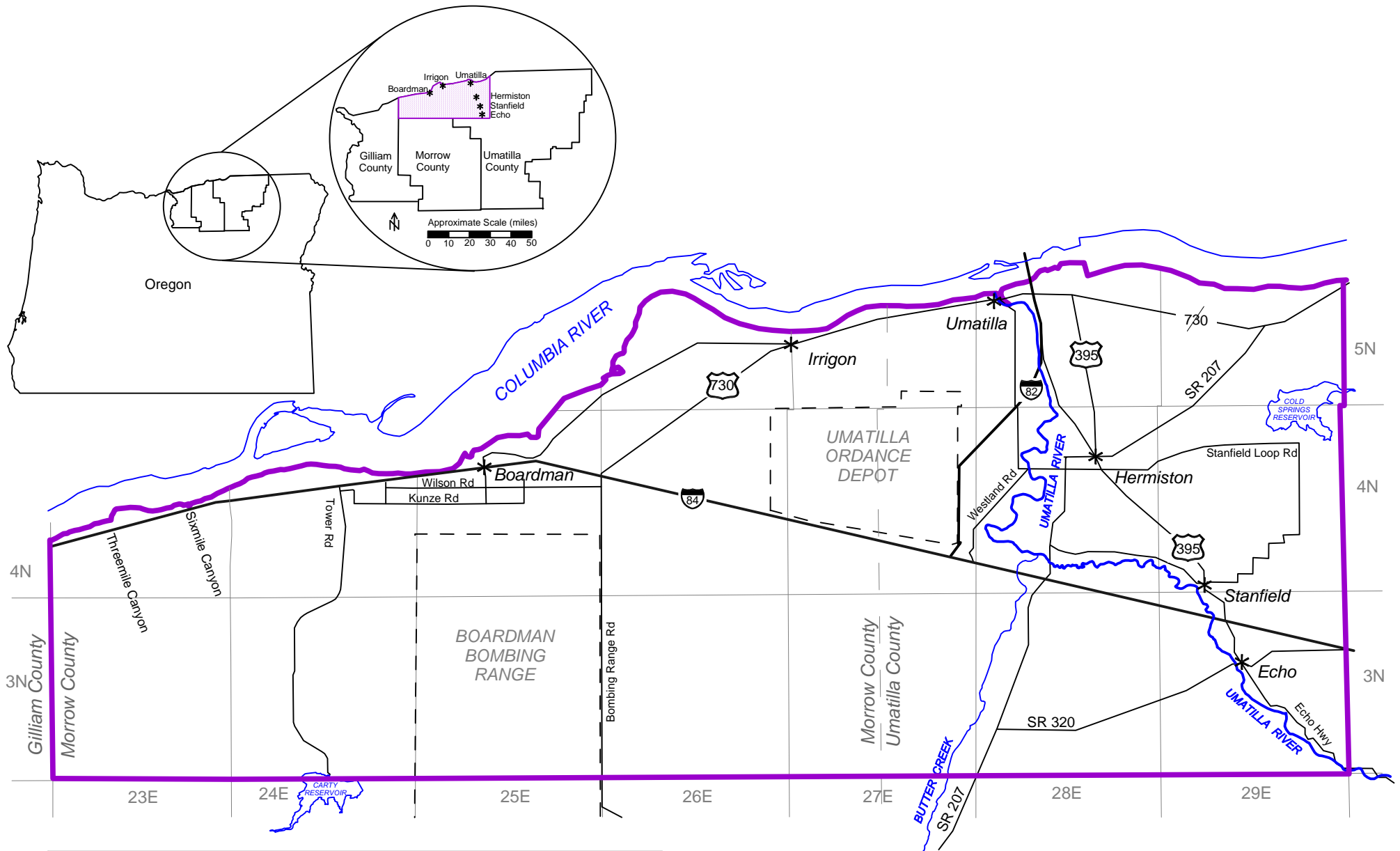


Figure 1-1
 Location and Boundaries of Lower Umatilla Basin Groundwater Management Area
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



Lower Umatilla Basin Groundwater Management Area Boundaries
 North: Columbia River
 South: 2N/3N Township Boundary
 East: 29E/30E Range Boundary
 West: 22E/23E Range Boundary (also the Morrow / Gilliam County line)

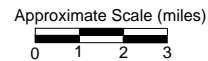
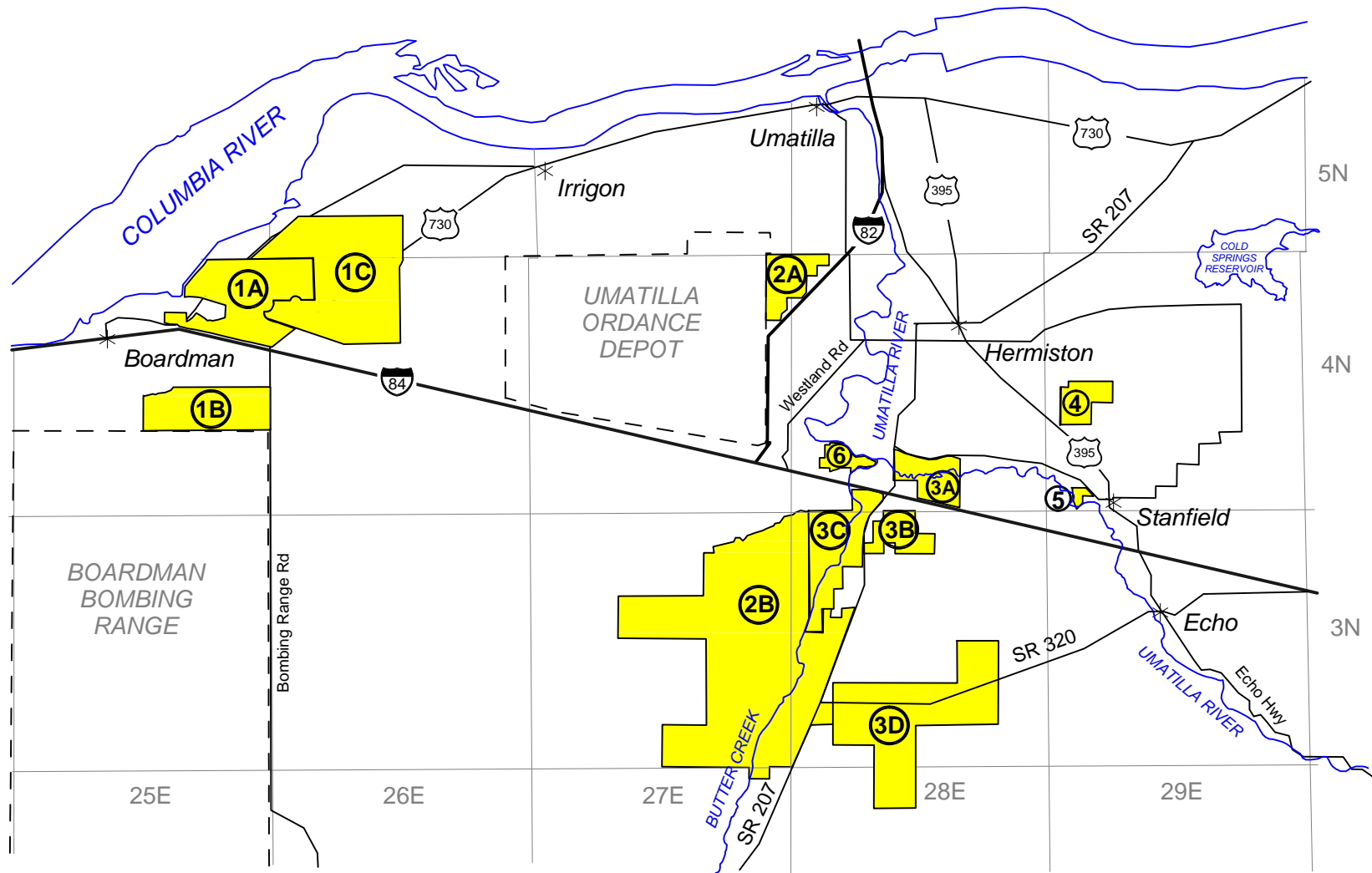


Figure 1-2
 Location of Food Processor Land Application Sites in the LUBGWMA
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



- | | | |
|--------------------------|---------------------------|-------------------|
| ①A Port of Morrow Farm 1 | ③A Simplot Plant Site | ④ Hermiston Foods |
| ①B Port of Morrow Farm 2 | ③B Simplot Terrace Site | ⑤ MorStarch |
| ①C Port of Morrow Farm 3 | ③C Simplot Expansion Site | ⑥ Snack Alliance |
| ②A ConAgra North Farm | ③D Simplot Levy Site | |
| ②B ConAgra Madison Ranch | | |

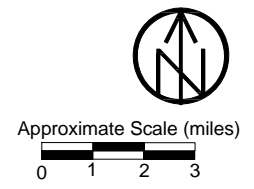


Figure 2-1
 Well Locations and Surface Water Bodies - Port of Morrow Farms
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

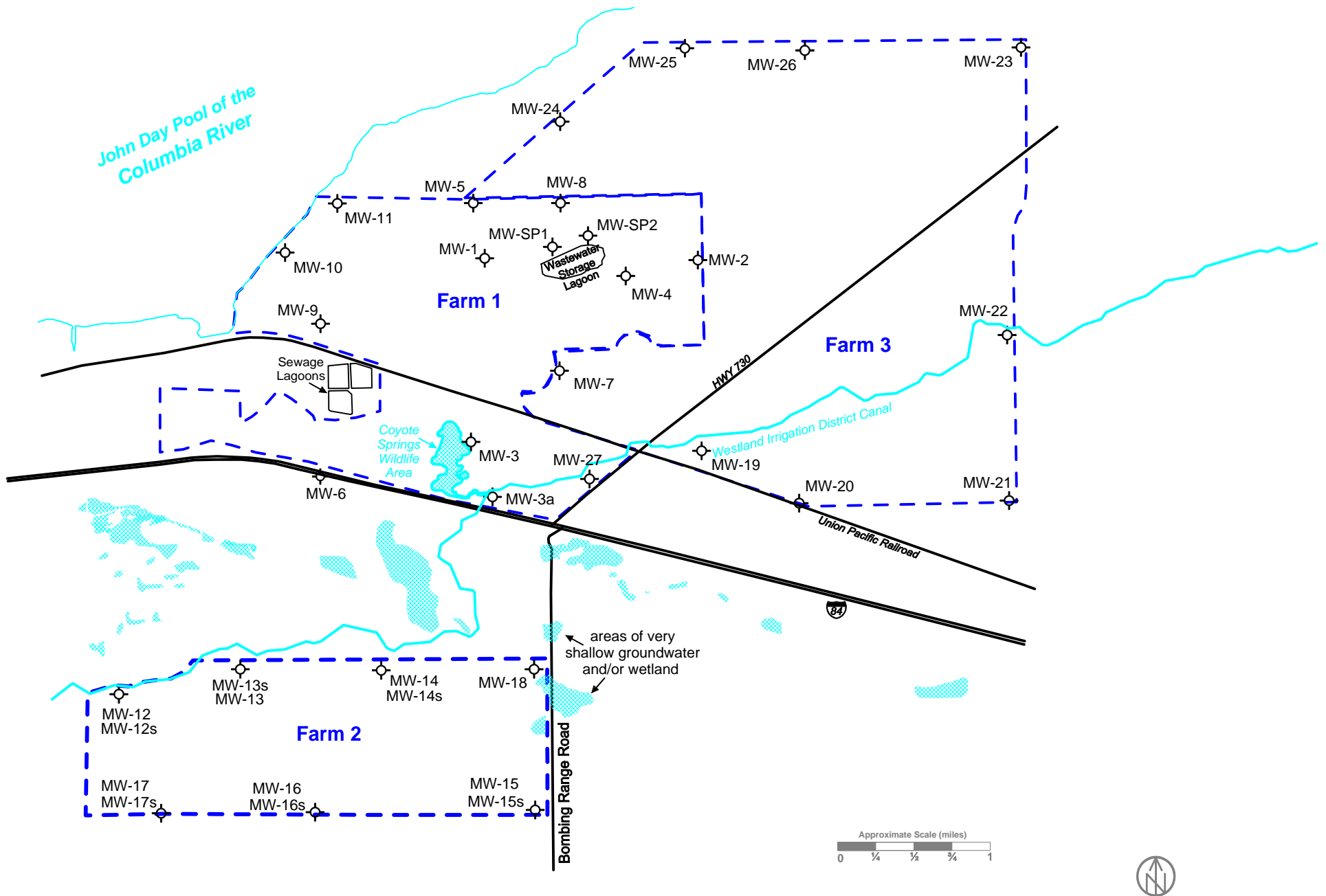


Figure 2-2
 LOWESS Lines and Trend Lines Through Nitrate Data - Port of Morrow Farm 1
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

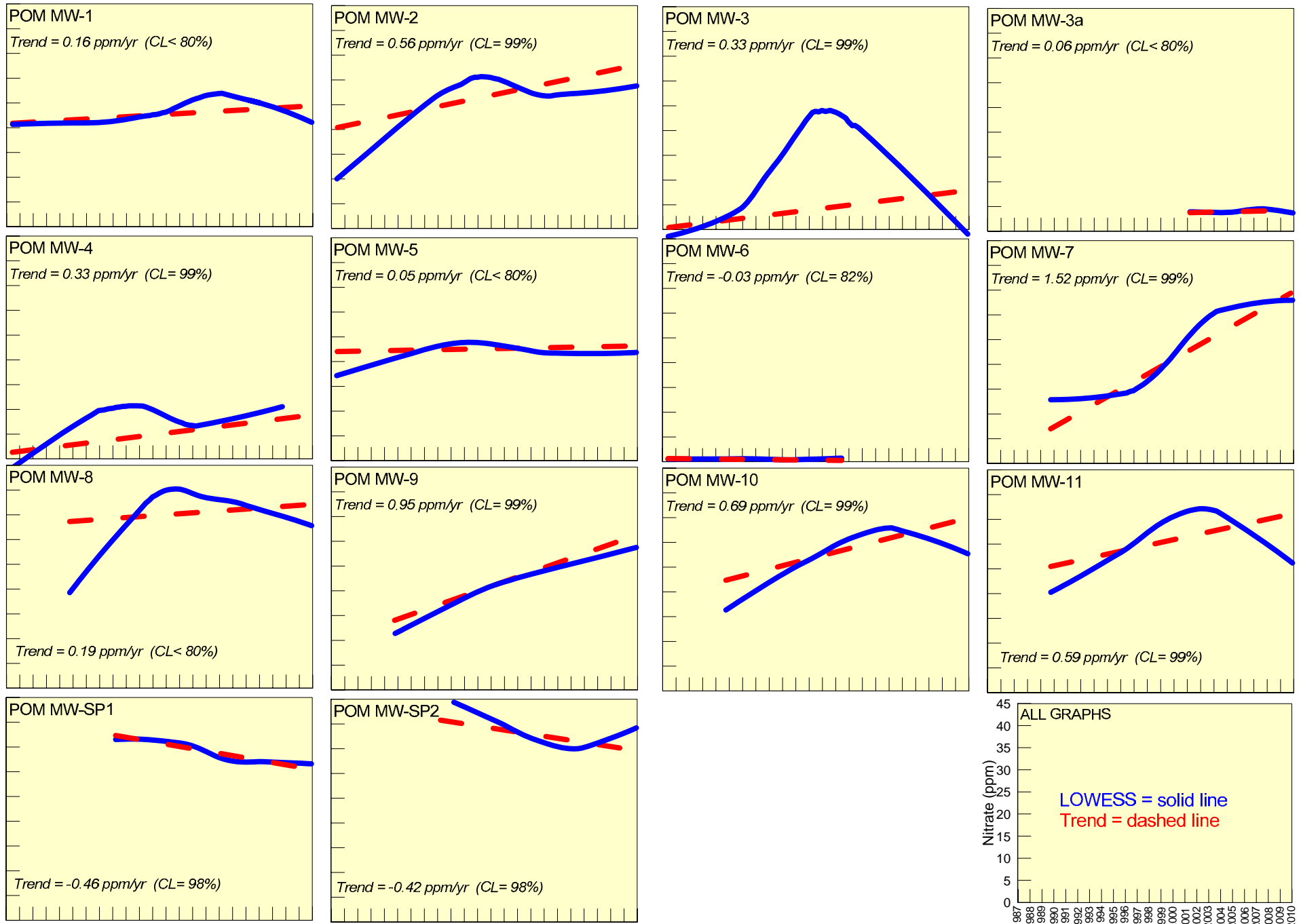


Figure 2-3
Nitrate Trends - Port of Morrow Farms
Third Trend Analysis of Food Processor Land Application Sites
in the LUBGWMA

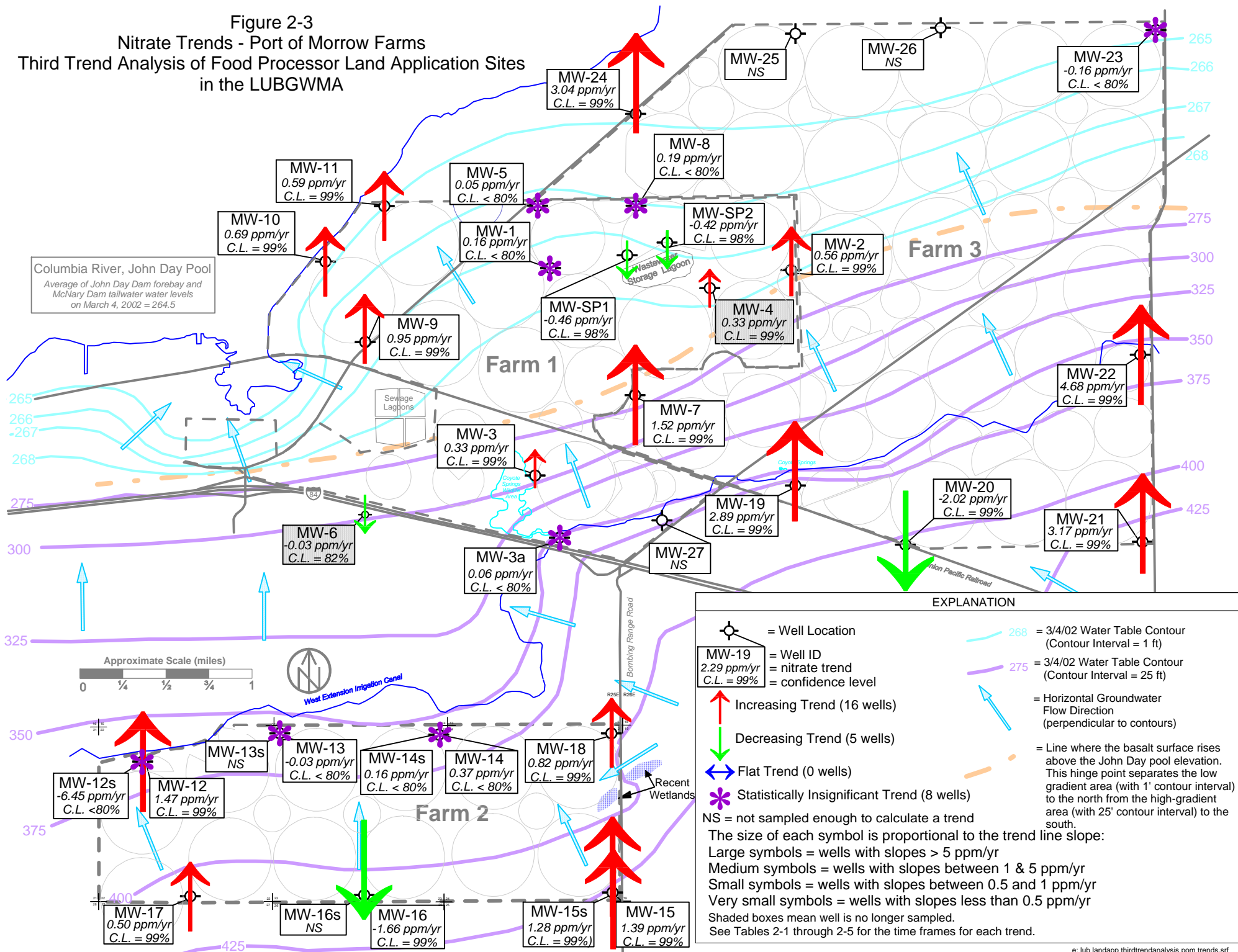


Figure 2-4
 Average Nitrate Concentrations - Port of Morrow Farms
 Third Trend Analysis of Food Processor Land Application Sites
 in the LUBGWMA

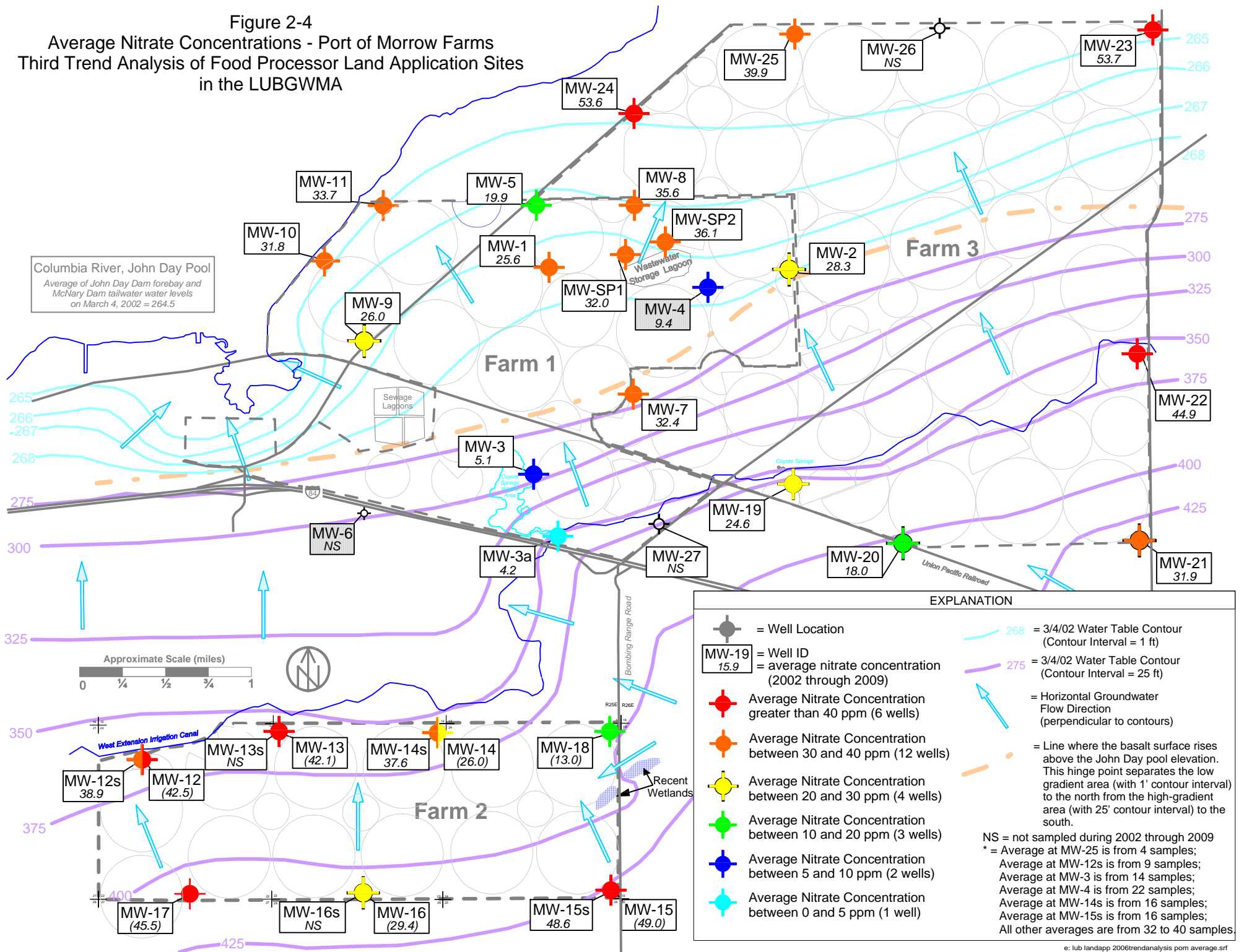
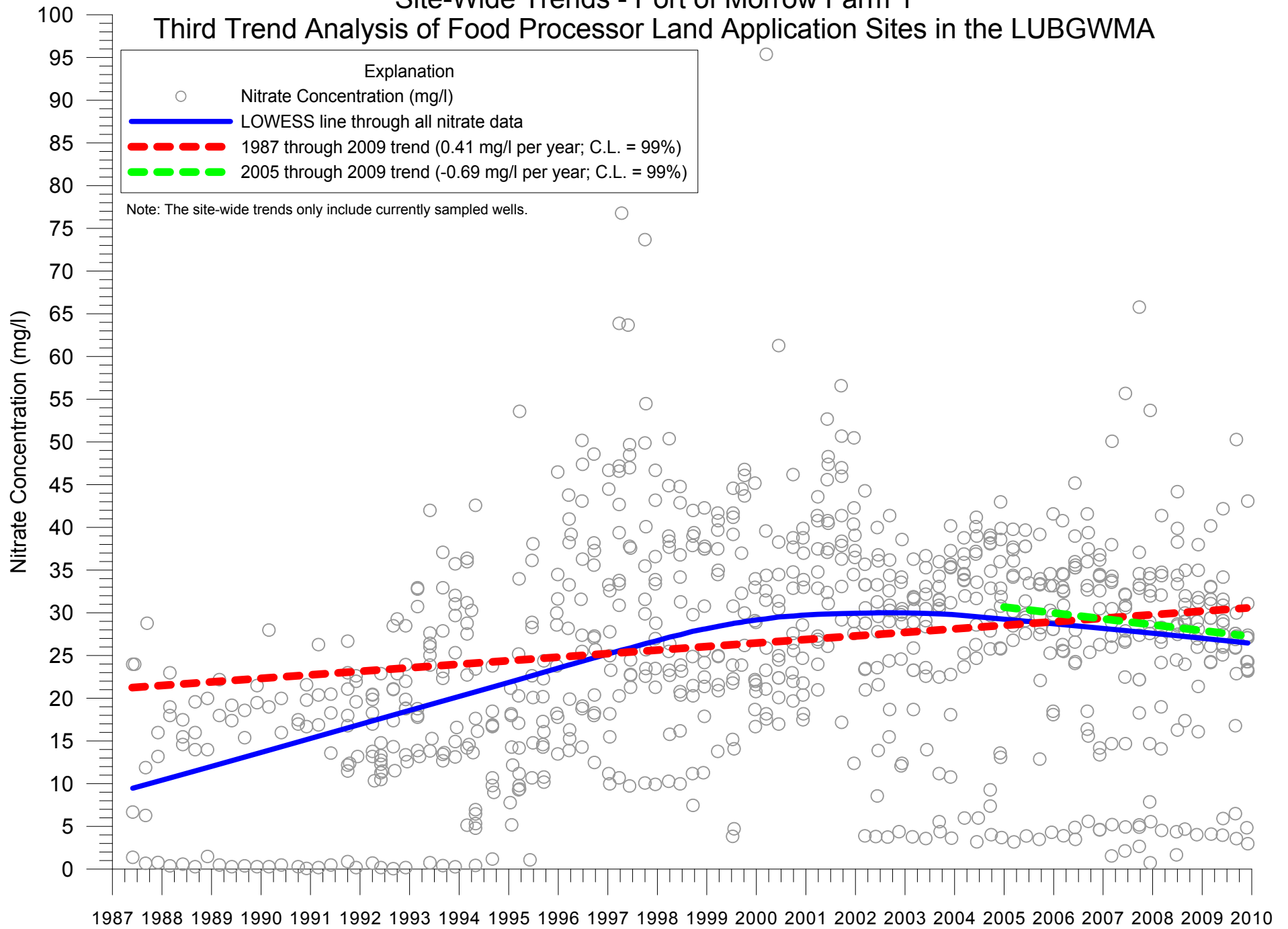


Figure 2-5

Site-Wide Trends - Port of Morrow Farm 1

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



- Explanation
- Nitrate Concentration (mg/l)
 - LOWESS line through all nitrate data
 - - - 1987 through 2009 trend (0.41 mg/l per year; C.L. = 99%)
 - - - 2005 through 2009 trend (-0.69 mg/l per year; C.L. = 99%)

Note: The site-wide trends only include currently sampled wells.

