples collected in 1991 and 1993 from 30 water supply wells distributed broadly across the project

study area. These data are considered to have a high level of quality control, including strict well selection, field sampling, and laboratory analysis protocols.

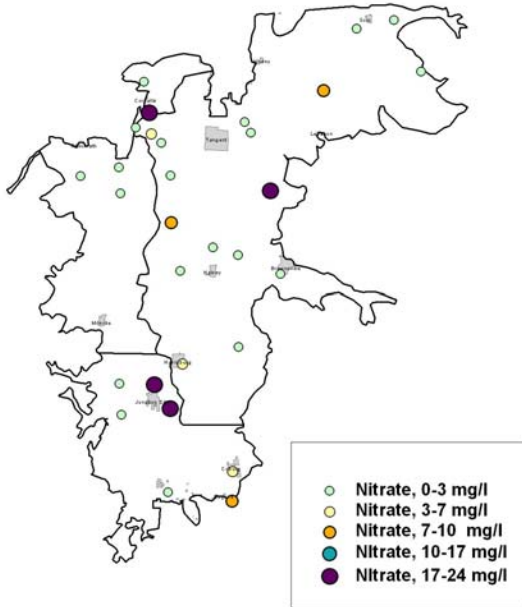


Figure A-6 includes locations and nitrate concentration ranges for these 30 wells. Nitrate concentrations ranging from 3.0-10.0 mg/L occurred in six wells, and exceedances of the nitrate MCL (10.0 mg/L) occurred in four wells. The limited number of wells sampled in this study and their wide spatial distribution across the study area makes it difficult to determine any general patterns in nitrate distribution. However, these data are consistent with the data from other studies showing elevated nitrate concentrations near Junction City, Harrisburg, and Coburg.

**FIGURE A-6: USGS NAWQA study  
Nitrate results from 1991 and 1993**

## REFERENCES

- DEQ, 1988. "Assessment of Oregon's Groundwater for Agricultural Chemicals." Laboratories and Applied Research Division, Oregon Department of Environmental Quality
- DEQ, 1993a. "Statewide Groundwater Monitoring Program-Master Plan." Oregon Department of Environmental Quality, Water Quality Division, Portland, Oregon.
- DEQ, 1993b. "Statewide Groundwater Monitoring Program, 1993 Junction City Groundwater Investigation." Oregon Department of Environmental Quality, Groundwater Section, Water Quality Division, Portland, Oregon.
- DEQ, 1994a. "Statewide Groundwater Monitoring Program, 1994 Albany-Lebanon Plain Area Groundwater Investigation." Oregon Department of Environmental Quality, Groundwater Section, Water Quality Division, Portland, Oregon.
- DEQ, 2003a. Southern Willamette Valley Groundwater Assessment: 2000-2001 Nitrate Study, Groundwater Quality Protection Program, Water Quality Division.
- DEQ, 2003b. Southern Willamette Valley 2002 Groundwater Study, Region Environmental Solutions and the Groundwater Quality Protection Program, Western Region
- Hinkle, S.R., 1997. Quality of shallow groundwater in alluvial aquifers of the Willamette Basin, Oregon 1993-1995; U.S. Geological Survey Water-Resources Investigative Report 97-4082-B.