Figure 2-6
 Upgradient vs. Downgradient Nitrate Comparisons
 Western Portion of Port of Morrow Farm 1

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

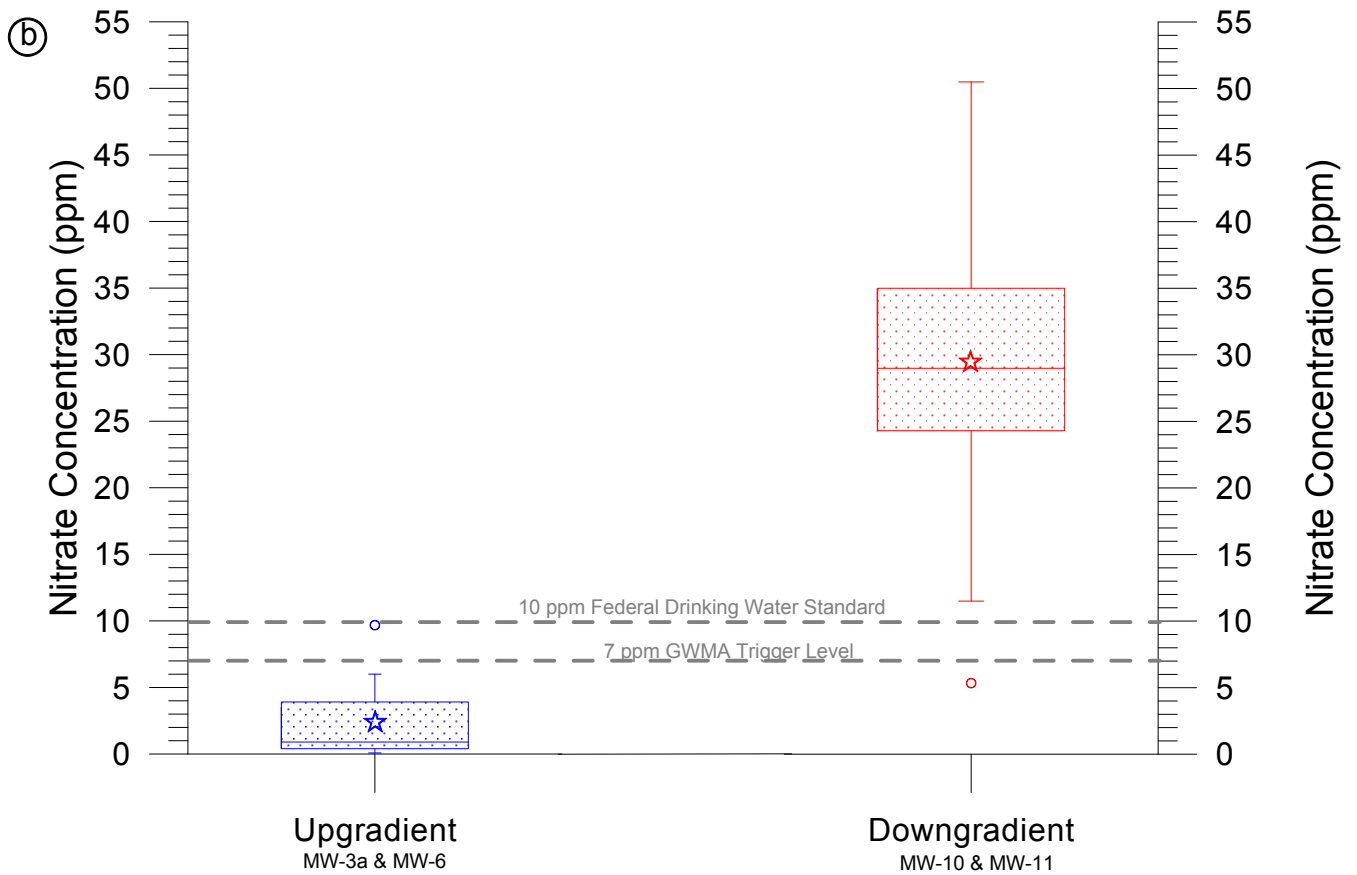
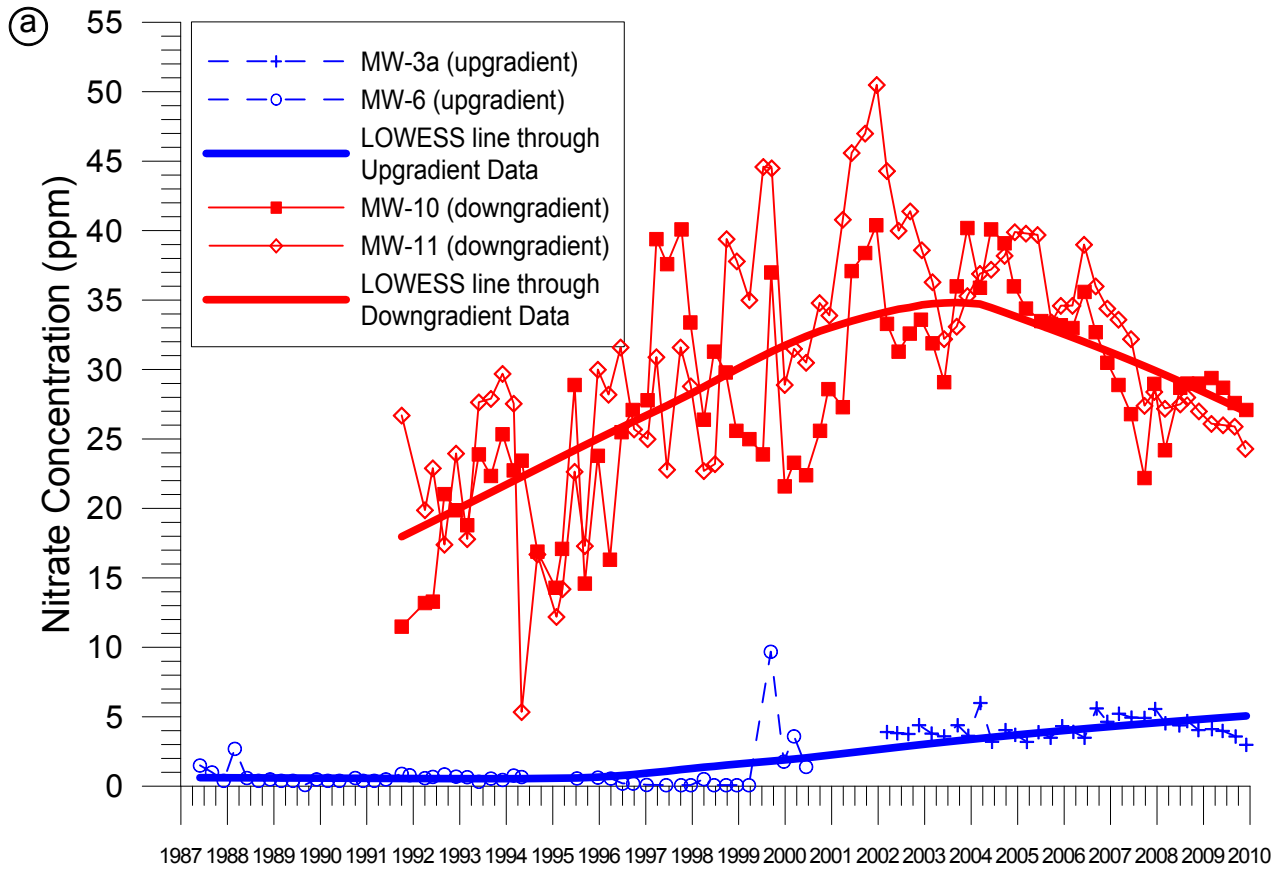


Figure 2-7

Upgradient vs. Downgradient Nitrate Comparisons

Eastern Portion of Port of Morrow Farm 1 & Western Portion of Farm 3

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

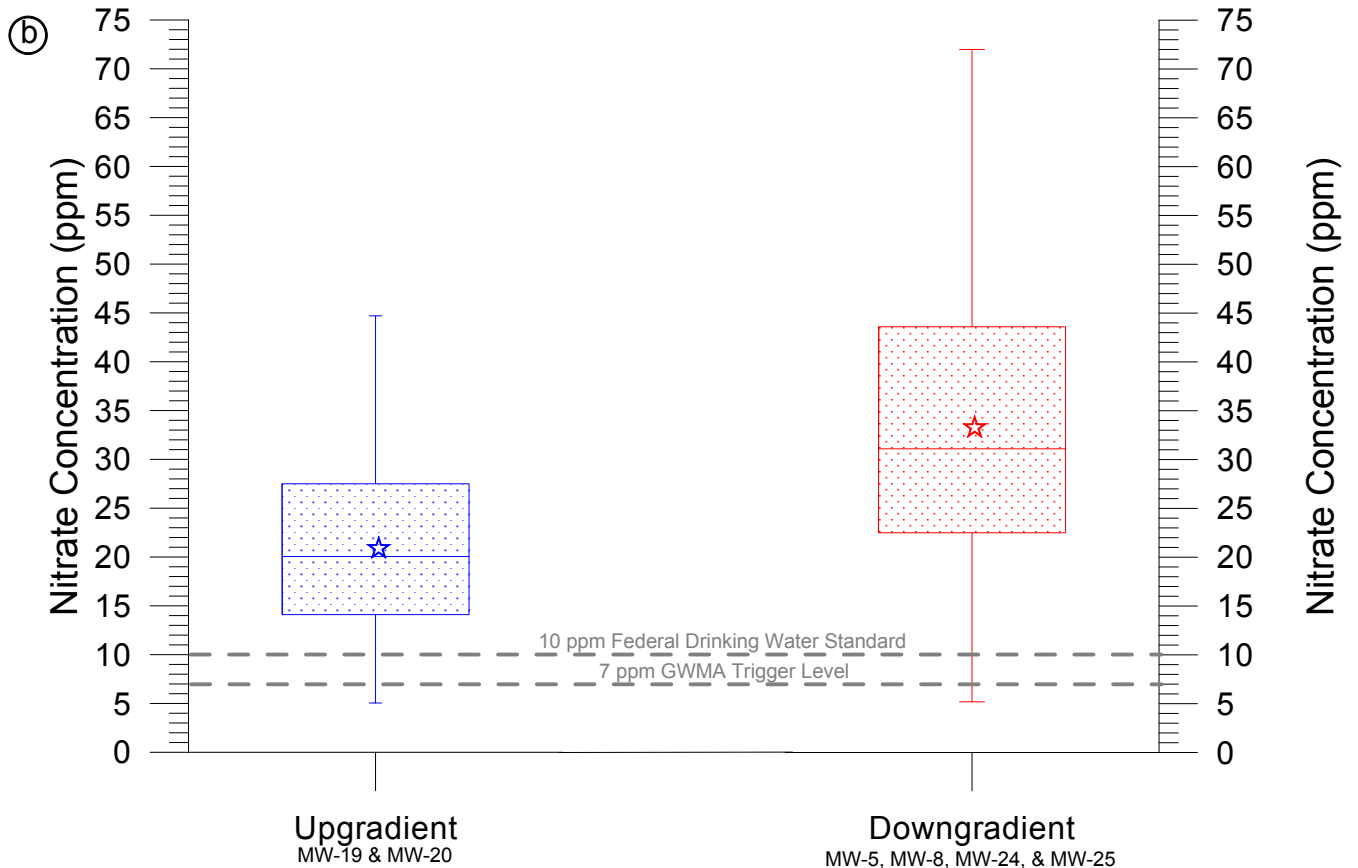
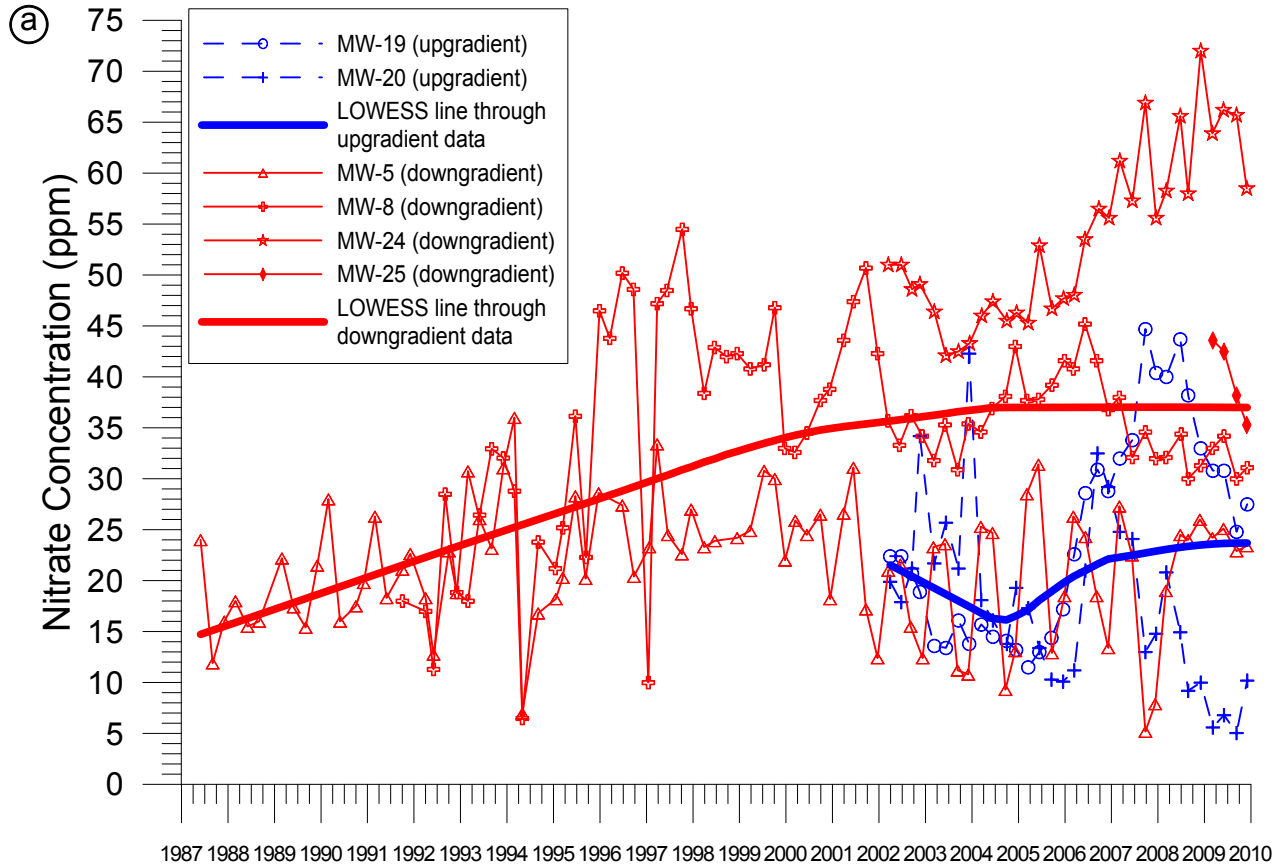


Figure 2-8
 LOWESS Lines and Trend Lines Through Nitrate Data - Port of Morrow Farm 2
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

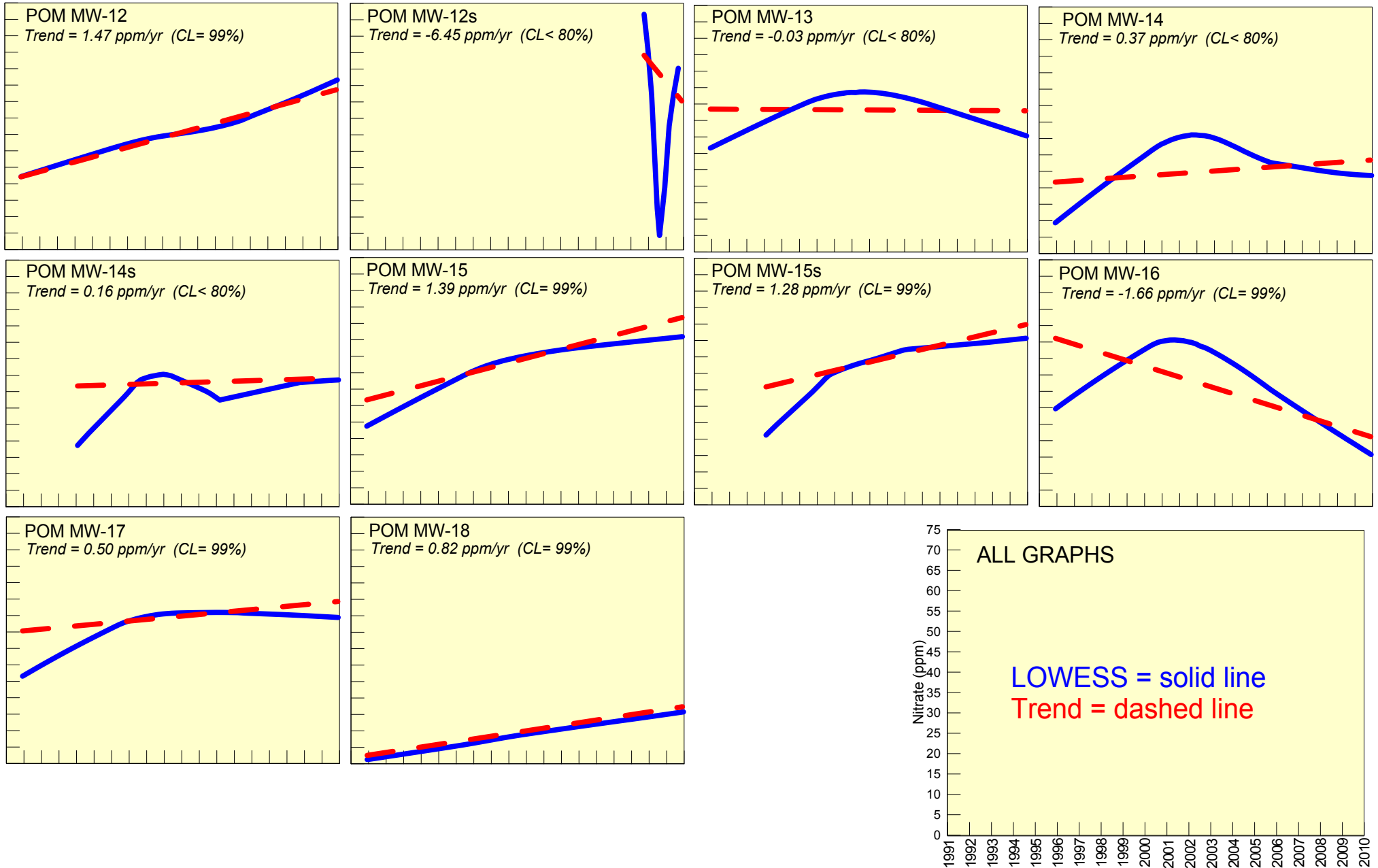


Figure 2-9
 Site-Wide Trends - Port of Morrow Farm 2

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

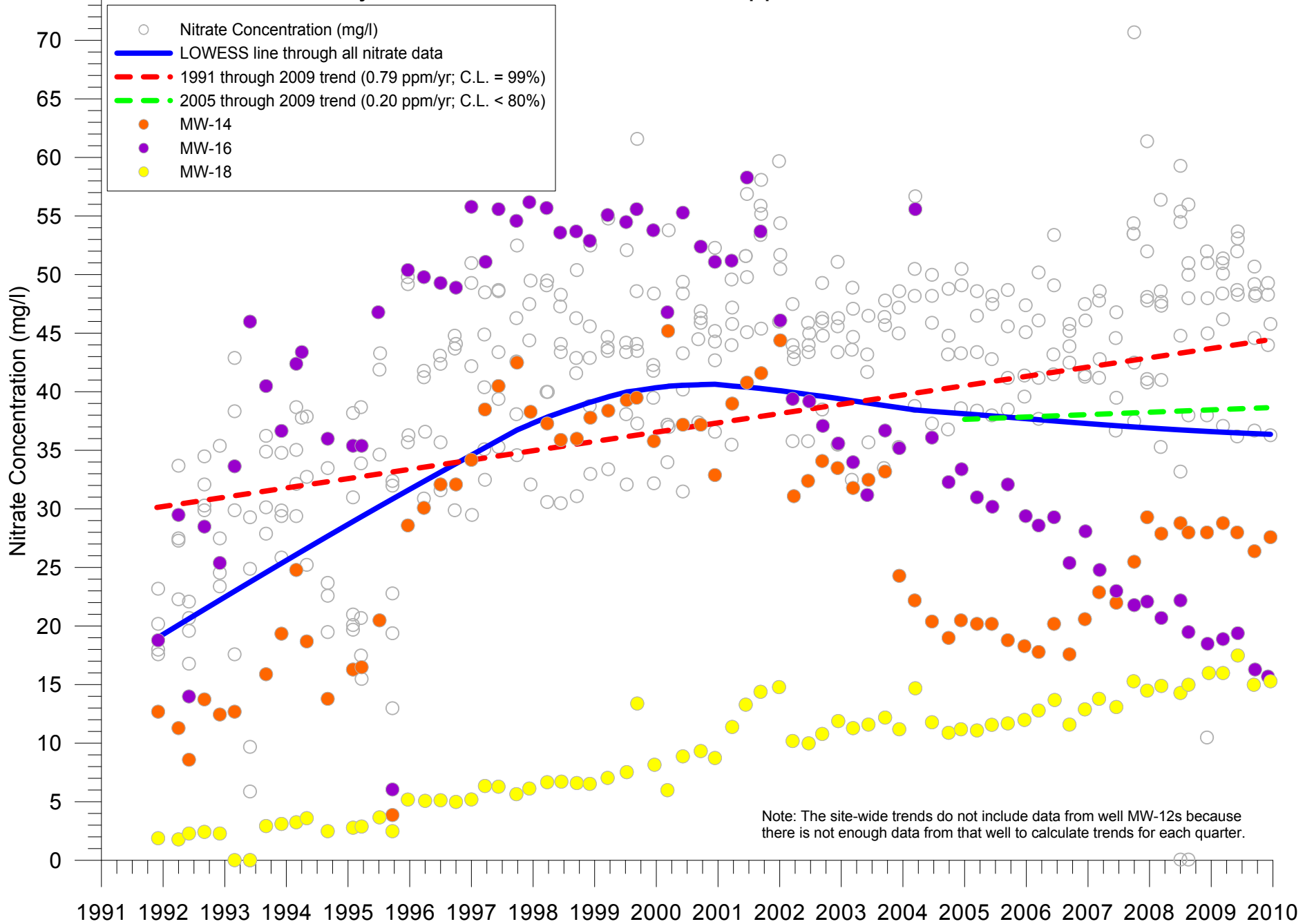


Figure 2-10
 LOWESS Lines and Trend Lines Through Nitrate Data - Port of Morrow Farm 3
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

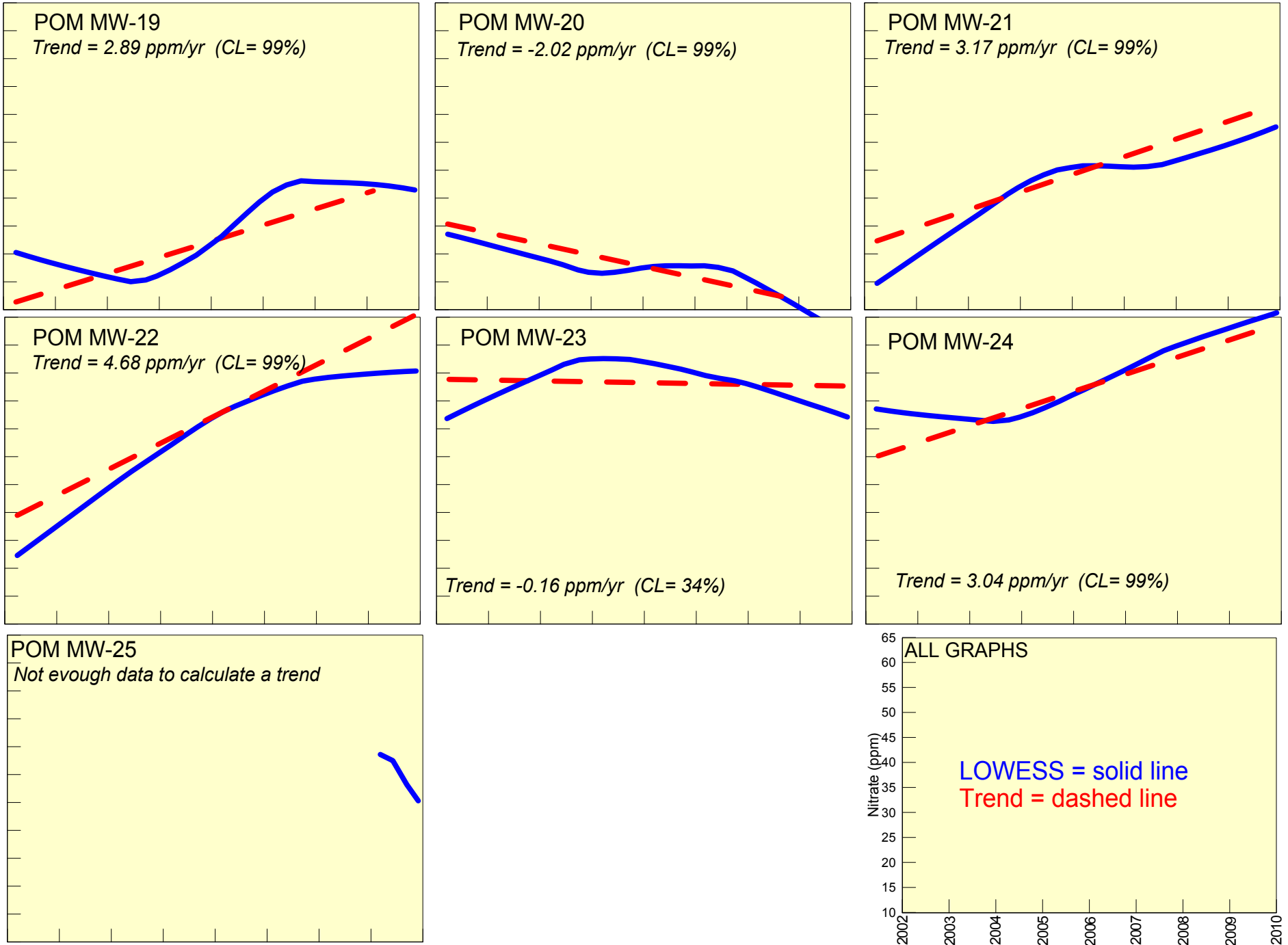
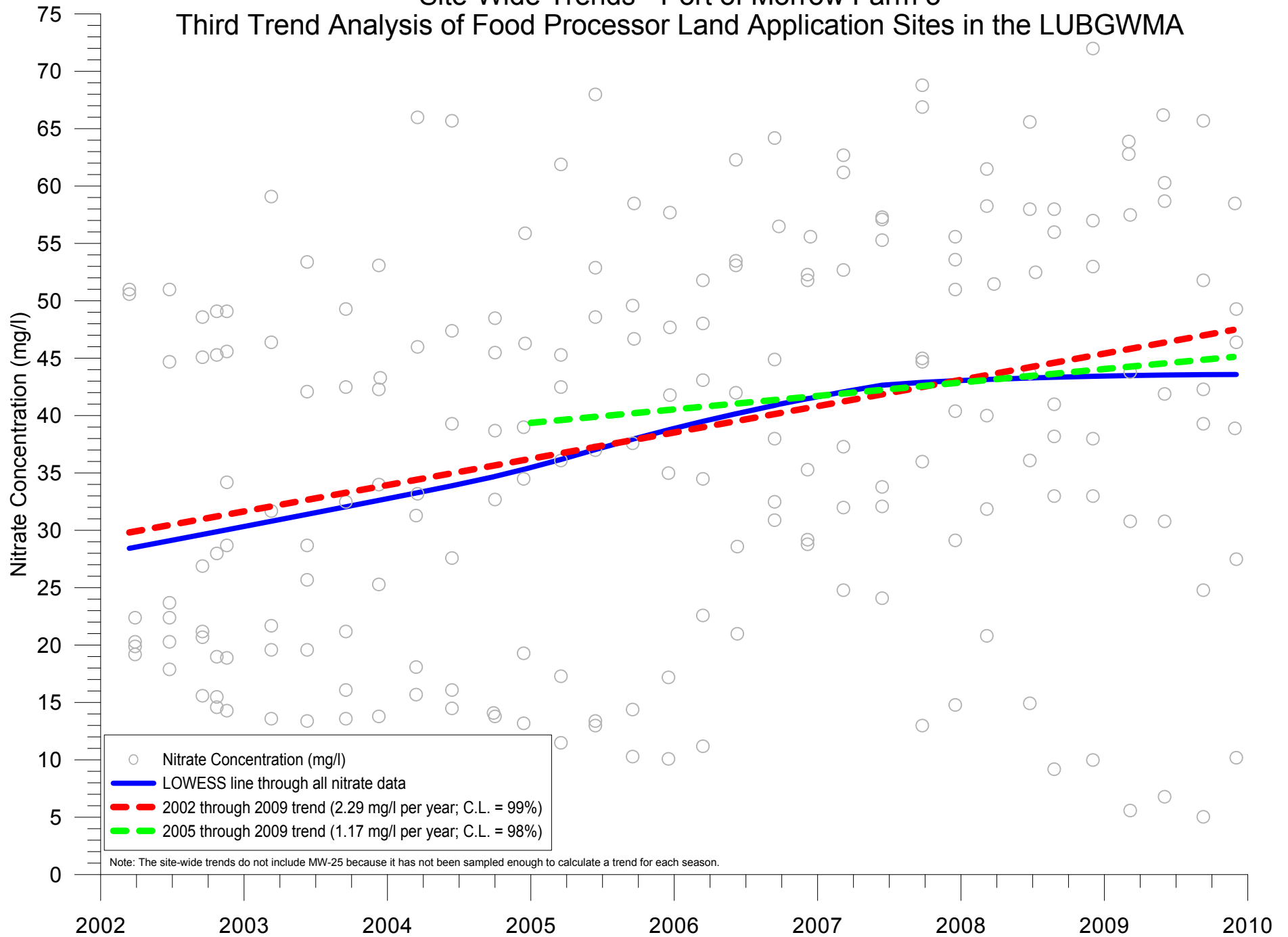


Figure 2-11
Site-Wide Trends - Port of Morrow Farm 3
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



○ Nitrate Concentration (mg/l)
— LOWESS line through all nitrate data
- - 2002 through 2009 trend (2.29 mg/l per year; C.L. = 99%)
- - 2005 through 2009 trend (1.17 mg/l per year; C.L. = 98%)

Note: The site-wide trends do not include MW-25 because it has not been sampled enough to calculate a trend for each season.

Figure 3-1
 LOWESS Lines and Trend Lines Through Nitrate Data - ConAgra North Farm
 Second Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

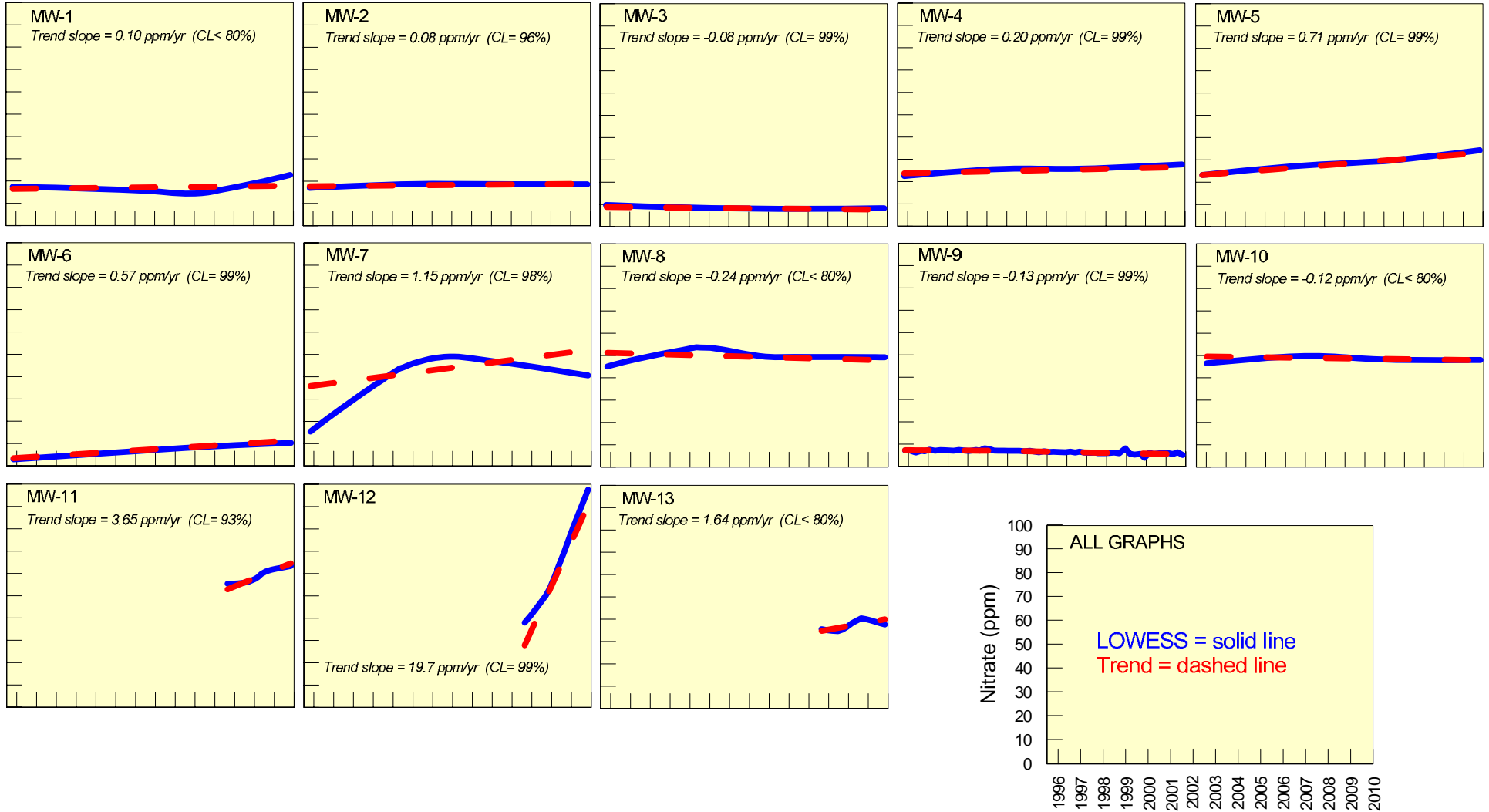


Figure 3-2
Nitrate Trends - ConAgra North Farm
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

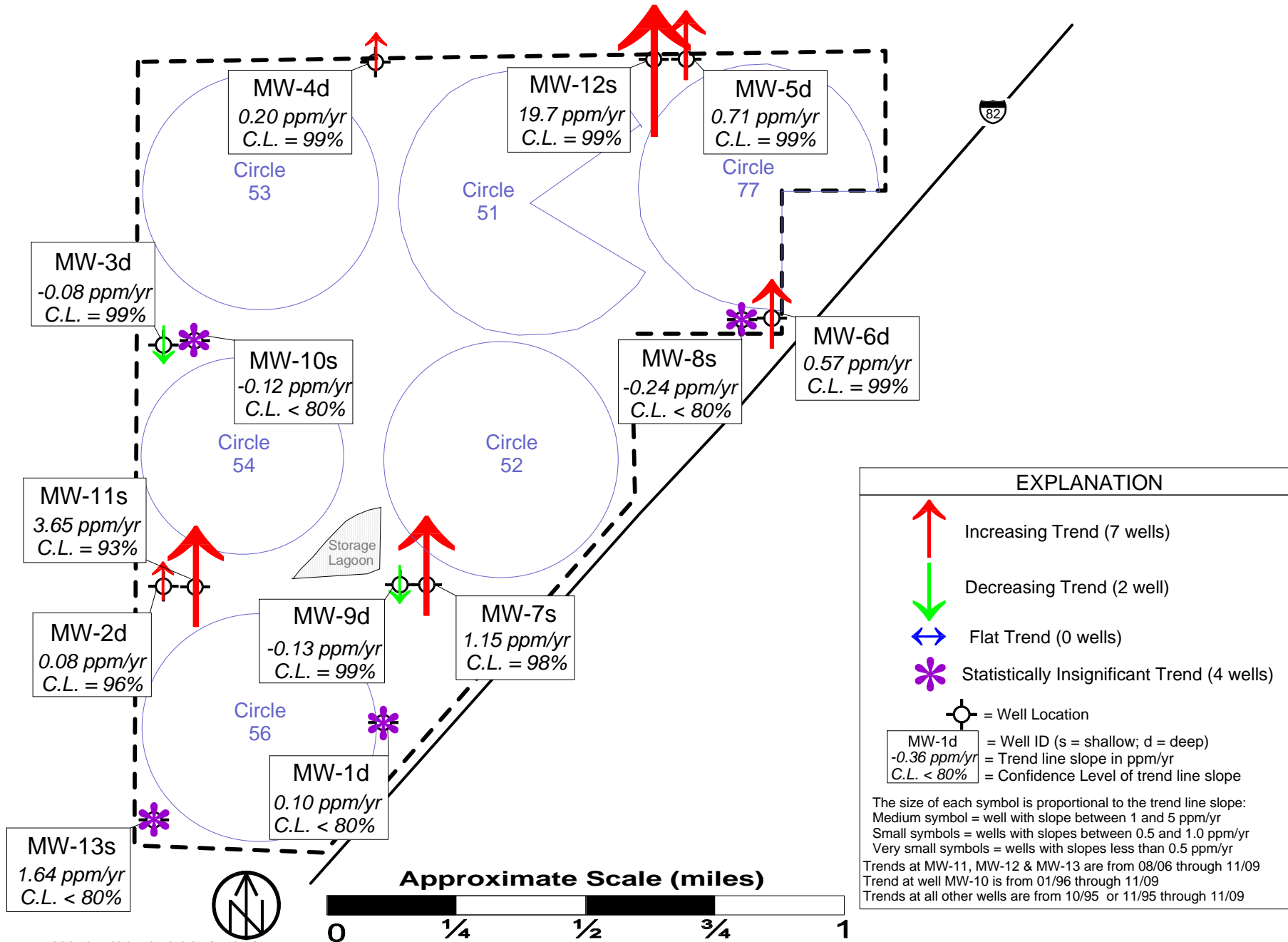


Figure 3-3
Average Nitrate Concentrations - ConAgra North Farm
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

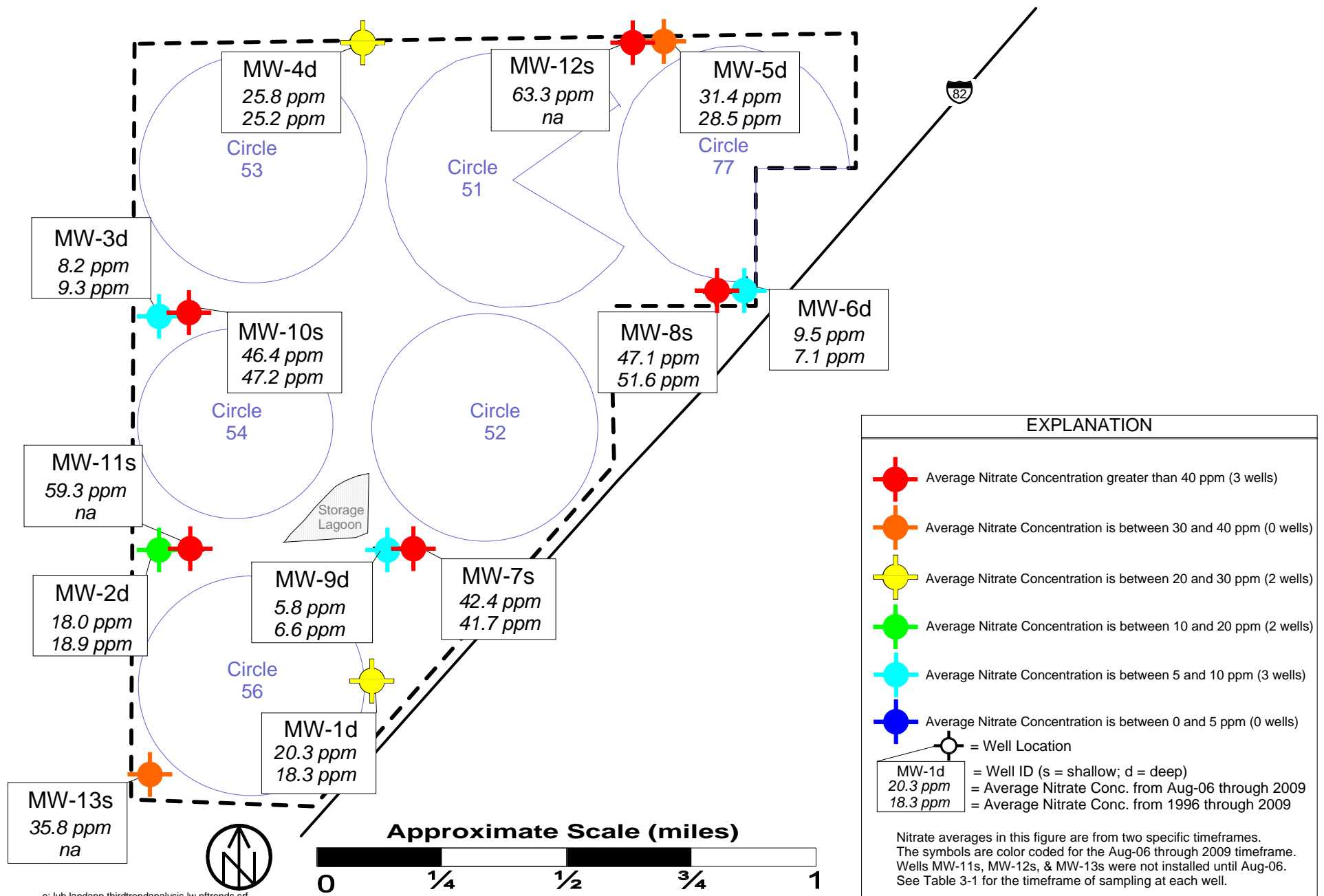


Figure 3-4
Site-Wide Trends - ConAgra North Farm
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

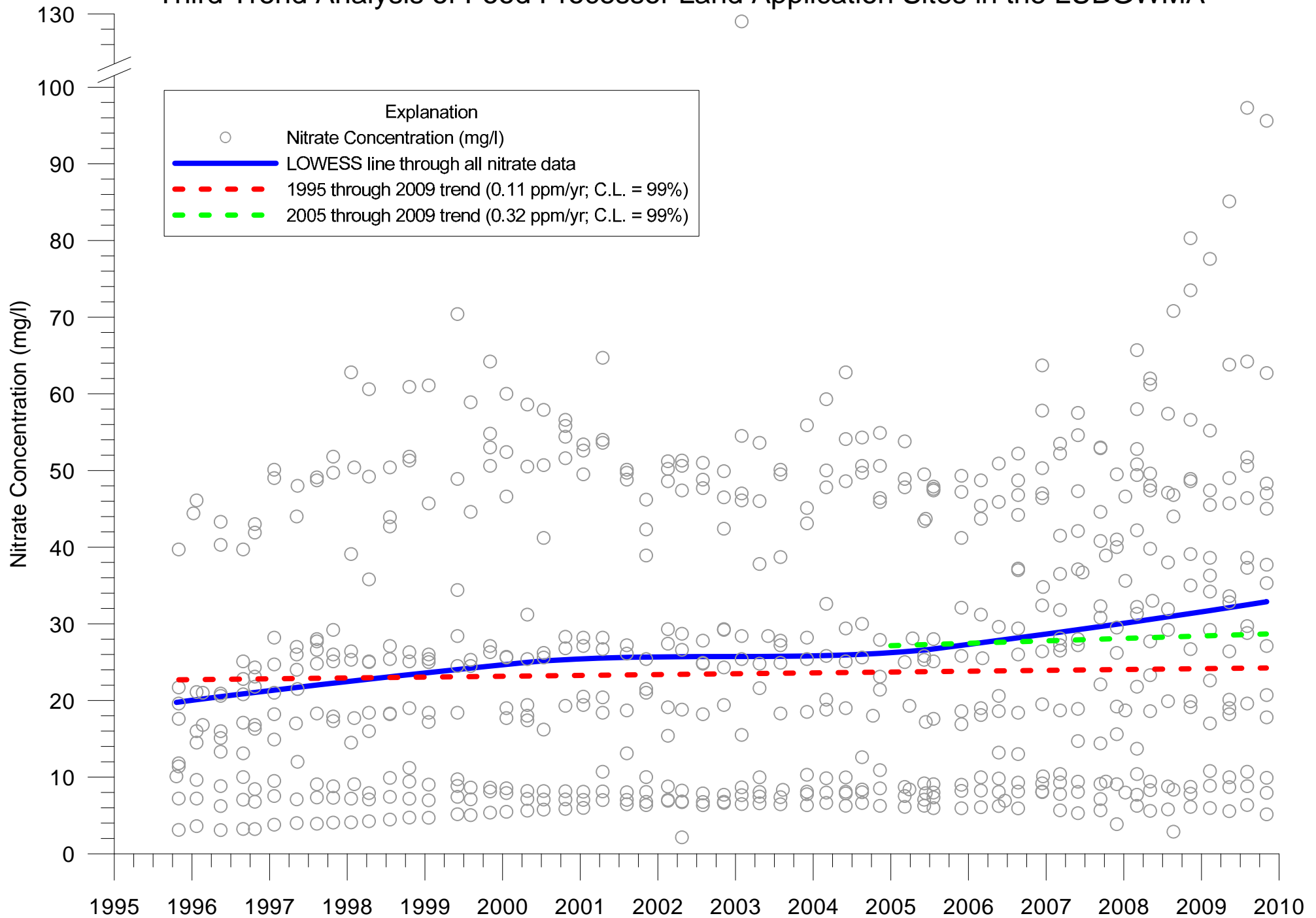


Figure 3-5

Upgradient vs. Downgradient Nitrate Comparisons - ConAgra North Farm Shallow Wells
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

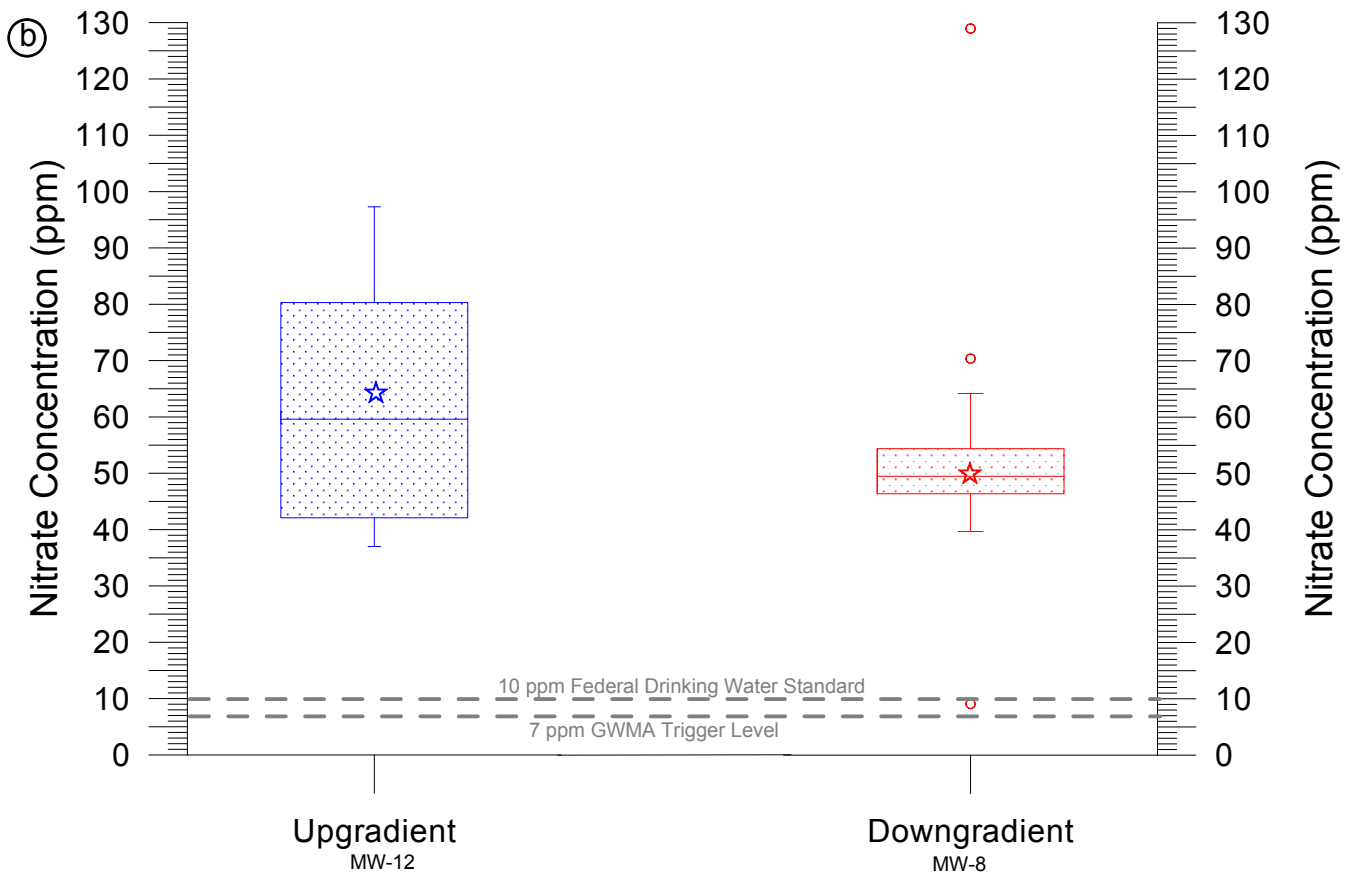
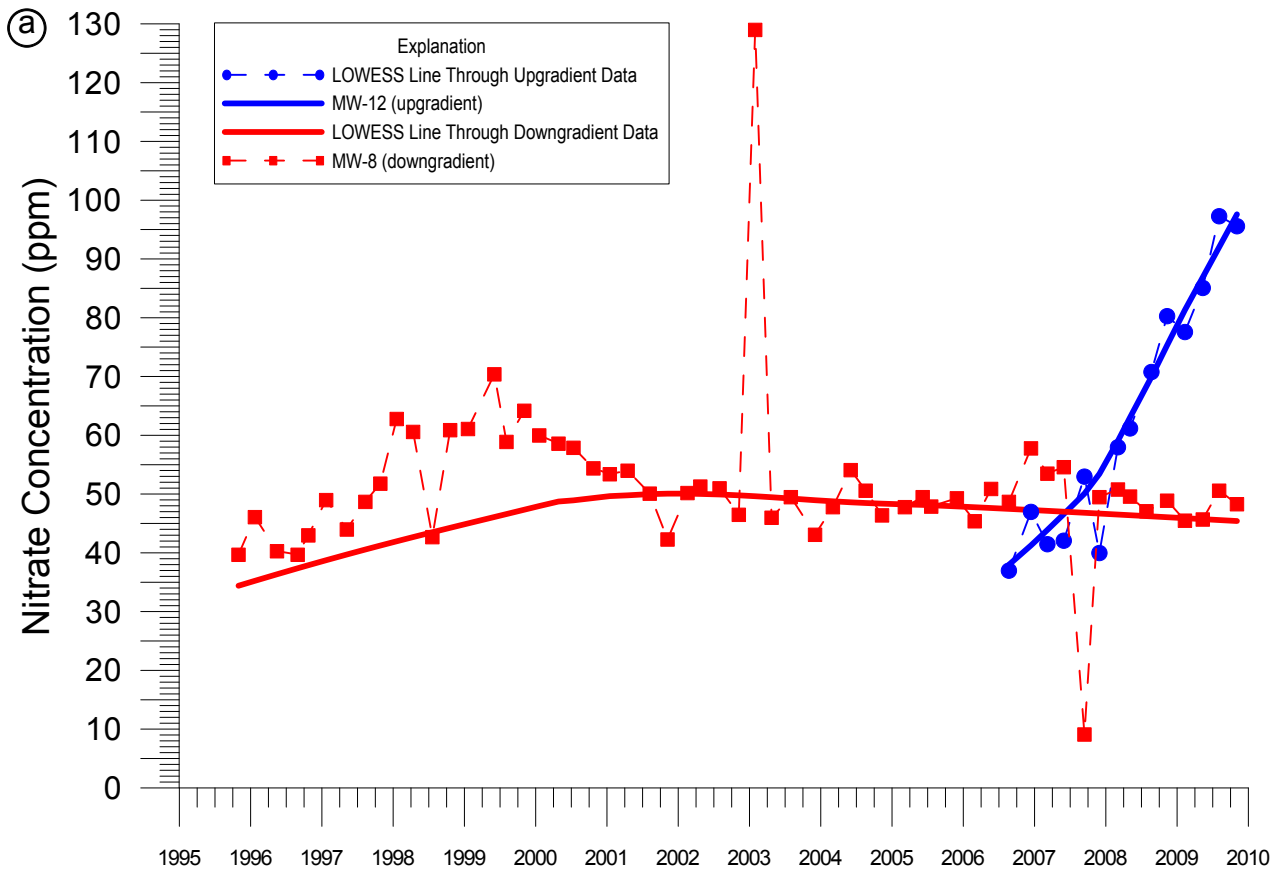


Figure 3-6
 LOWESS Lines and Trend Lines Through Nitrate Data - ConAgra Madison Ranch
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

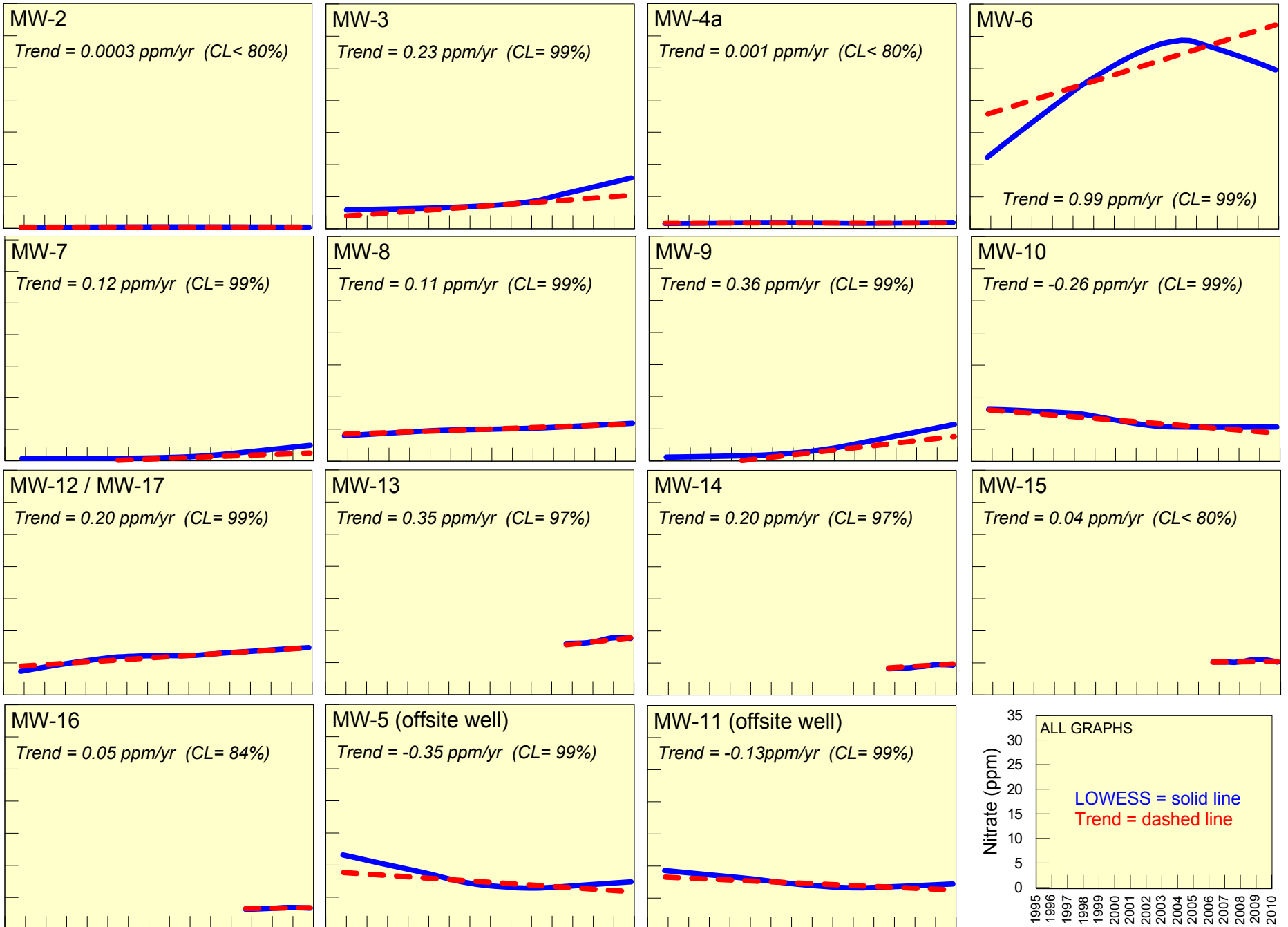


Figure 3-7
Nitrate Trends - ConAgra Madison Ranch
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

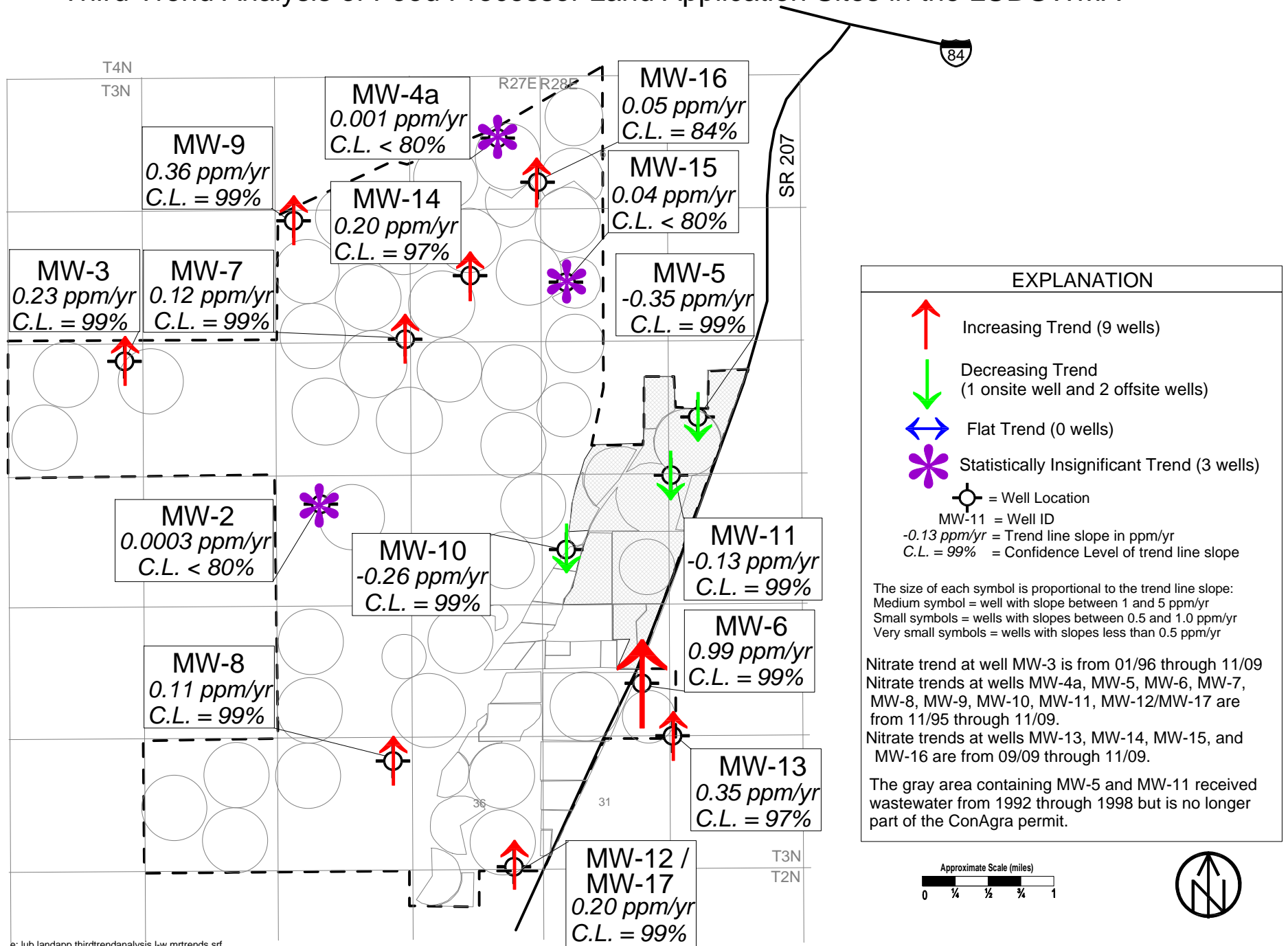


Figure 3-8
Average Nitrate Concentrations - ConAgra Madison Ranch
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

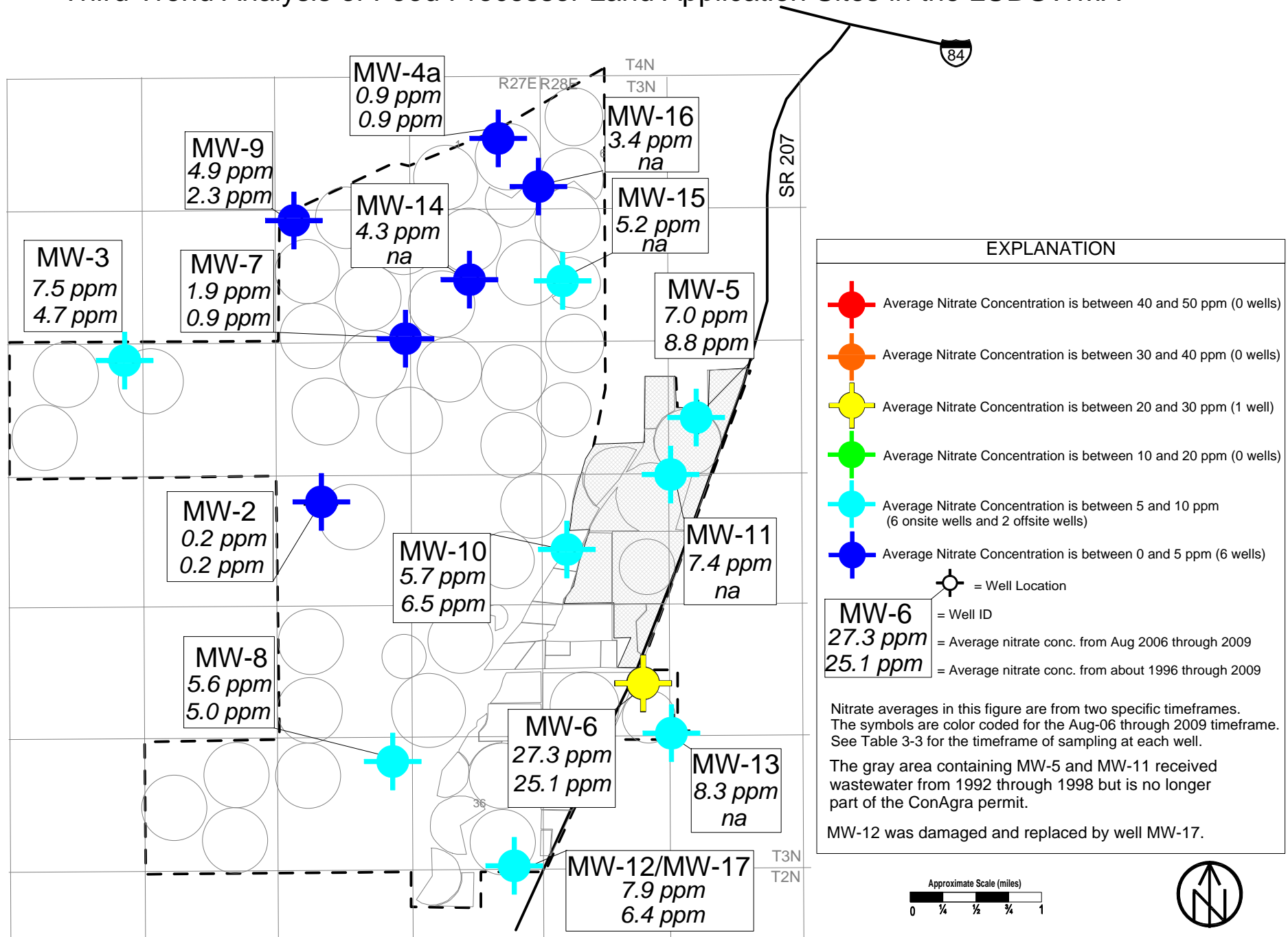
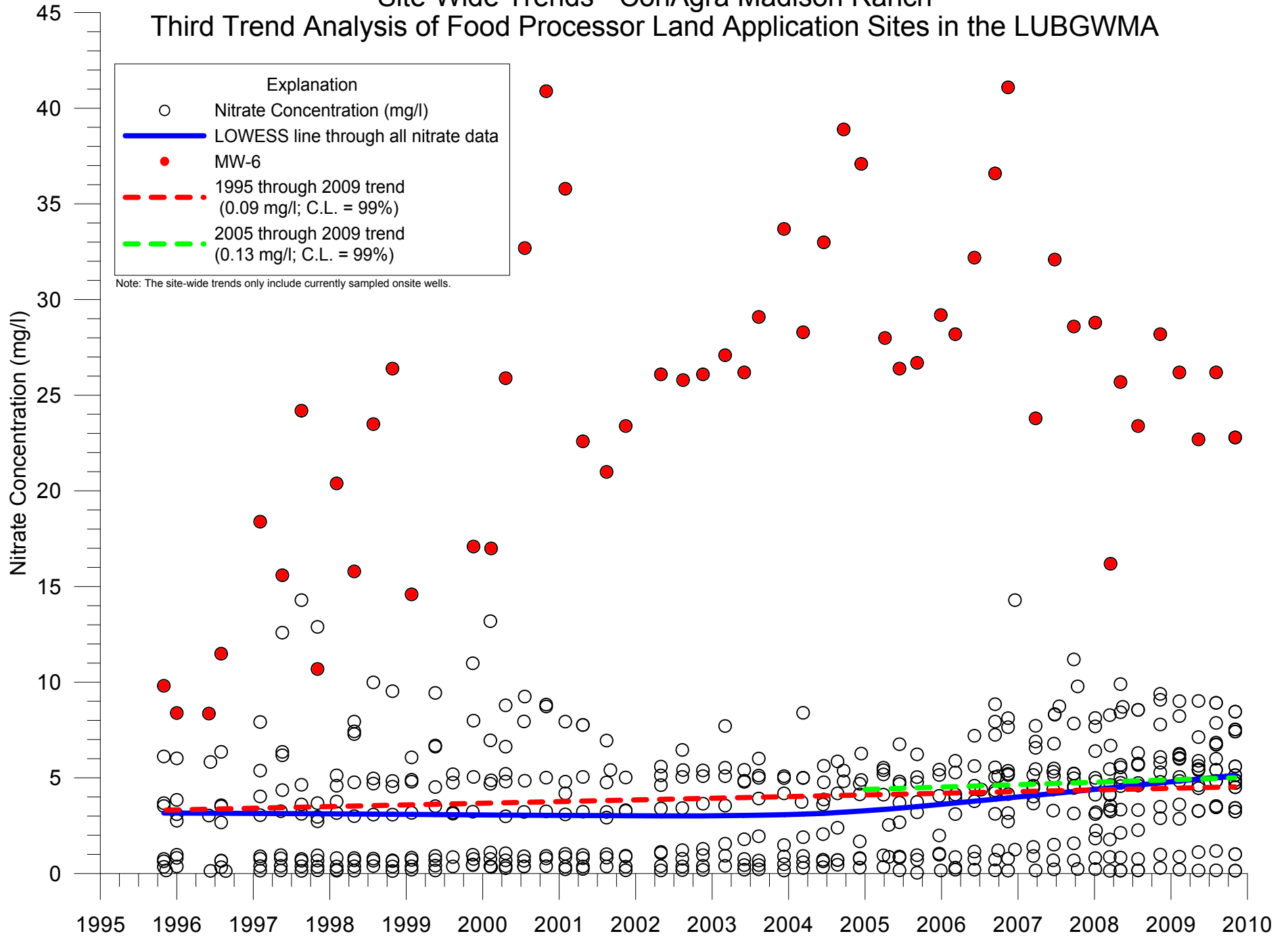


Figure 3-9

Site-Wide Trends - ConAgra Madison Ranch

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



Note: The site-wide trends only include currently sampled onsite wells.

Figure 4-1
 LOWESS Lines and Trend Lines Through Nitrate Data - Simplot Plant Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

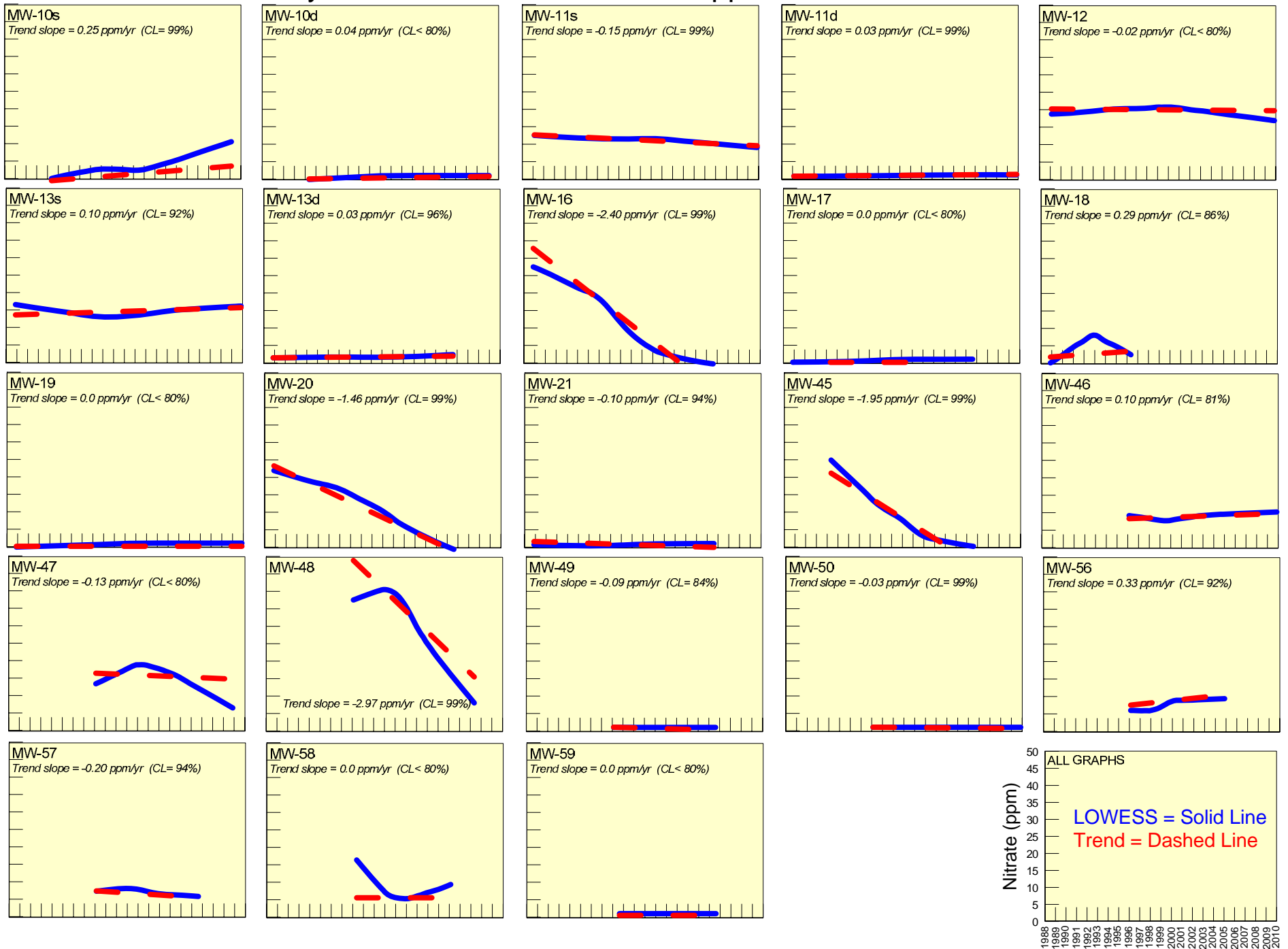


Figure 4-2
 Nitrate Trends - Simplot Plant Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

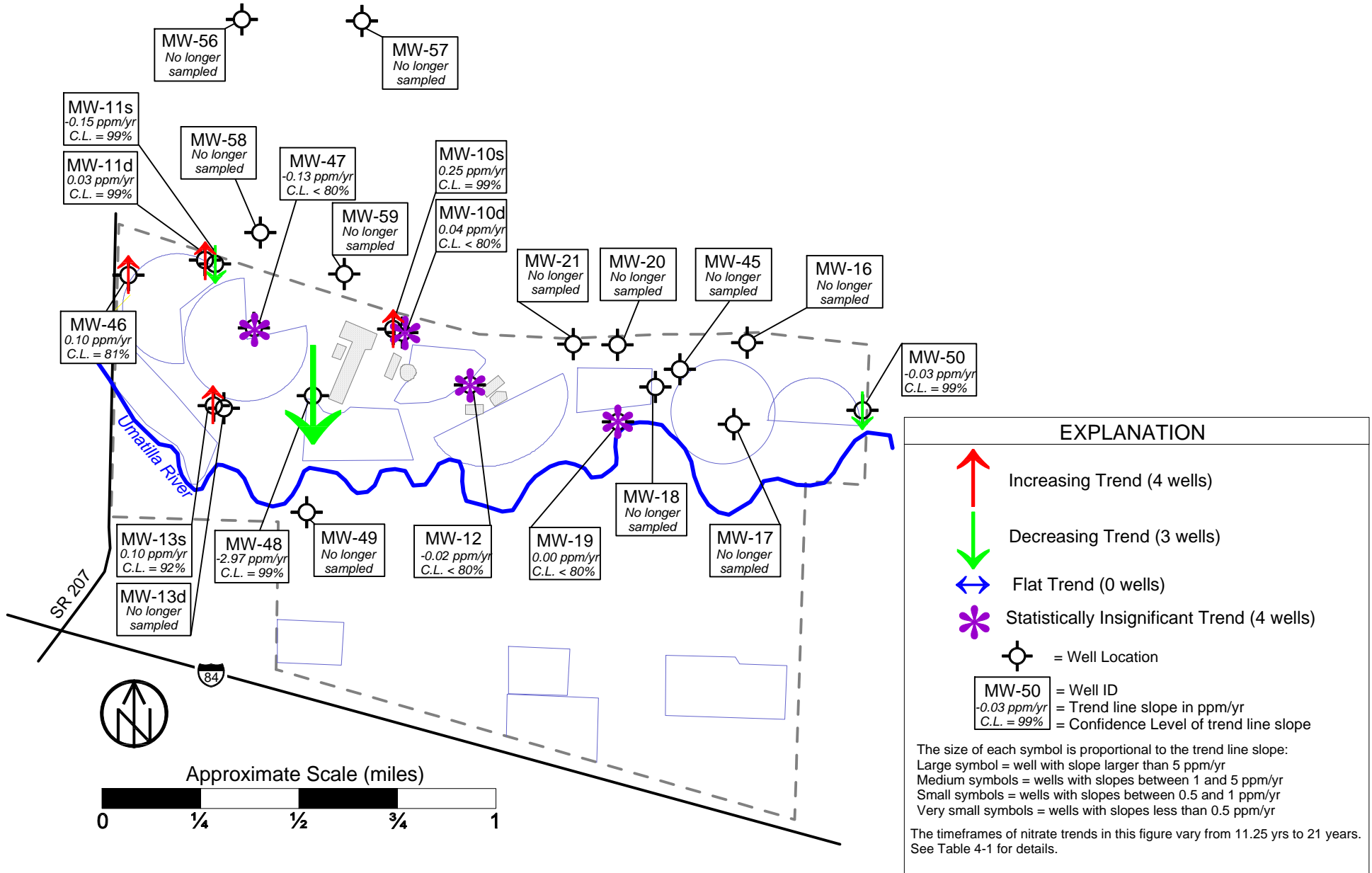


Figure 4-3
Average Nitrate Concentrations - Simplot Plant Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

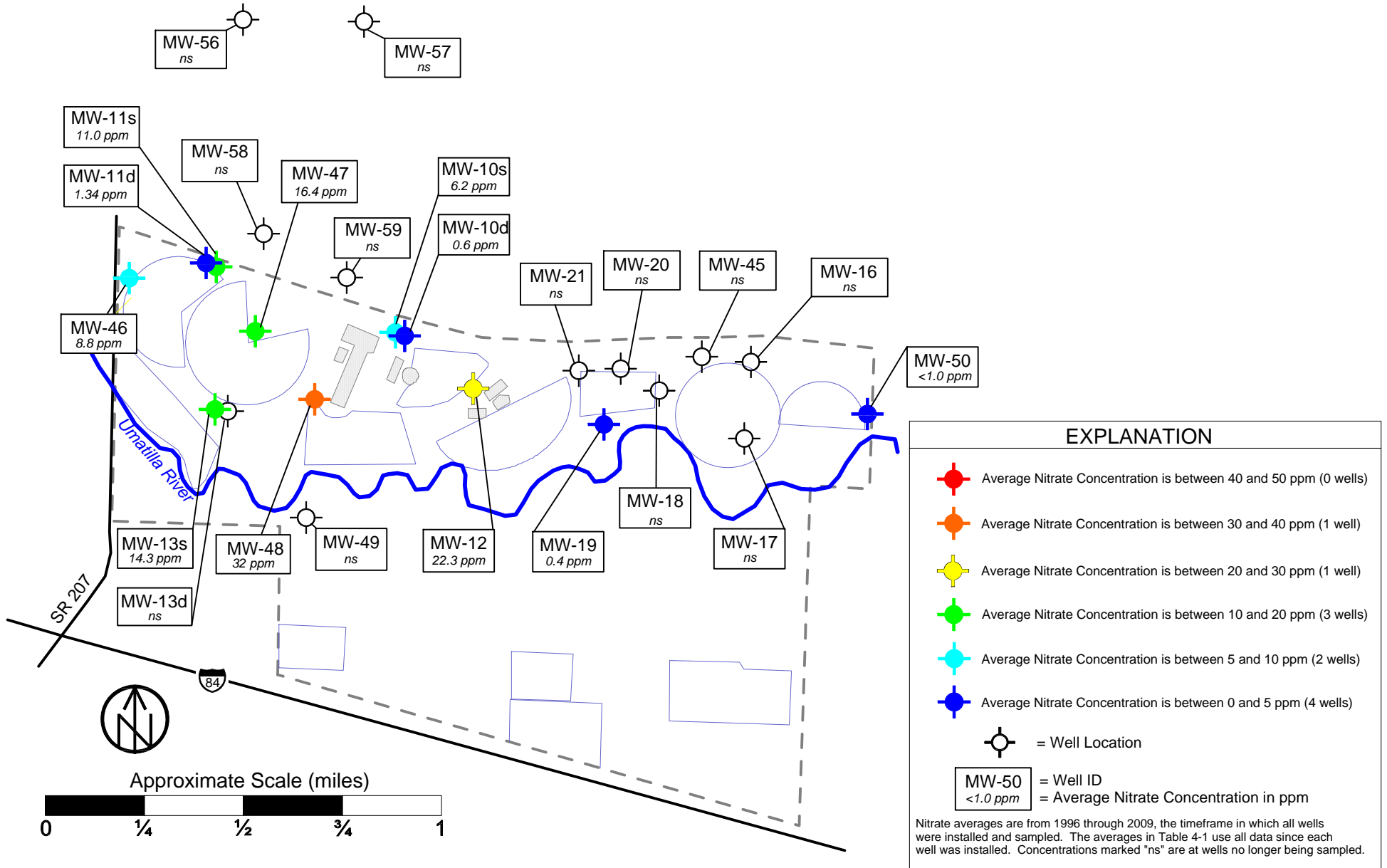


Figure 4-4
 Site-Wide Trends - Simplot Plant Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

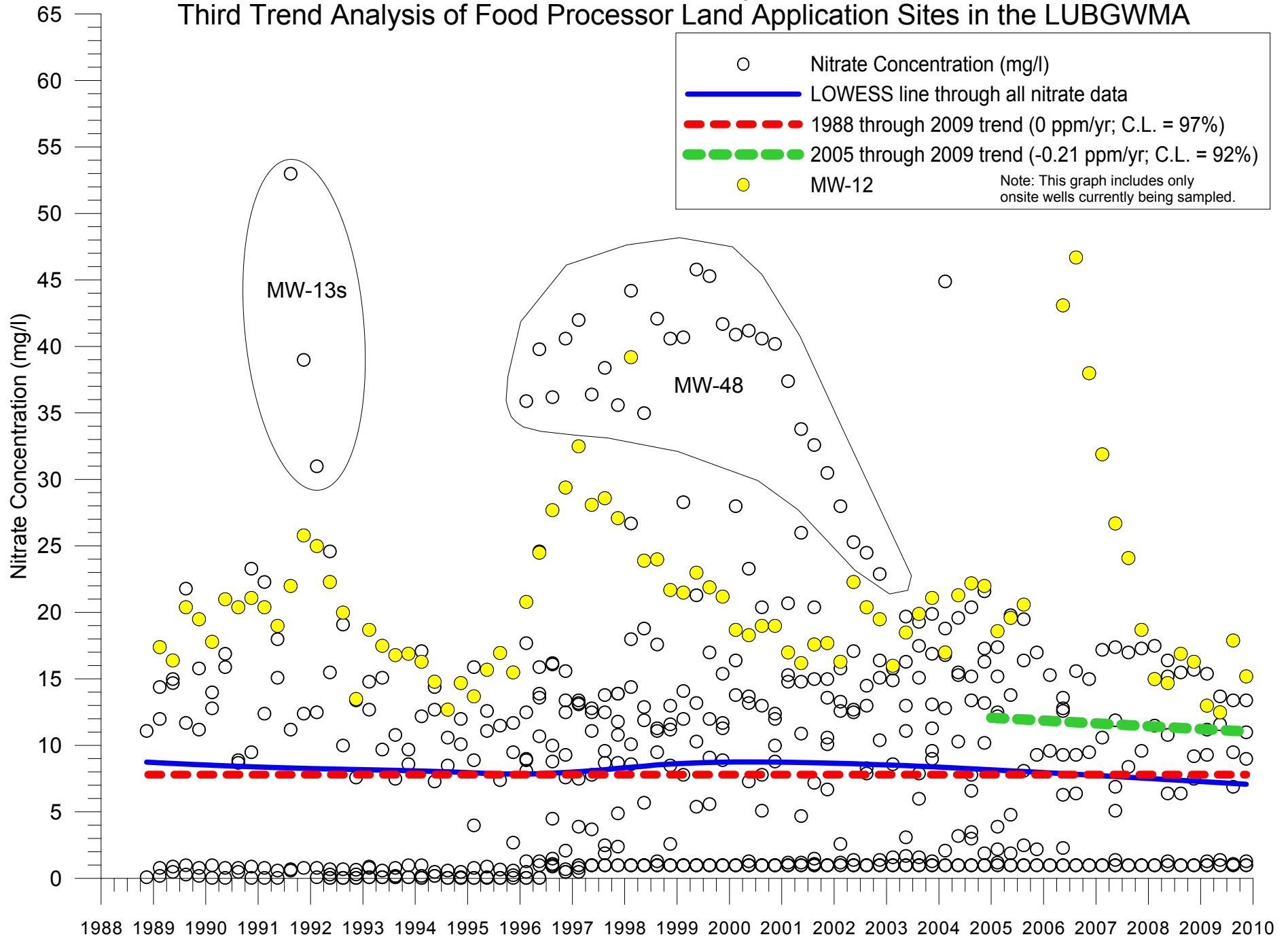


Figure 4-5

Upgradient vs. Downgradient Nitrate Comparisons - Simplot Plant Site Alluvial Wells
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

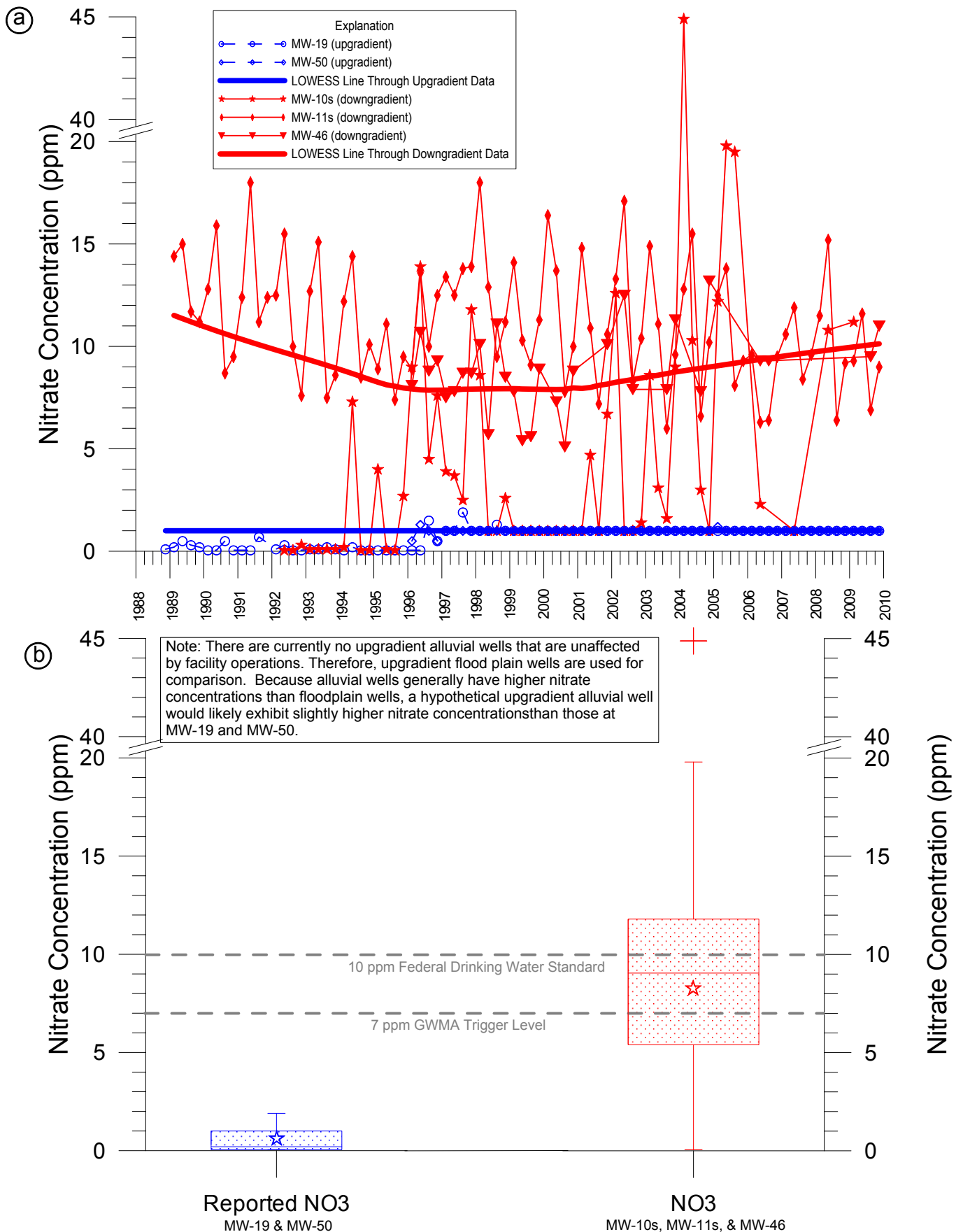


Figure 4-6
 LOWESS Lines and Trend Lines Through Nitrate Data - Simplot Terrace Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

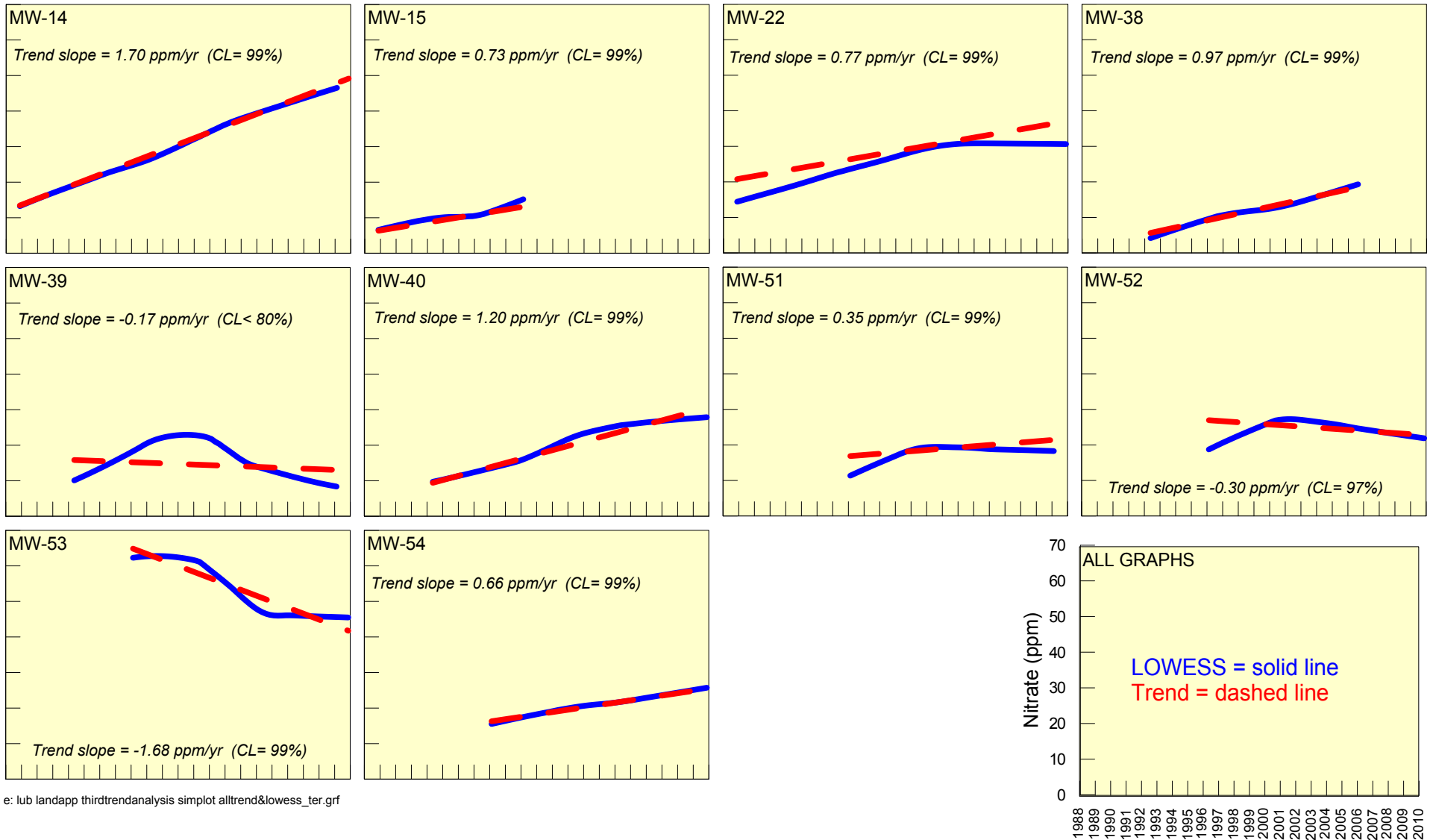
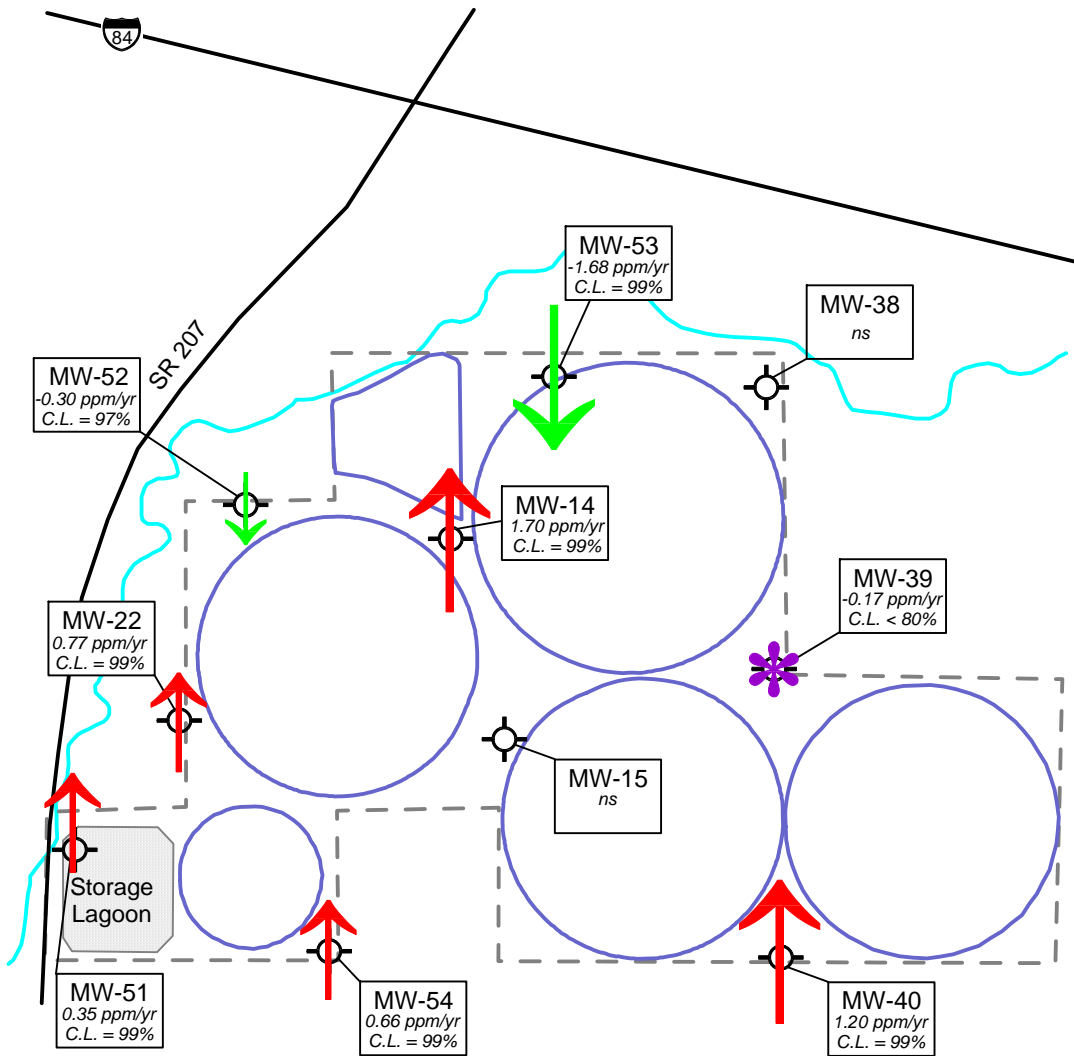


Figure 4-7
Nitrate Trends - Simplot Terrace Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



| EXPLANATION | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------|------------|-------------------------------------------------------------------------------------|
| | Increasing Trend (5 wells) | | | |
| | Decreasing Trend (2 wells) | | | |
| | Flat Trend (0 wells) | | | |
| | Statistically Insignificant Trend (1 well) | | | |
| | = Well Location | | | |
| <table border="1" style="font-size: small;"> <tr><td>MW-40</td></tr> <tr><td>1.20 ppm/yr</td></tr> <tr><td>C.L. = 99%</td></tr> </table> | MW-40 | 1.20 ppm/yr | C.L. = 99% | = Well ID = Trend line slope in ppm/yr = Confidence Level of trend line slope |
| MW-40 | | | | |
| 1.20 ppm/yr | | | | |
| C.L. = 99% | | | | |
| | ns = Well not sampled since last trend analysis | | | |
| The size of each symbol is proportional to the trend line slope: Large symbol = well with slope larger than 5 ppm/yr (0 wells) Medium symbol = well with slope between 1 and 5 ppm/yr (3 wells) Small symbol = well with slope between 0.5 and 1 ppm/yr (2 wells) Very small symbol = well with slope less than 0.5 ppm/yr (3 wells) | | | | |
| Nitrate trends at wells MW-14 & 22 are from 11/88 through 02/09 or 11/09. Nitrate trends at wells MW-39 & 40 are from 05/92 through 02/09 or 11/09. Nitrate trends at wells MW-51, 52, 53, & 54 are from 02/96 through 02/09 or 11/09. Nitrate trend at well MW-15 is from 11/88 through 02/98. | | | | |

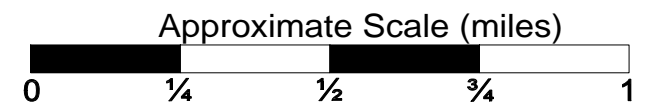
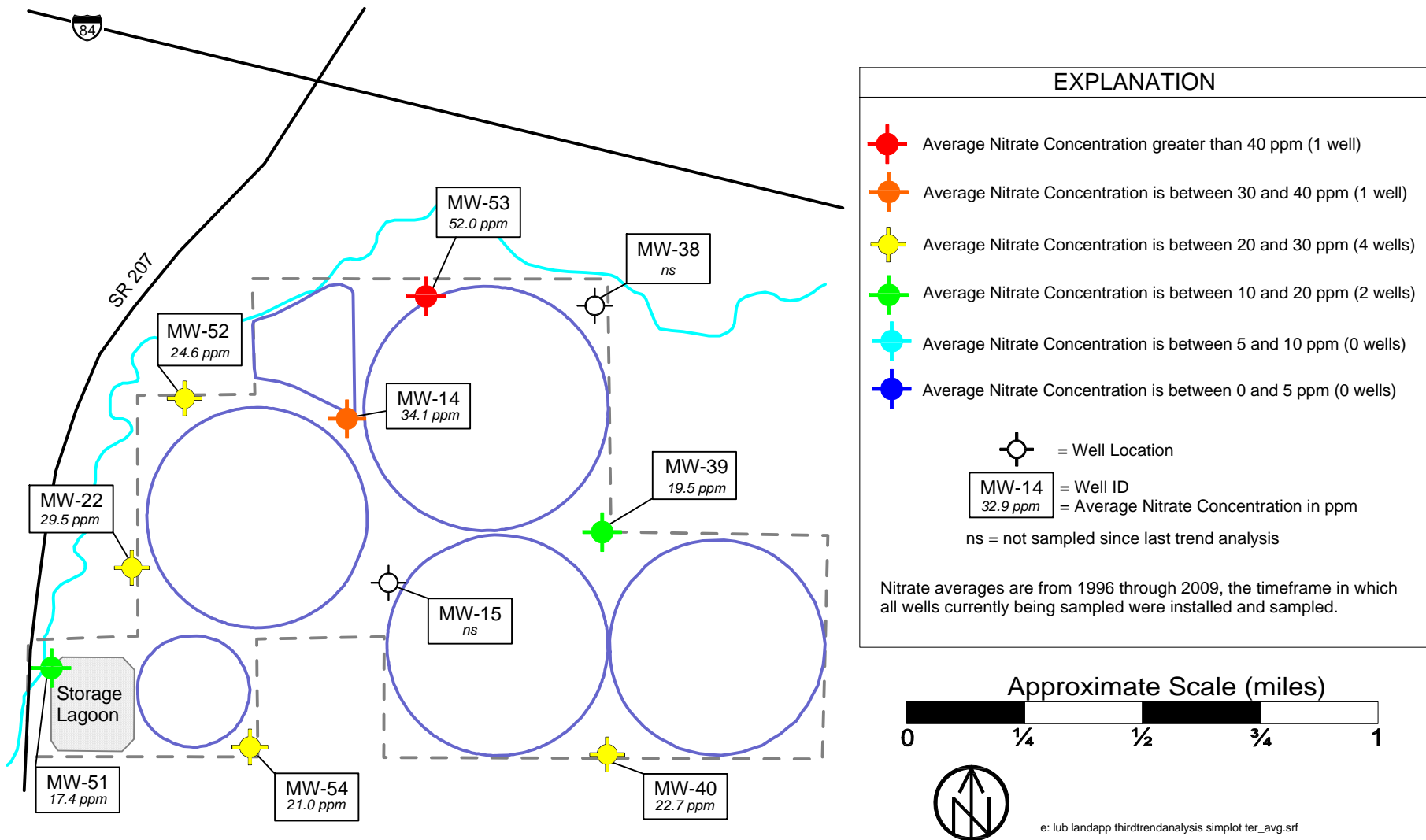
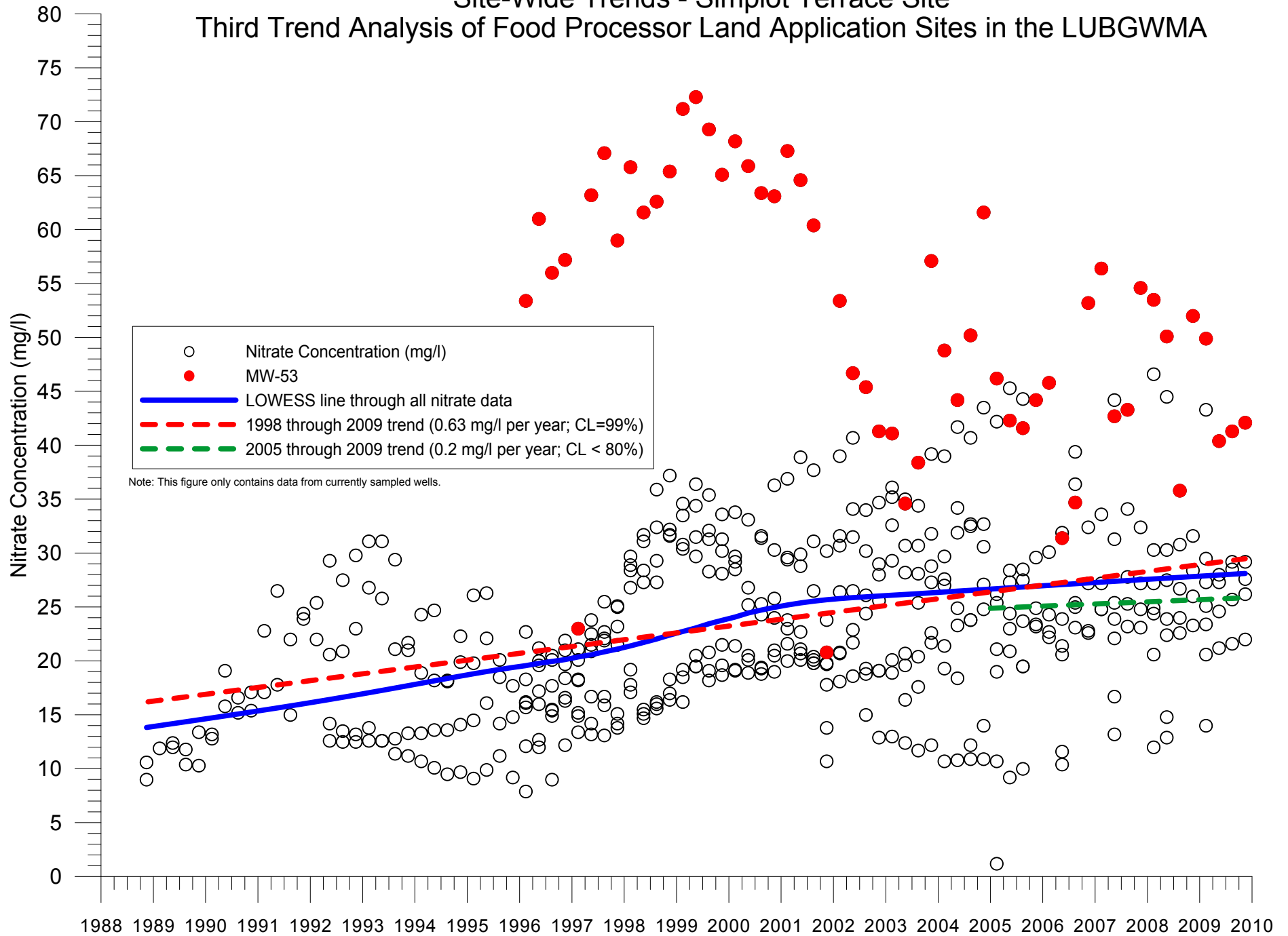


Figure 4-8
Average Nitrate Concentrations - Simplot Terrace Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



| Well ID | Average Nitrate Concentration (ppm) | Concentration Range Category |
|---------|-------------------------------------|------------------------------|
| MW-53 | 52.0 | Greater than 40 ppm |
| MW-14 | 34.1 | Between 30 and 40 ppm |
| MW-39 | 19.5 | Between 10 and 20 ppm |
| MW-40 | 22.7 | Between 20 and 30 ppm |
| MW-22 | 29.5 | Between 20 and 30 ppm |
| MW-52 | 24.6 | Between 20 and 30 ppm |
| MW-51 | 17.4 | Between 10 and 20 ppm |
| MW-54 | 21.0 | Between 20 and 30 ppm |
| MW-15 | ns | Not sampled |
| MW-38 | ns | Not sampled |

Figure 4-9
Site-Wide Trends - Simplot Terrace Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



Note: This figure only contains data from currently sampled wells.

Figure 4-10

Upgradient vs. Downgradient Nitrate Comparisons - Simplot Terrace Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

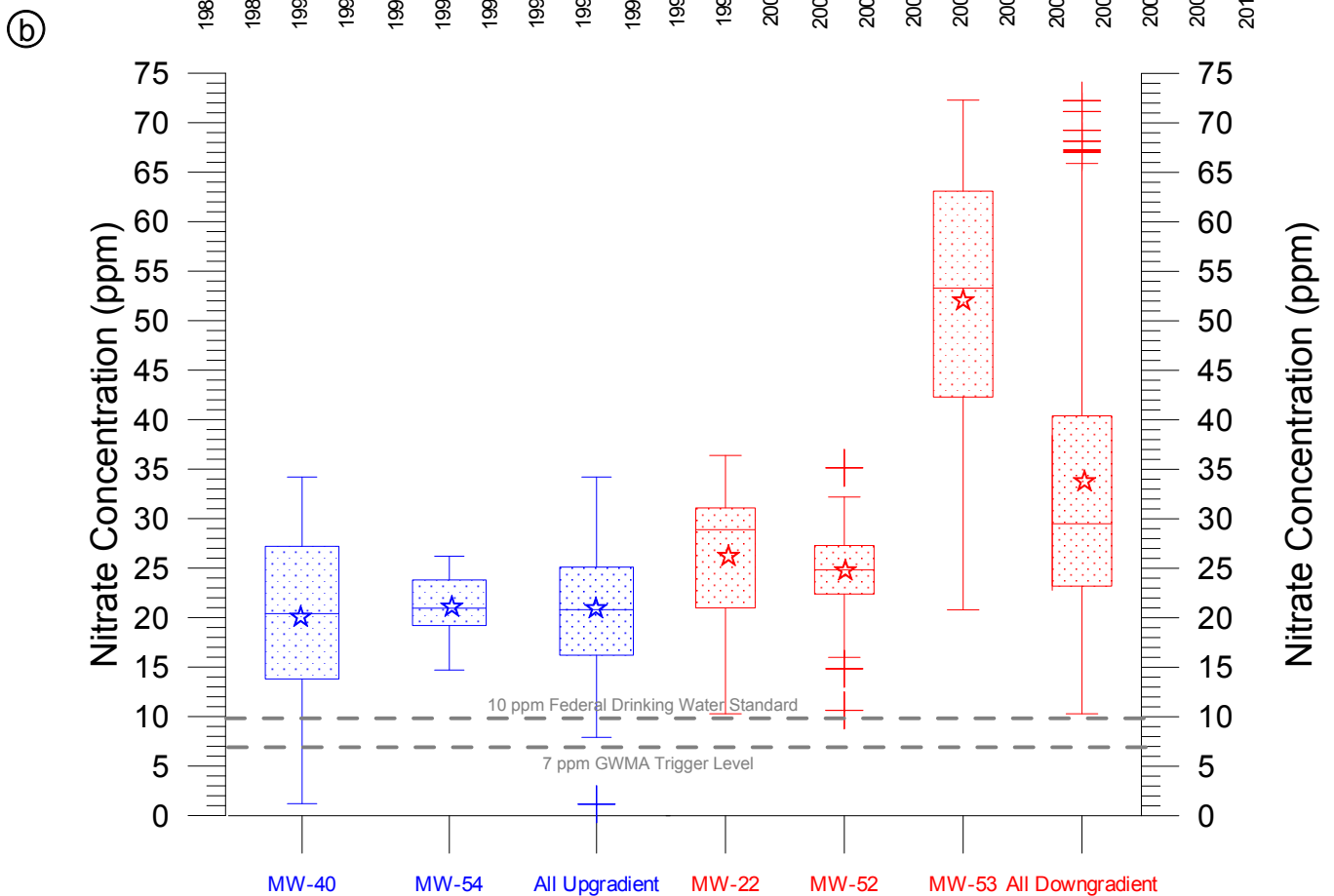
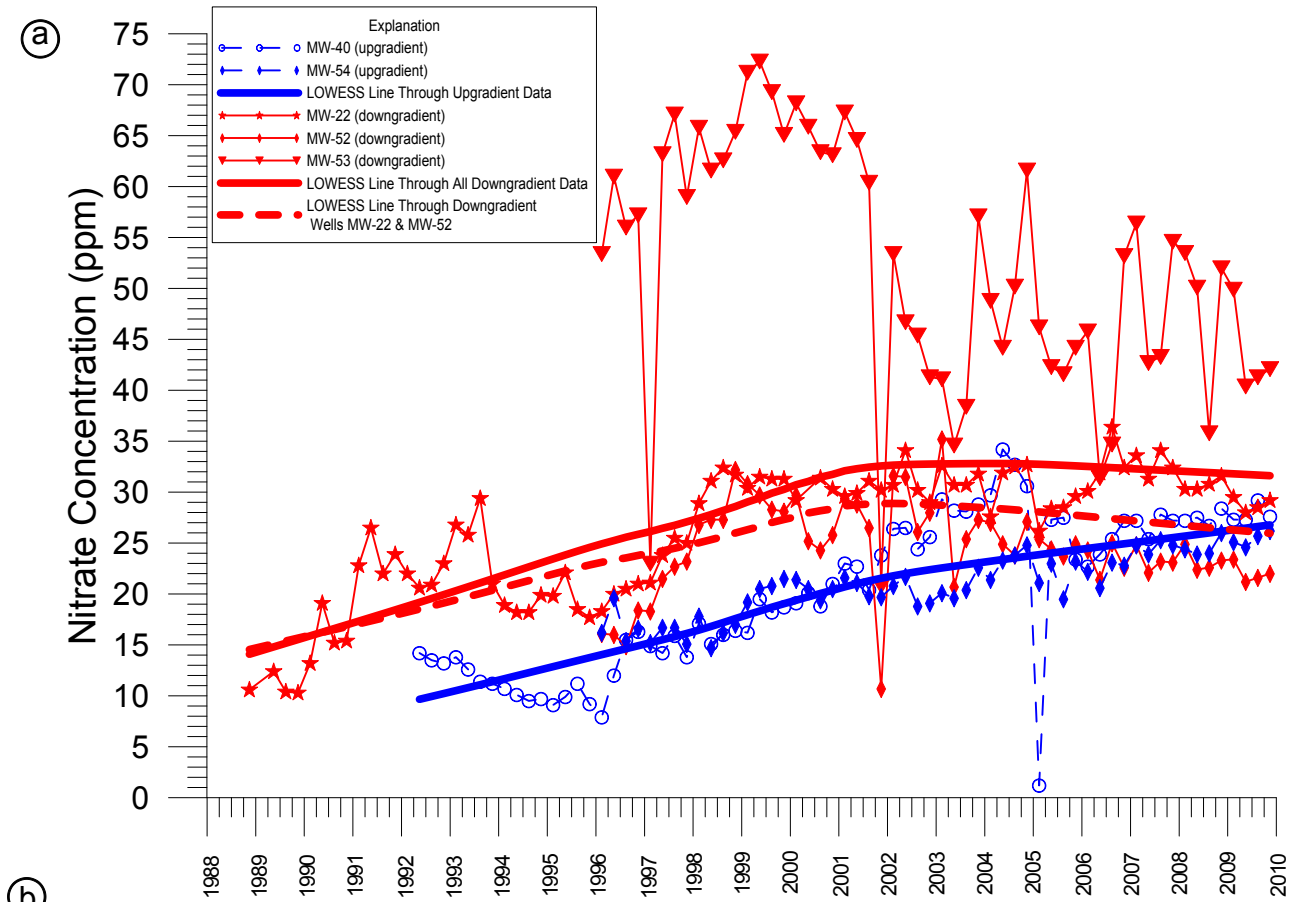


Figure 4-11
 LOWESS Lines and Trend Lines Through Nitrate Data - Simplot Expansion Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

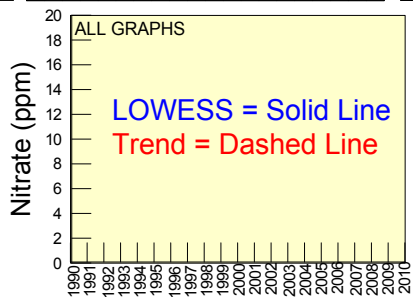
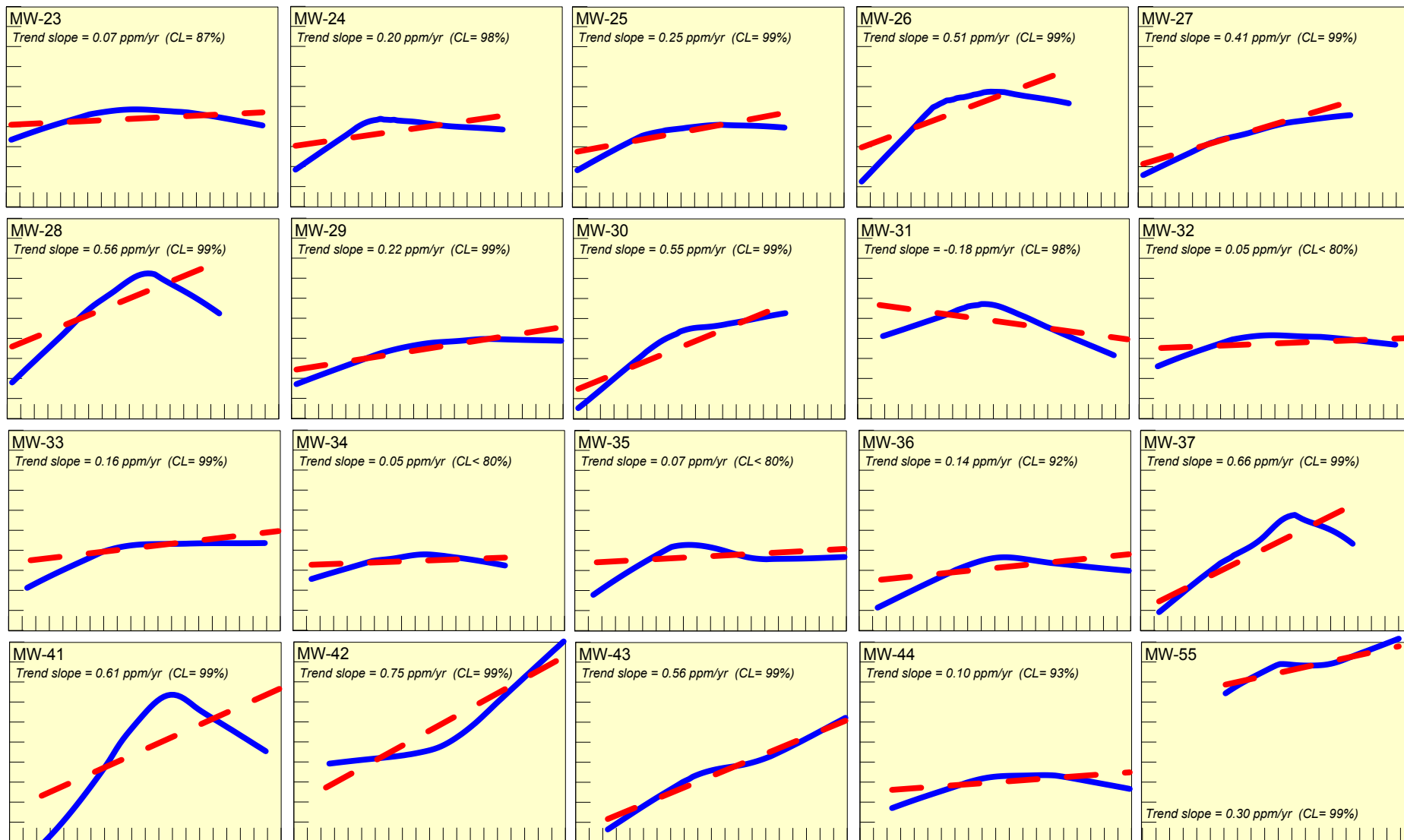


Figure 4-12
Nitrate Trends - Simplot Expansion Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

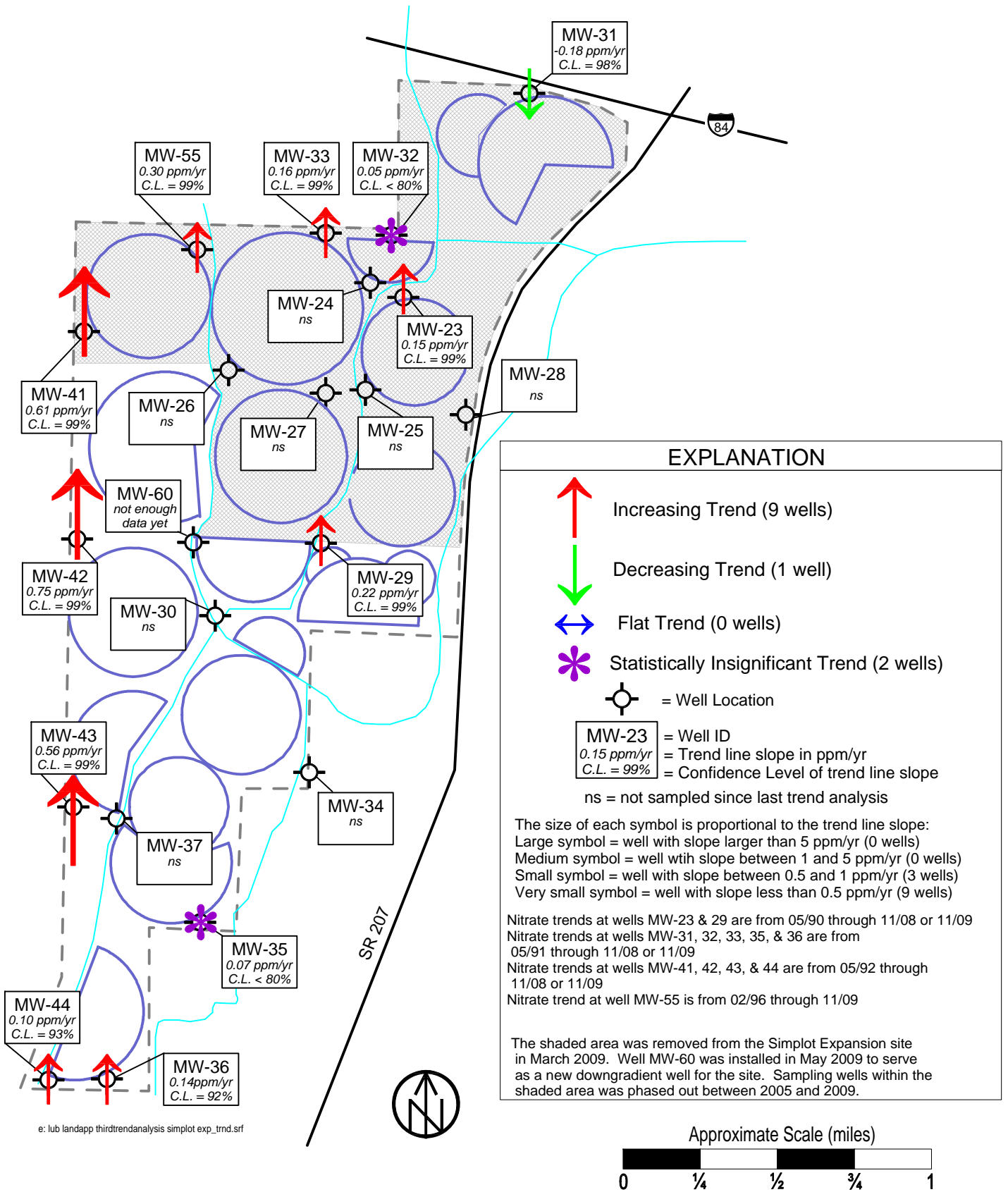


Figure 4-13
 Average Nitrate Concentrations - Simplot Expansion Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

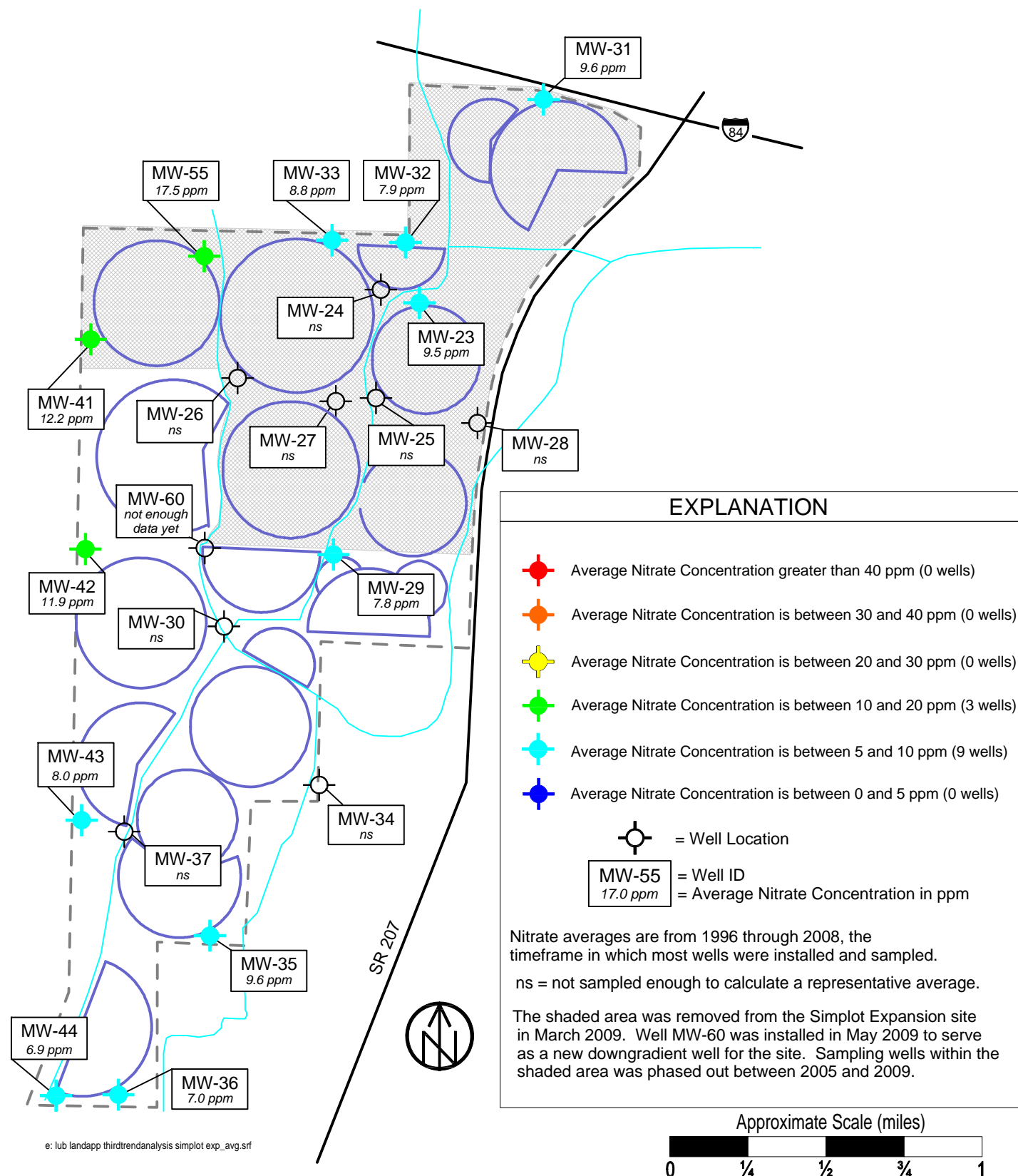


Figure 4-14
 Site-Wide Trends - Simplot Expansion Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

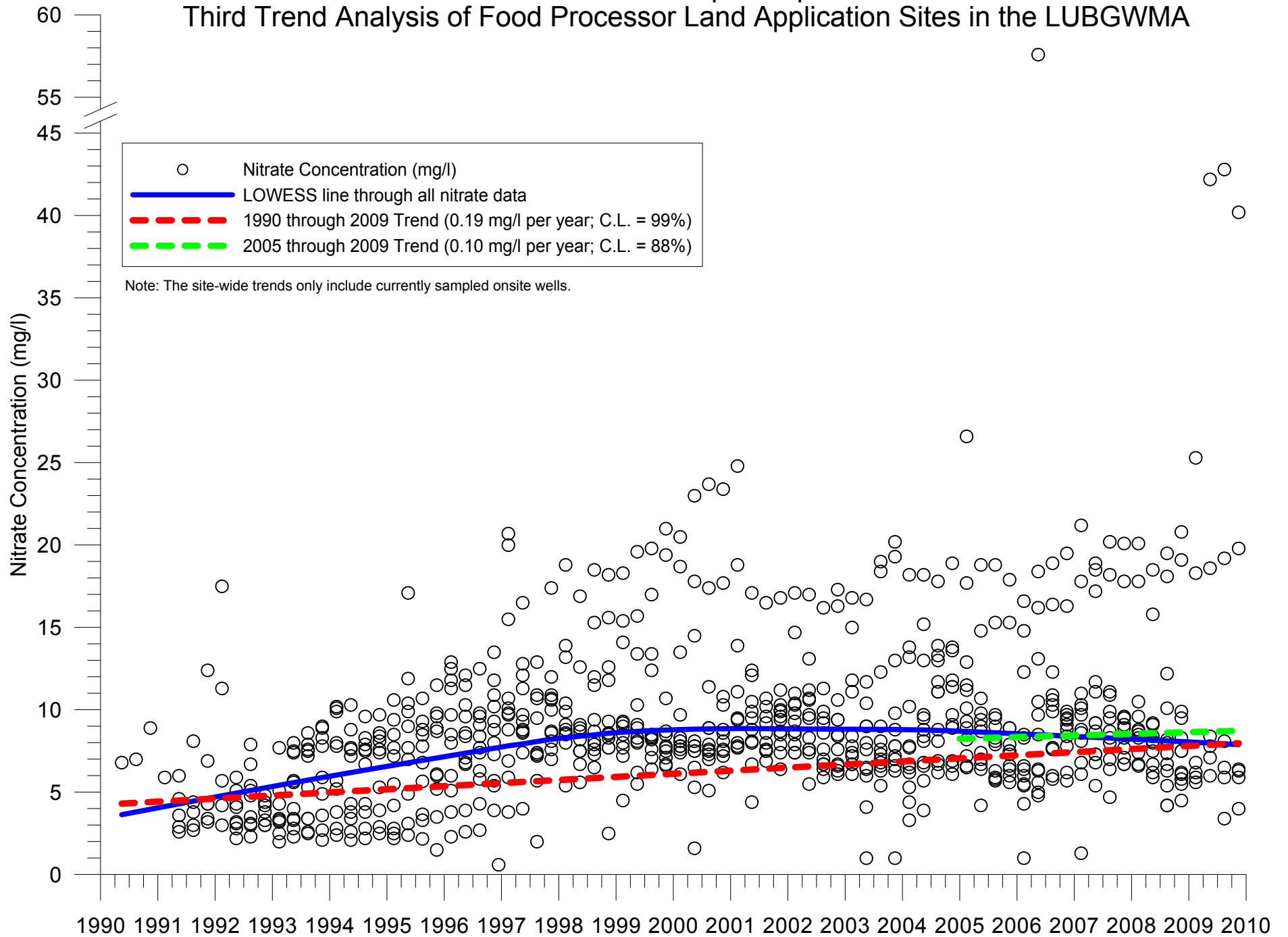


Figure 4-15

Upgradient vs. Downgradient Nitrate Comparisons - Simplot Expansion Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

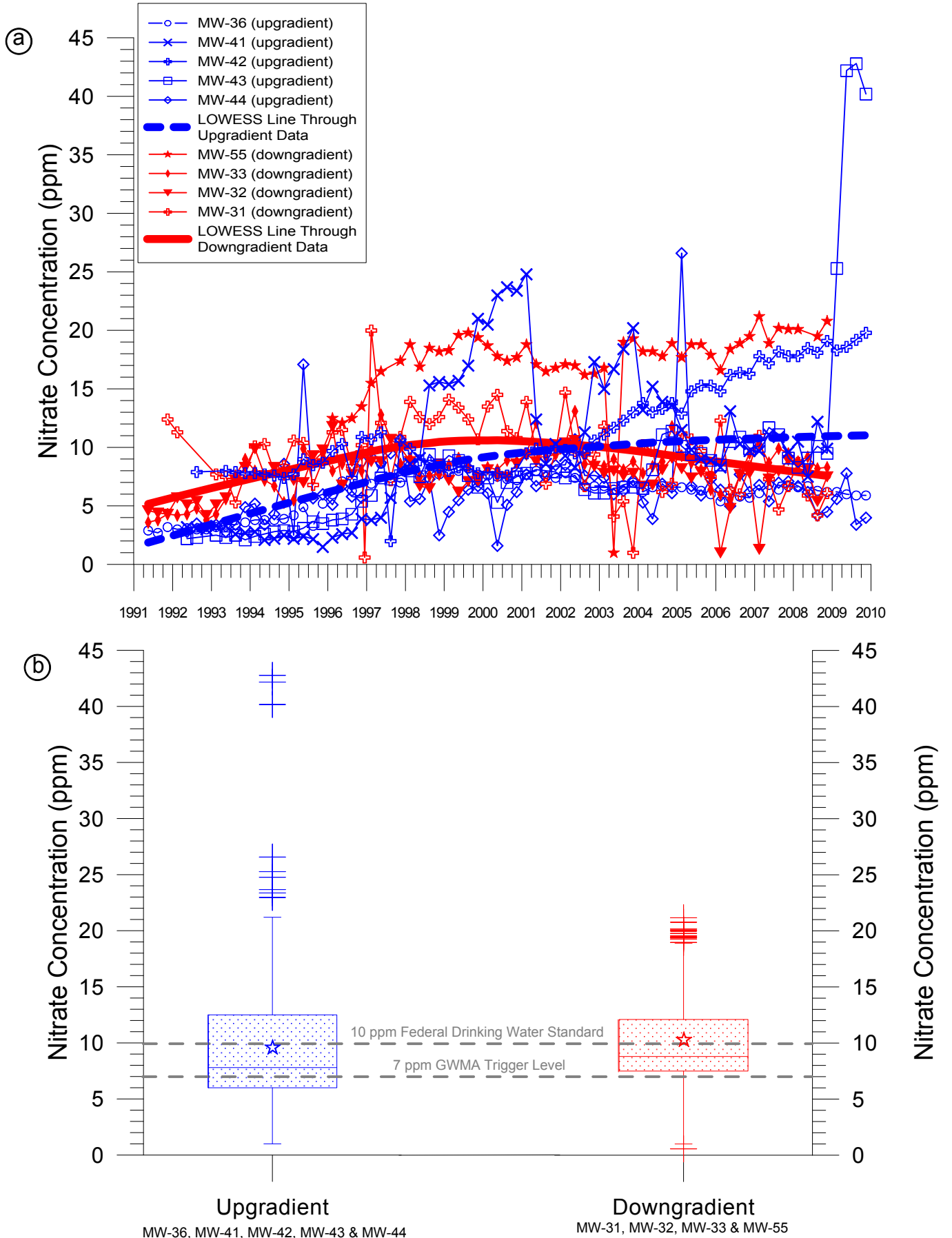
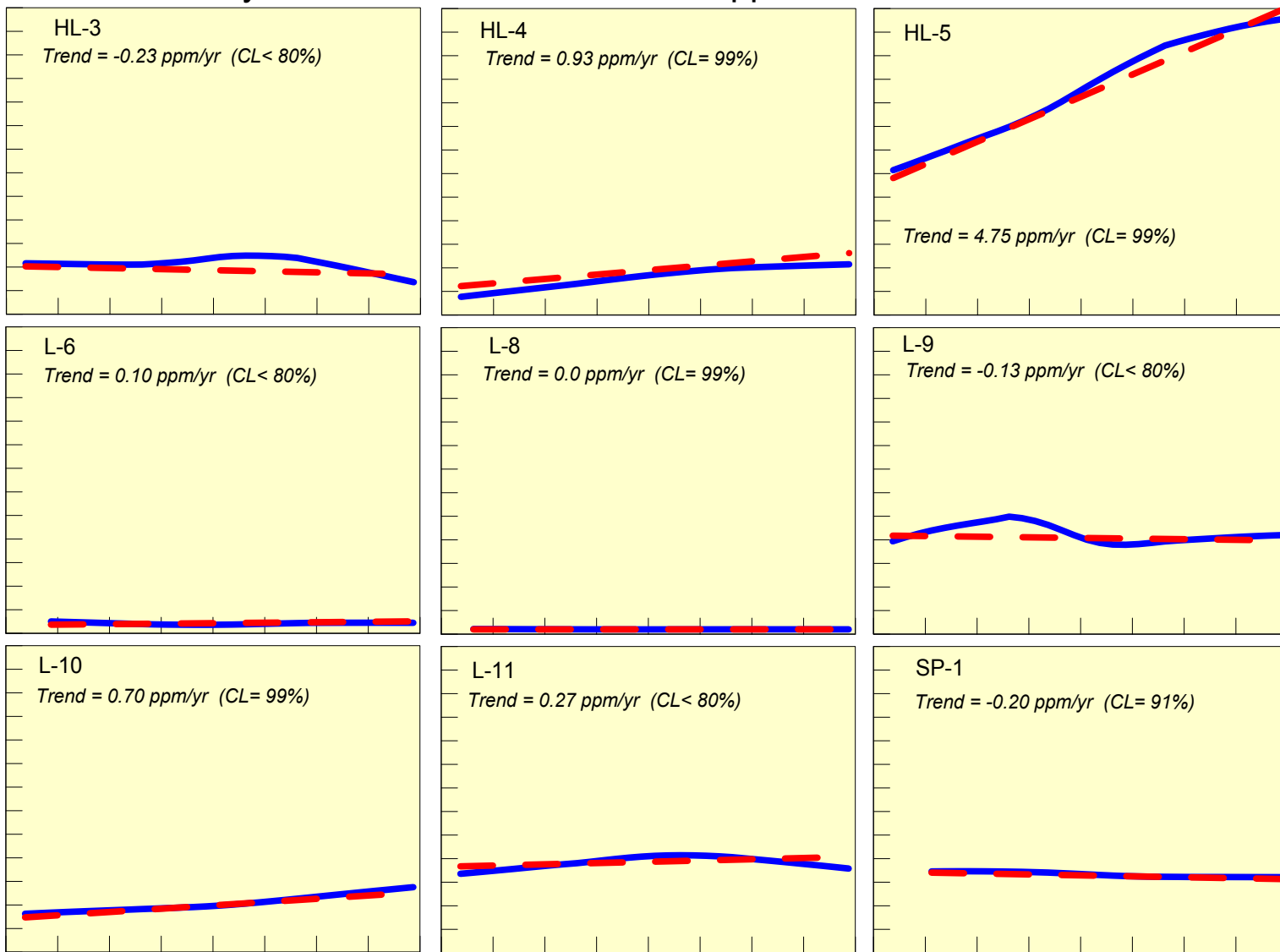


Figure 4-16

LOWESS Lines and Trend Lines Through Nitrate Data - Simplot Levy Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



e: lub landapp thirtrendanalysis simplot alltrends&lowess_levy.grf

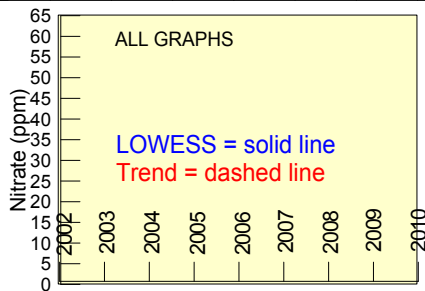


Figure 4-17 Nitrate Trends - Simplot Levy Site Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

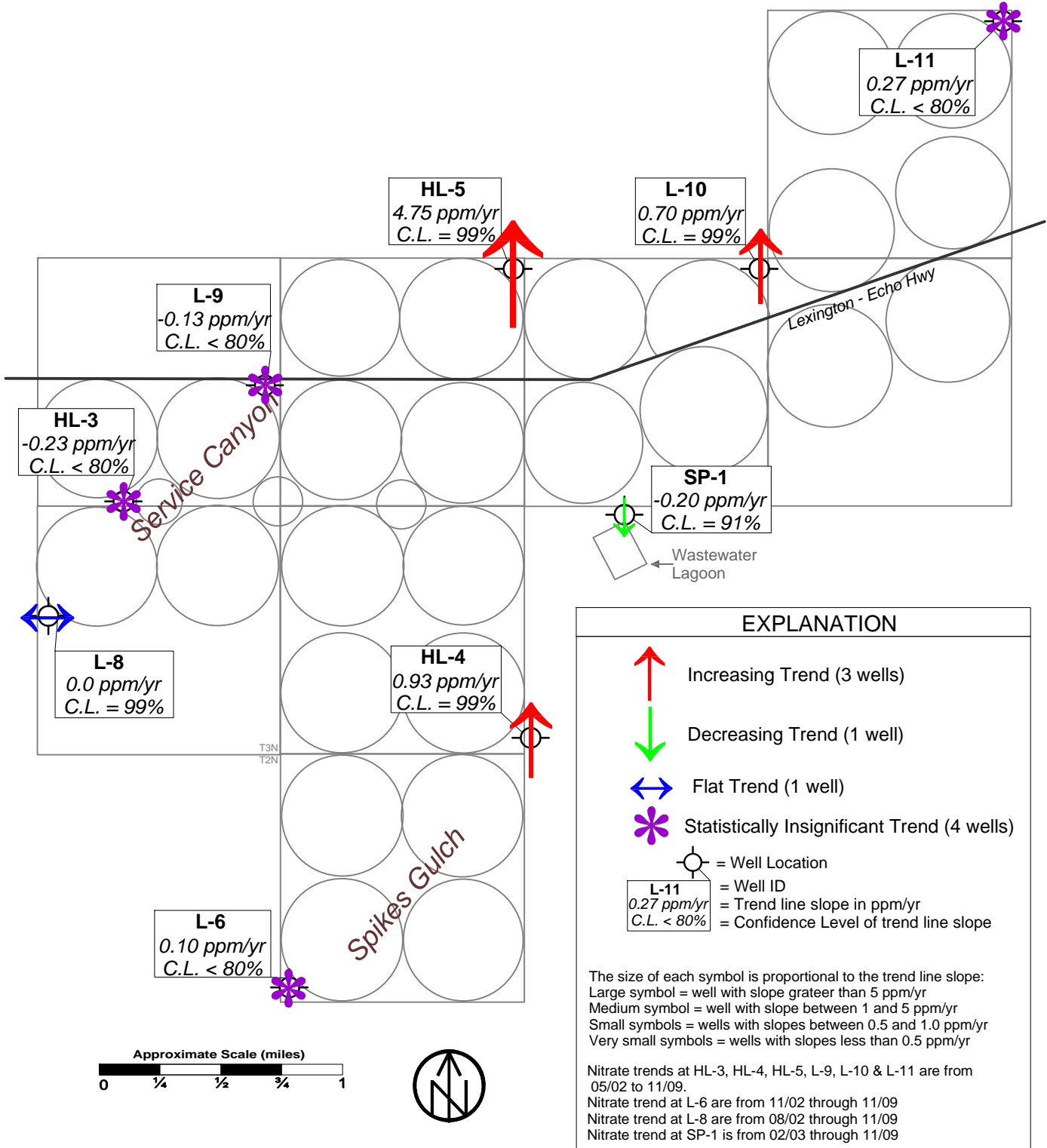


Figure 4-18
Average Nitrate Concentrations - Simplot Levy Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

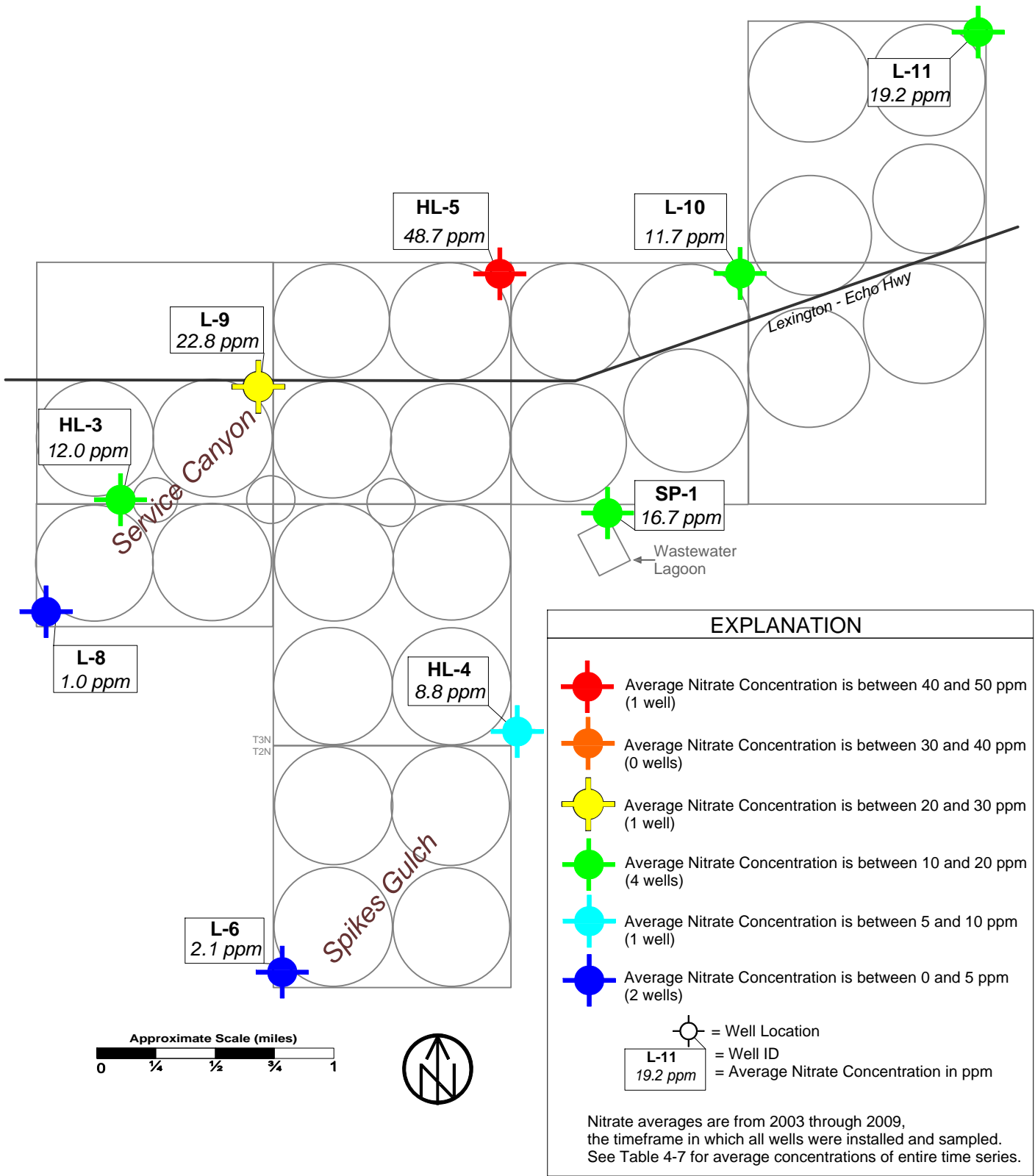
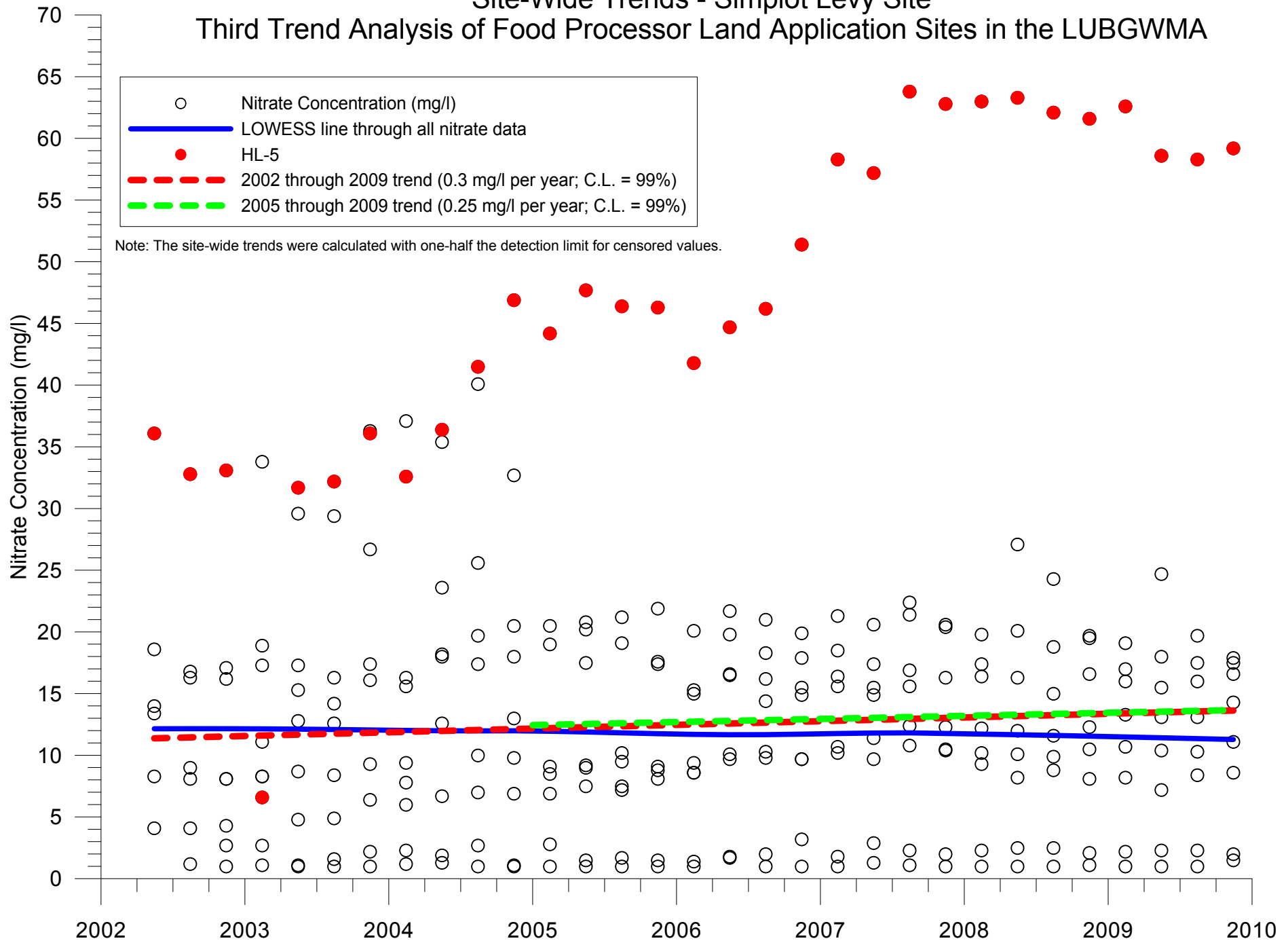


Figure 4-19
 Site-Wide Trends - Simplot Levy Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



Note: The site-wide trends were calculated with one-half the detection limit for censored values.

Figure 4-20

Upgradient vs. Downgradient Nitrate Comparisons - Simplot Levy Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

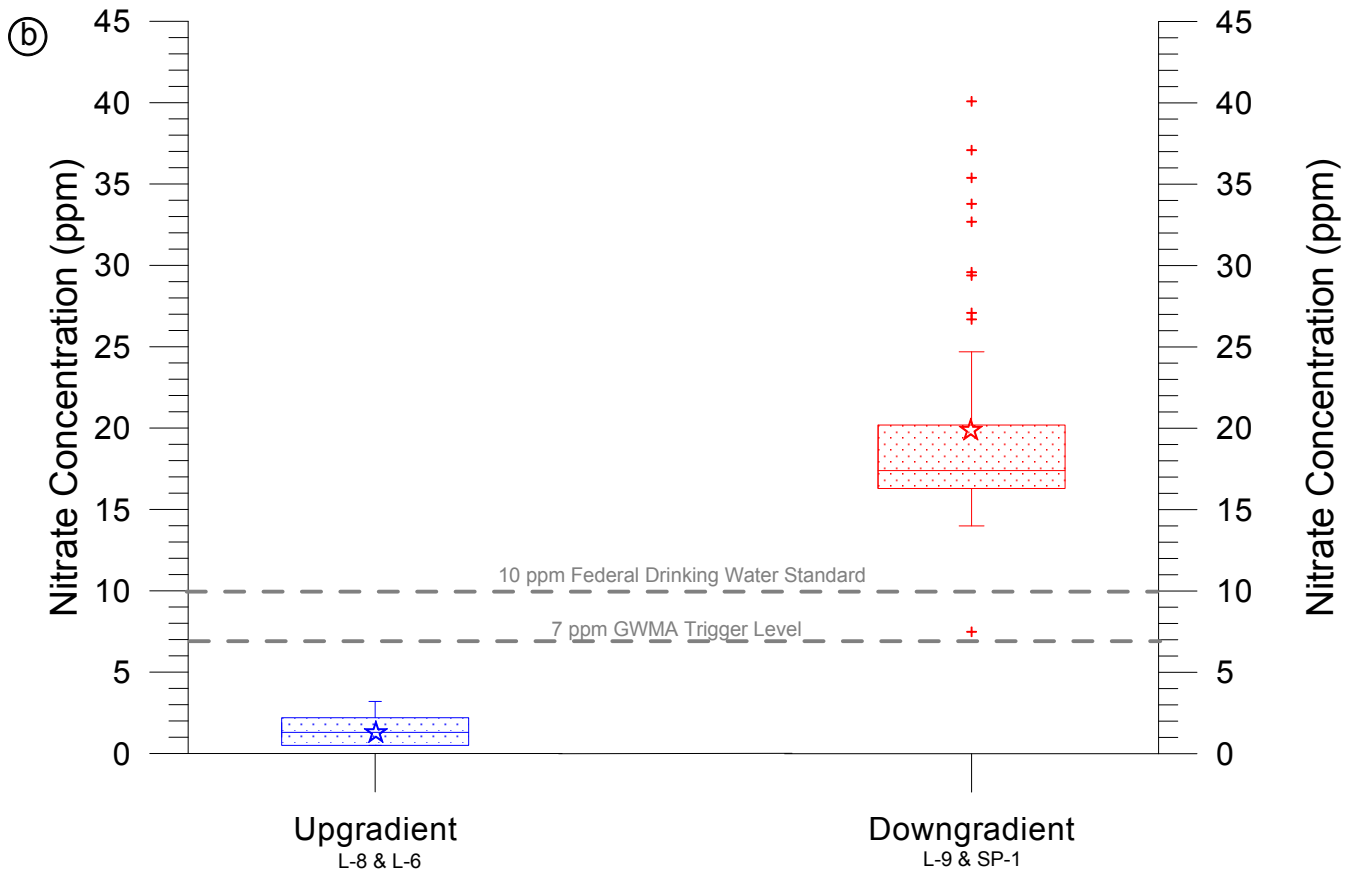
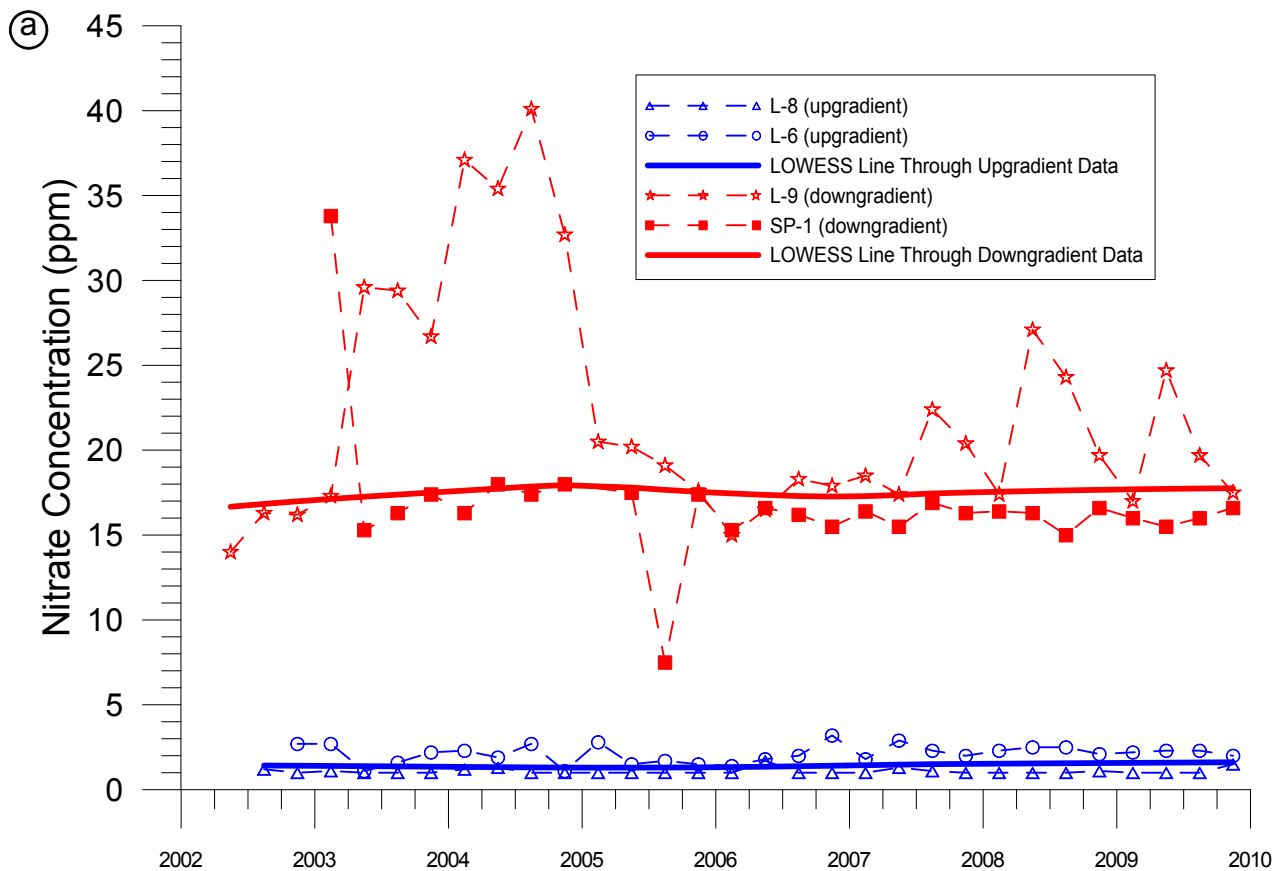


Figure 5-1
 LOWESS Lines and Trend Lines Through Nitrate Data - Hermiston Foods Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUB GWMA

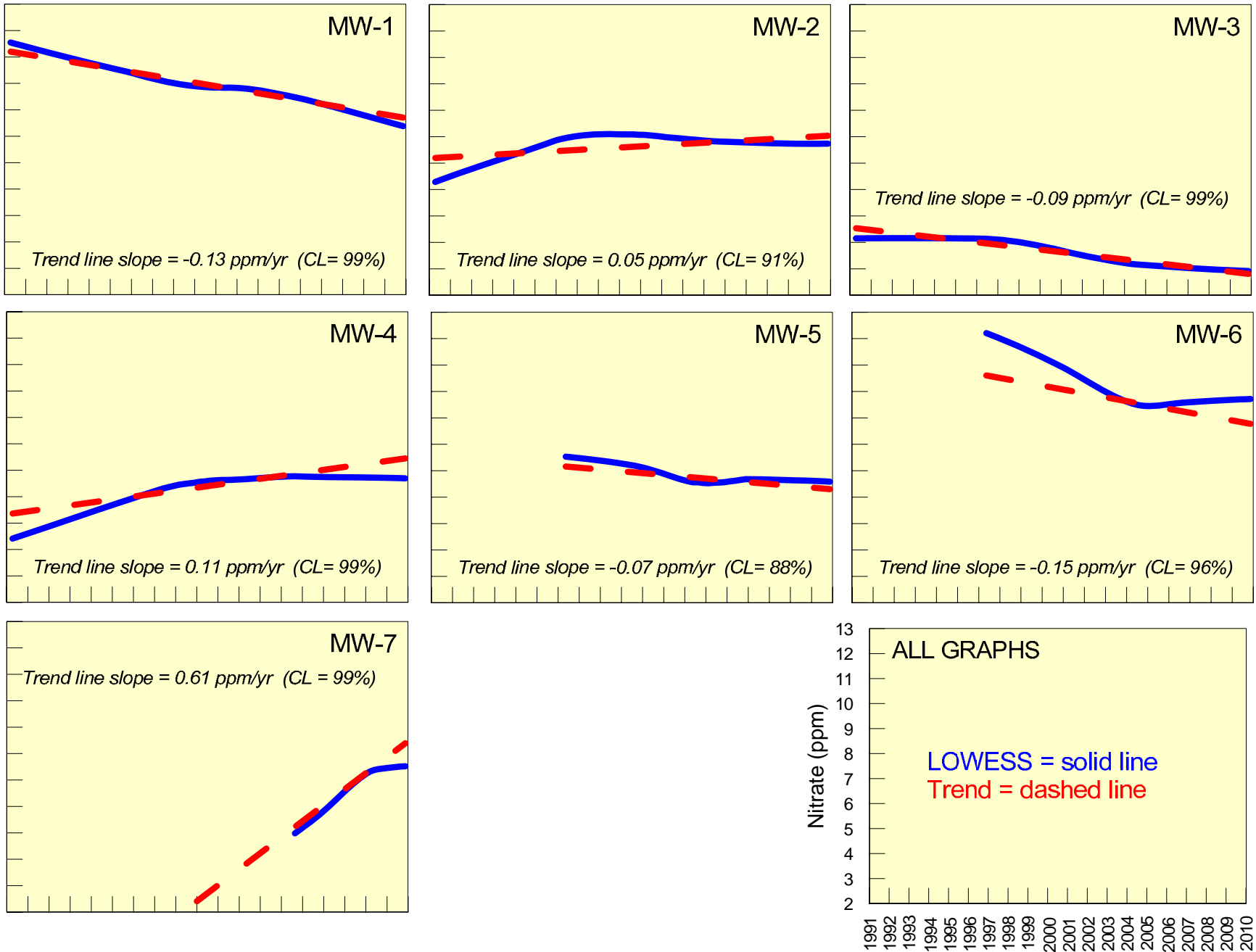


Figure 5-2 Nitrate Trends - Hermiston Foods Site Third Trend Analysis of Food Processor Land Application Sites in the LUB GWMA

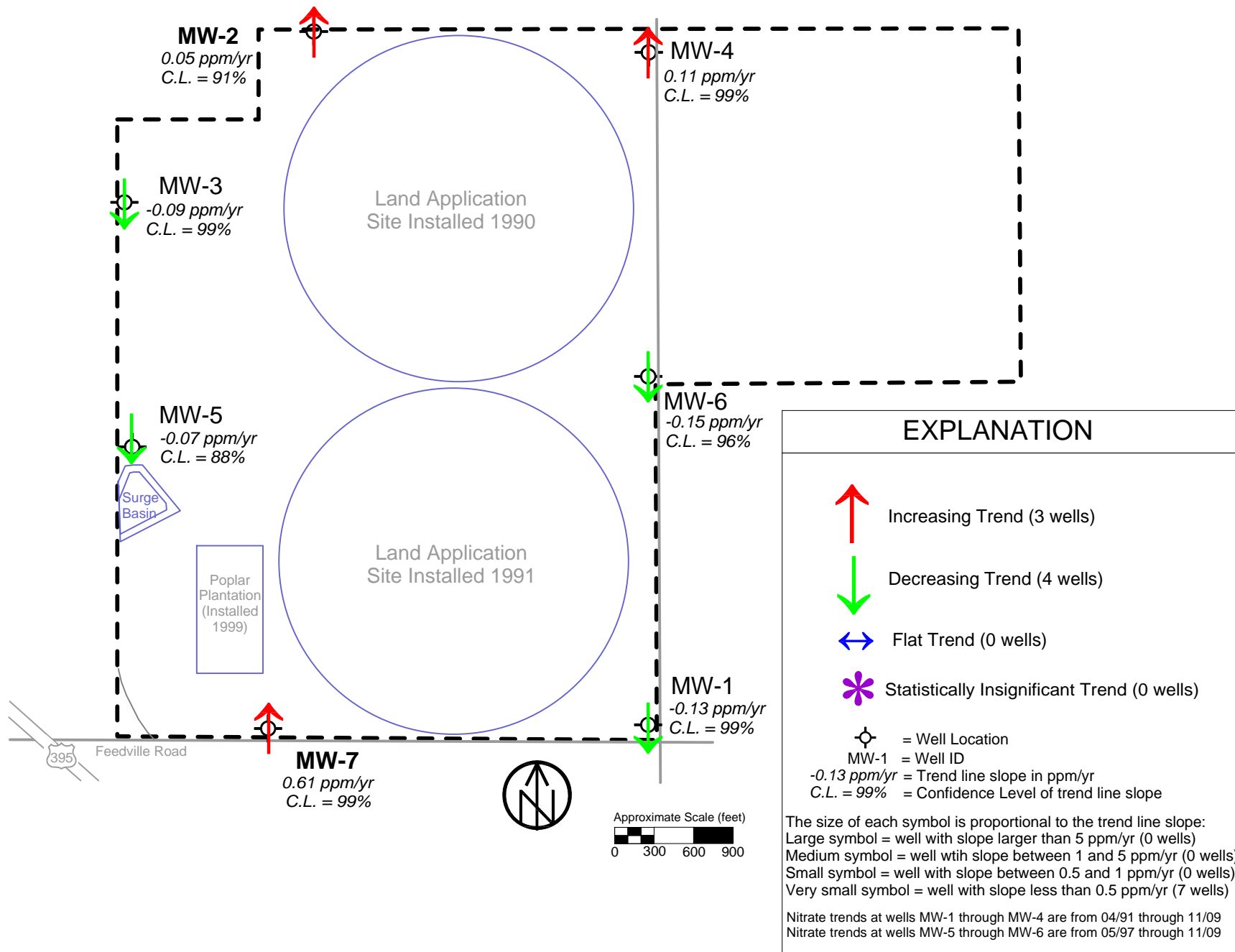


Figure 5-3
Average Nitrate Concentrations - Hermiston Foods Site
Third Trend Analysis of Food Processor Land Application Sites in the LUB GWMA

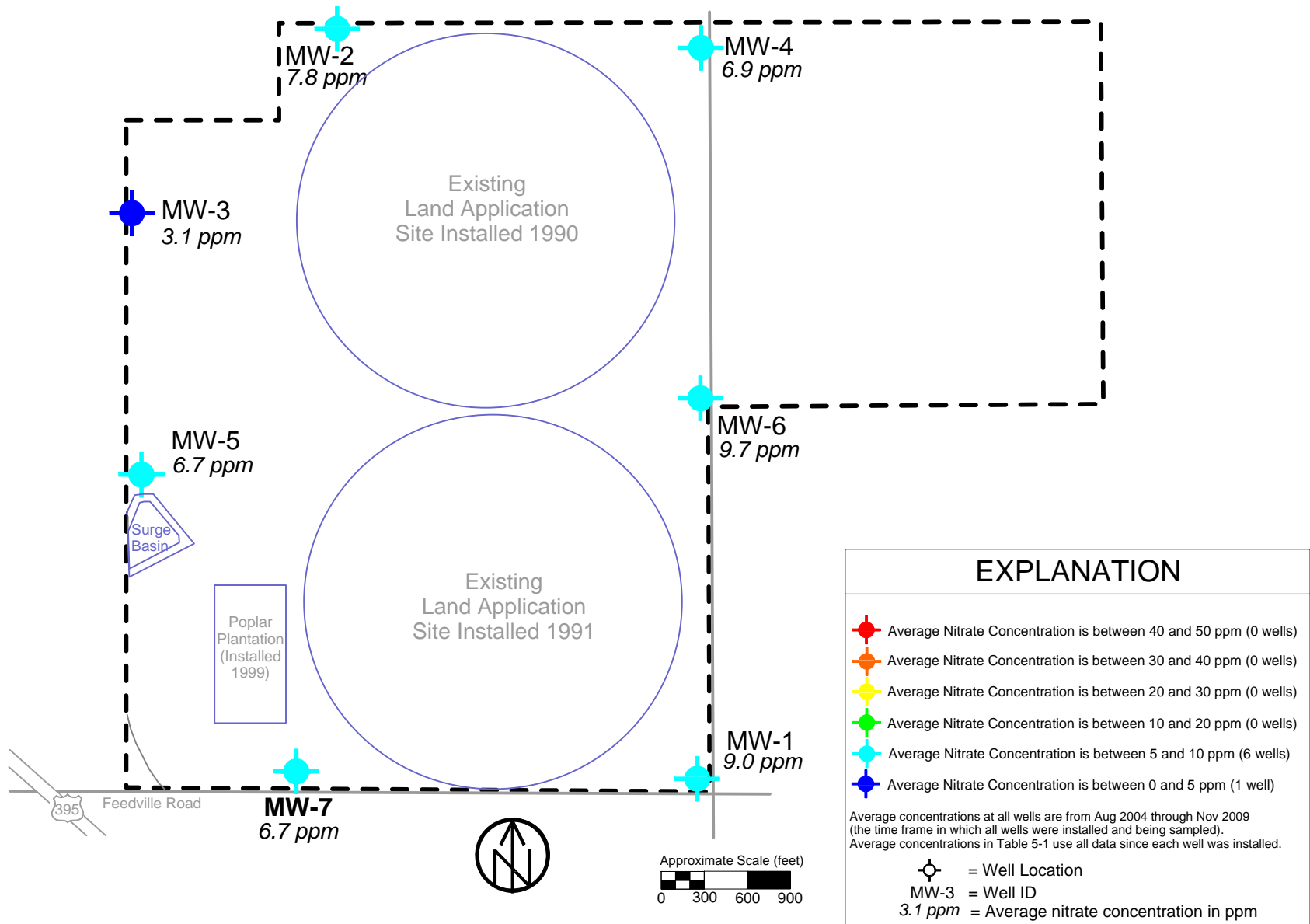
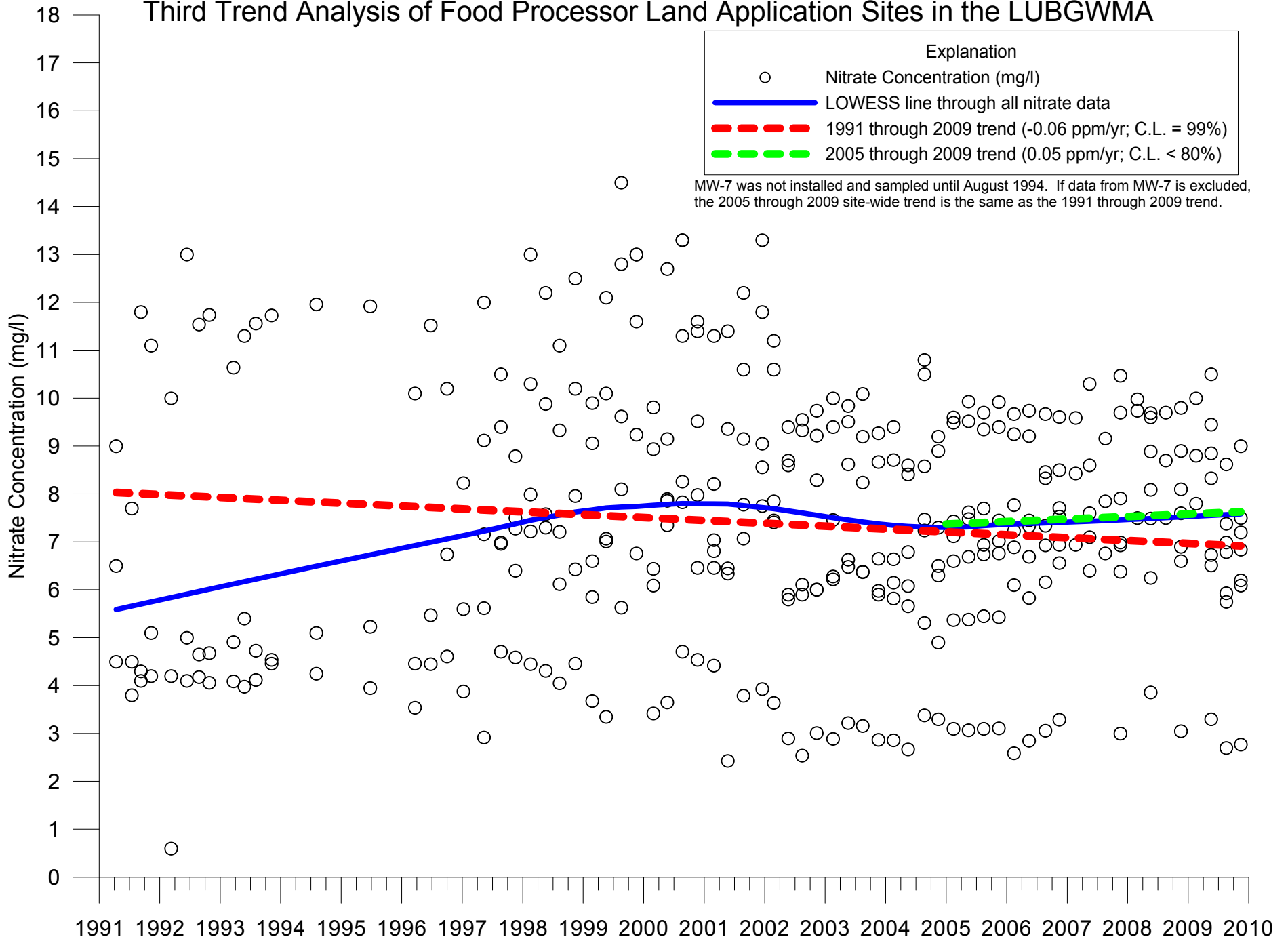


Figure 5-4
 Site-Wide Trends - Hermiston Foods Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



Explanation

- Nitrate Concentration (mg/l)
- LOWESS line through all nitrate data
- - - 1991 through 2009 trend (-0.06 ppm/yr; C.L. = 99%)
- - - 2005 through 2009 trend (0.05 ppm/yr; C.L. < 80%)

MW-7 was not installed and sampled until August 1994. If data from MW-7 is excluded, the 2005 through 2009 site-wide trend is the same as the 1991 through 2009 trend.

Figure 5-5

Upgradient vs. Downgradient Nitrate Comparisons - Hermiston Foods
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

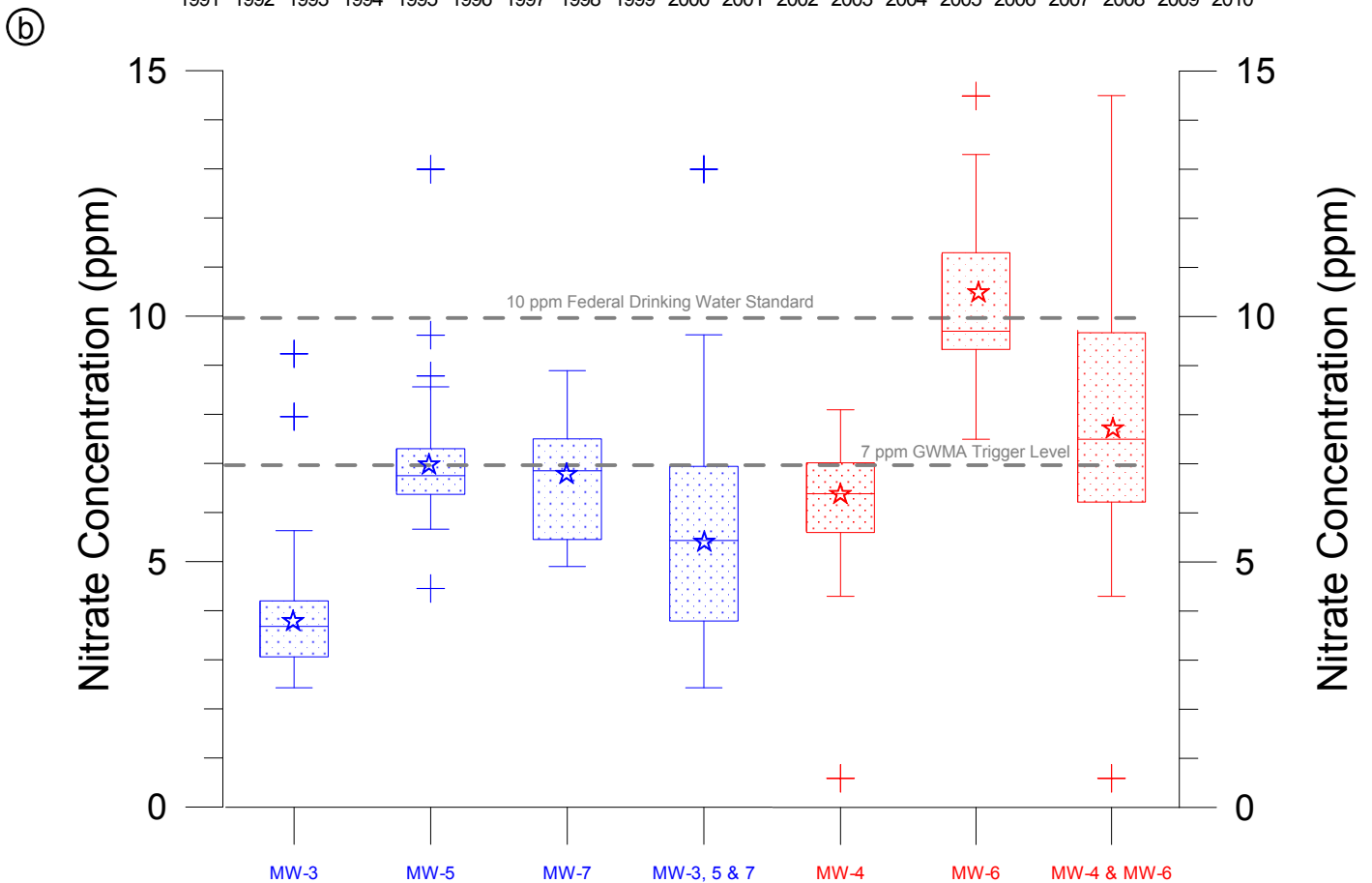
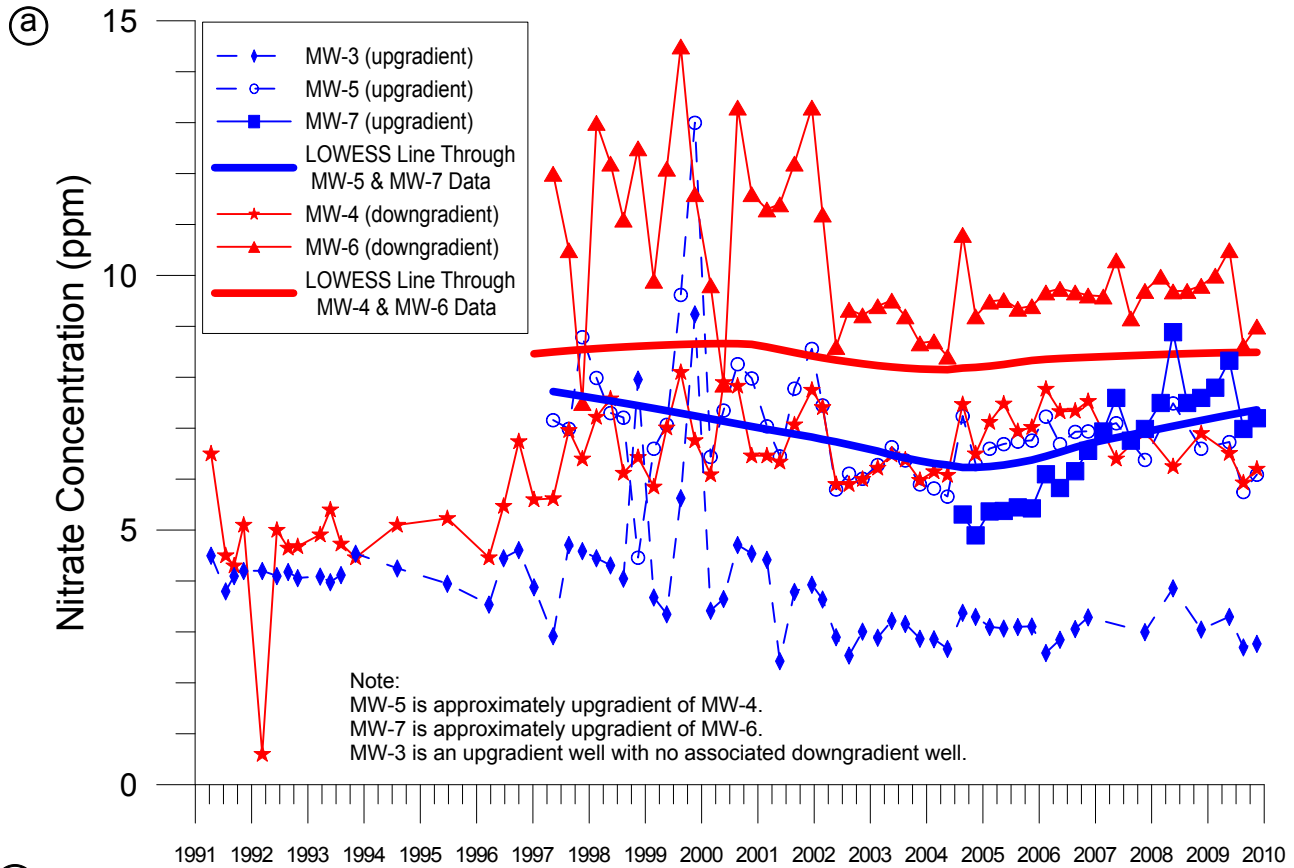


Figure 6-1
 LOWESS Lines and Trend Lines Through Nitrate Data - MorStarch Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

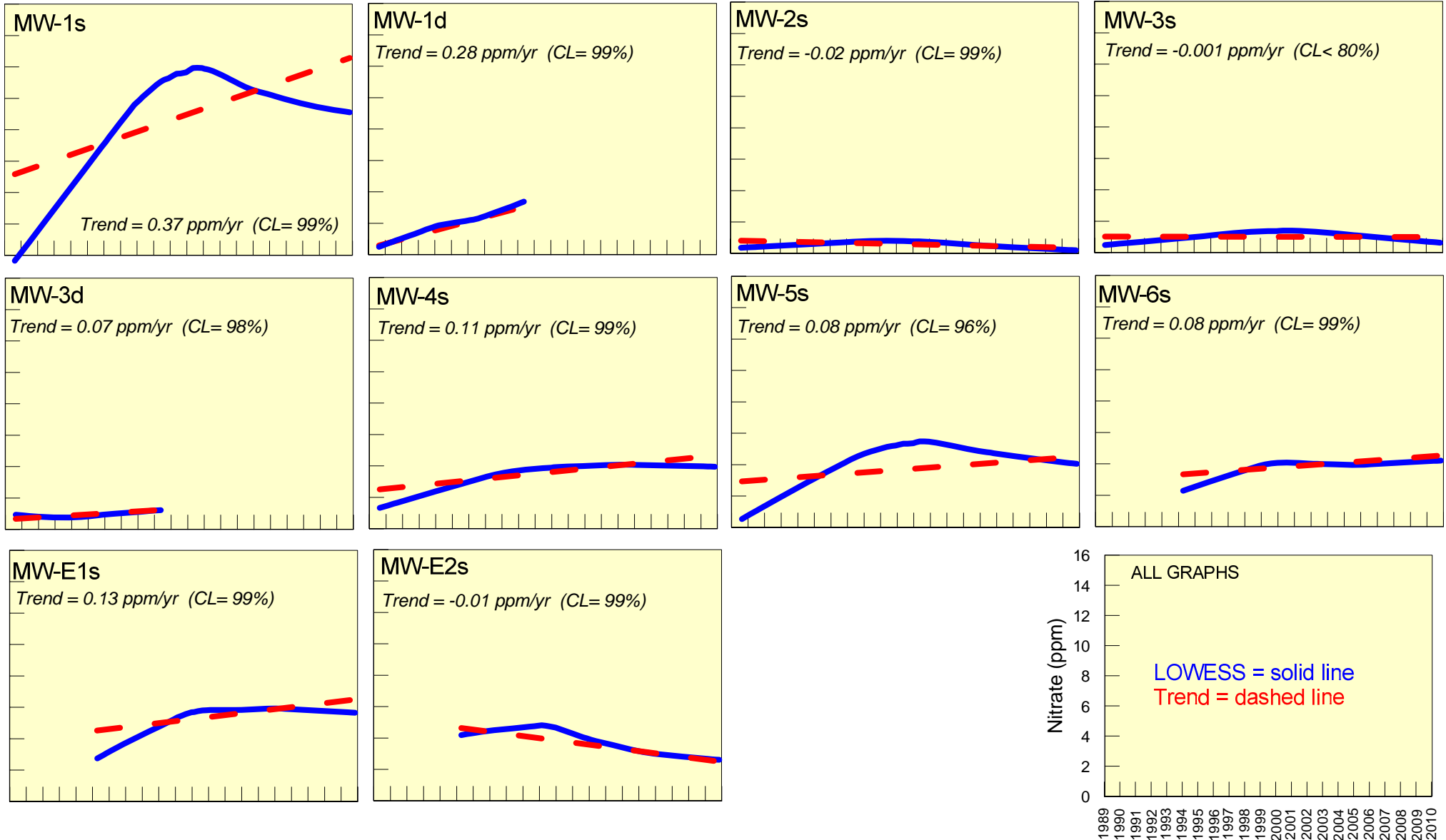
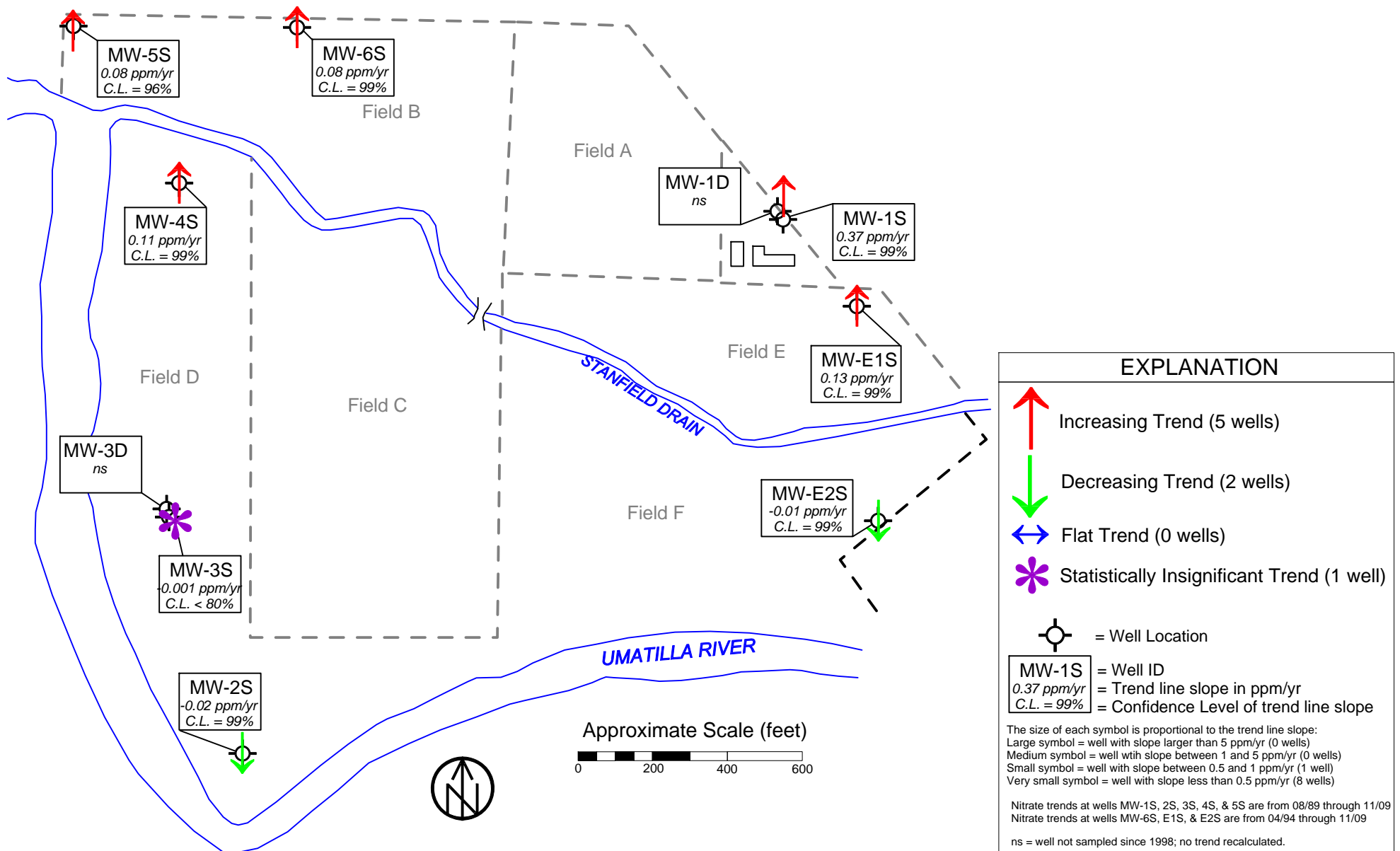
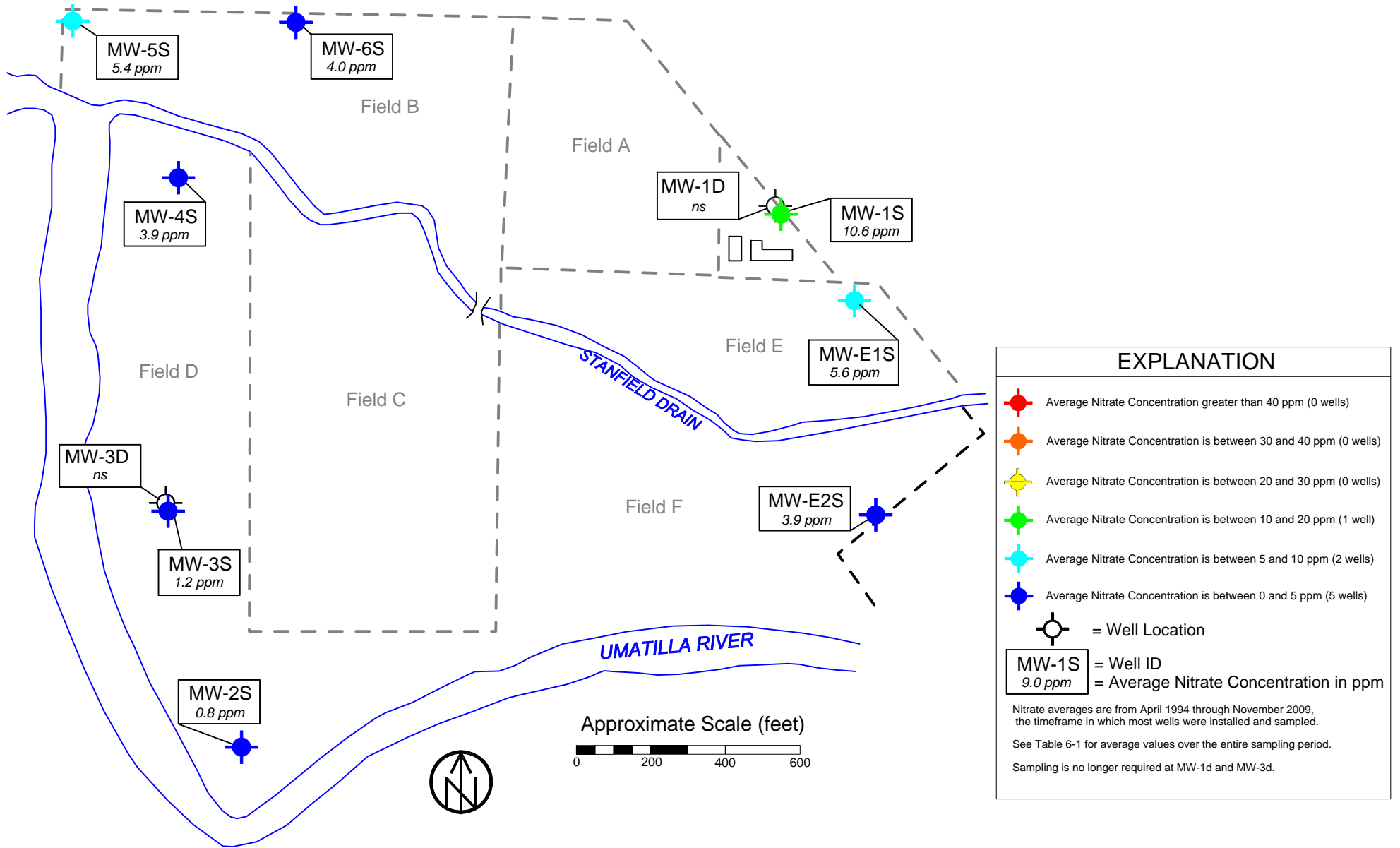


Figure 6-2 Nitrate Trends - MorStarch Site Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



| EXPLANATION | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| | Increasing Trend (5 wells) |
| | Decreasing Trend (2 wells) |
| | Flat Trend (0 wells) |
| | Statistically Insignificant Trend (1 well) |
| | = Well Location |
| MW-1S | = Well ID |
| 0.37 ppm/yr | = Trend line slope in ppm/yr |
| C.L. = 99% | = Confidence Level of trend line slope |
| <p>The size of each symbol is proportional to the trend line slope: Large symbol = well with slope larger than 5 ppm/yr (0 wells) Medium symbol = well with slope between 1 and 5 ppm/yr (0 wells) Small symbol = well with slope between 0.5 and 1 ppm/yr (1 well) Very small symbol = well with slope less than 0.5 ppm/yr (8 wells)</p> | |
| <p>Nitrate trends at wells MW-1S, 2S, 3S, 4S, & 5S are from 08/89 through 11/09 Nitrate trends at wells MW-6S, E1S, & E2S are from 04/94 through 11/09</p> | |
| <p>ns = well not sampled since 1998; no trend recalculated.</p> | |

Figure 6-3
Average Nitrate Concentrations - MorStarch Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA



| EXPLANATION | |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| | Average Nitrate Concentration greater than 40 ppm (0 wells) |
| | Average Nitrate Concentration is between 30 and 40 ppm (0 wells) |
| | Average Nitrate Concentration is between 20 and 30 ppm (0 wells) |
| | Average Nitrate Concentration is between 10 and 20 ppm (1 well) |
| | Average Nitrate Concentration is between 5 and 10 ppm (2 wells) |
| | Average Nitrate Concentration is between 0 and 5 ppm (5 wells) |
| | = Well Location |
| | = Well ID = Average Nitrate Concentration in ppm |
| Nitrate averages are from April 1994 through November 2009, the timeframe in which most wells were installed and sampled. | |
| See Table 6-1 for average values over the entire sampling period. | |
| Sampling is no longer required at MW-1d and MW-3d. | |

Figure 6-4
Site-Wide Trends - MorStarch Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

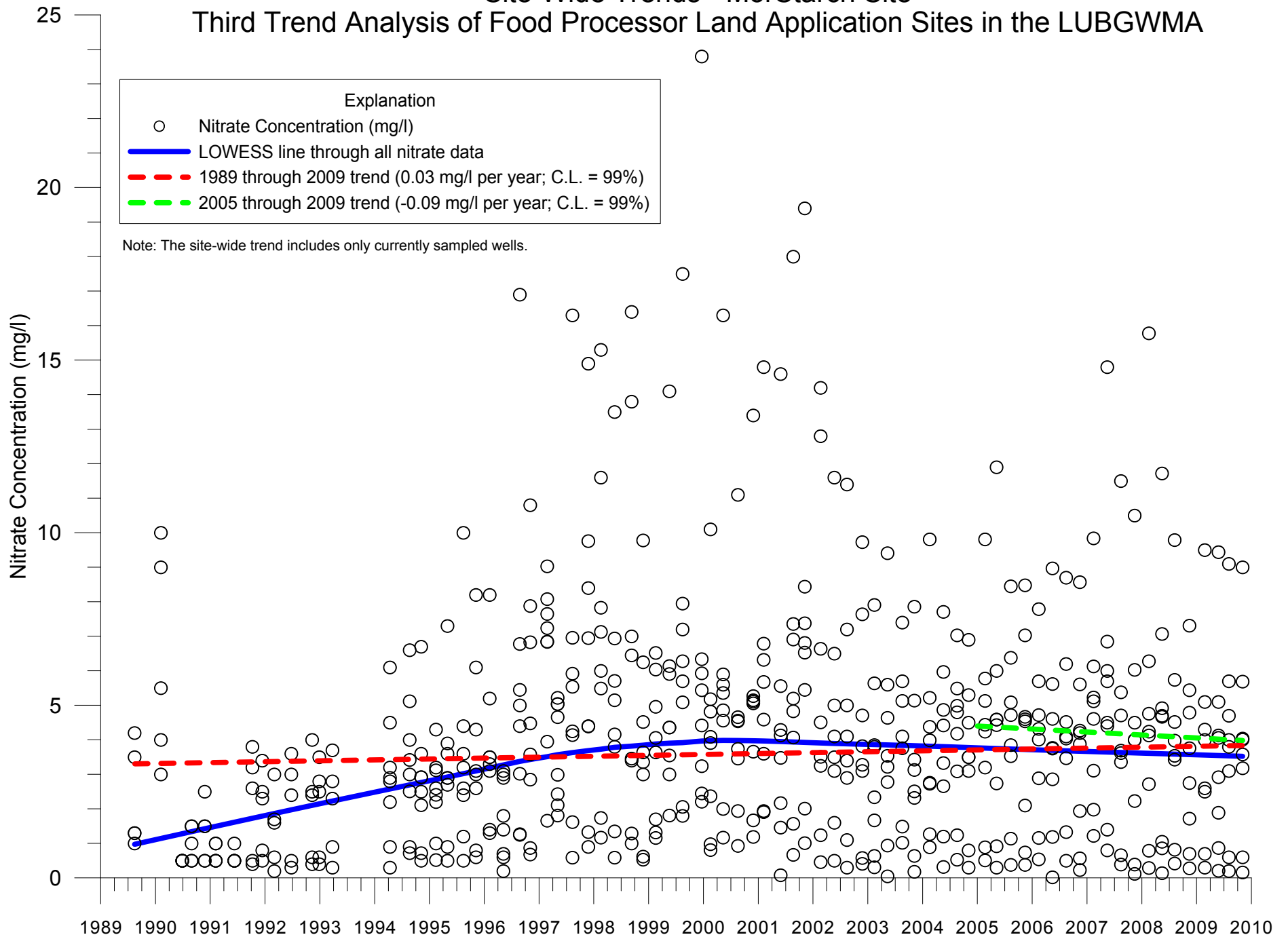


Figure 6-5

Upgradient vs. Downgradient Nitrate Comparisons - MorStarch Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

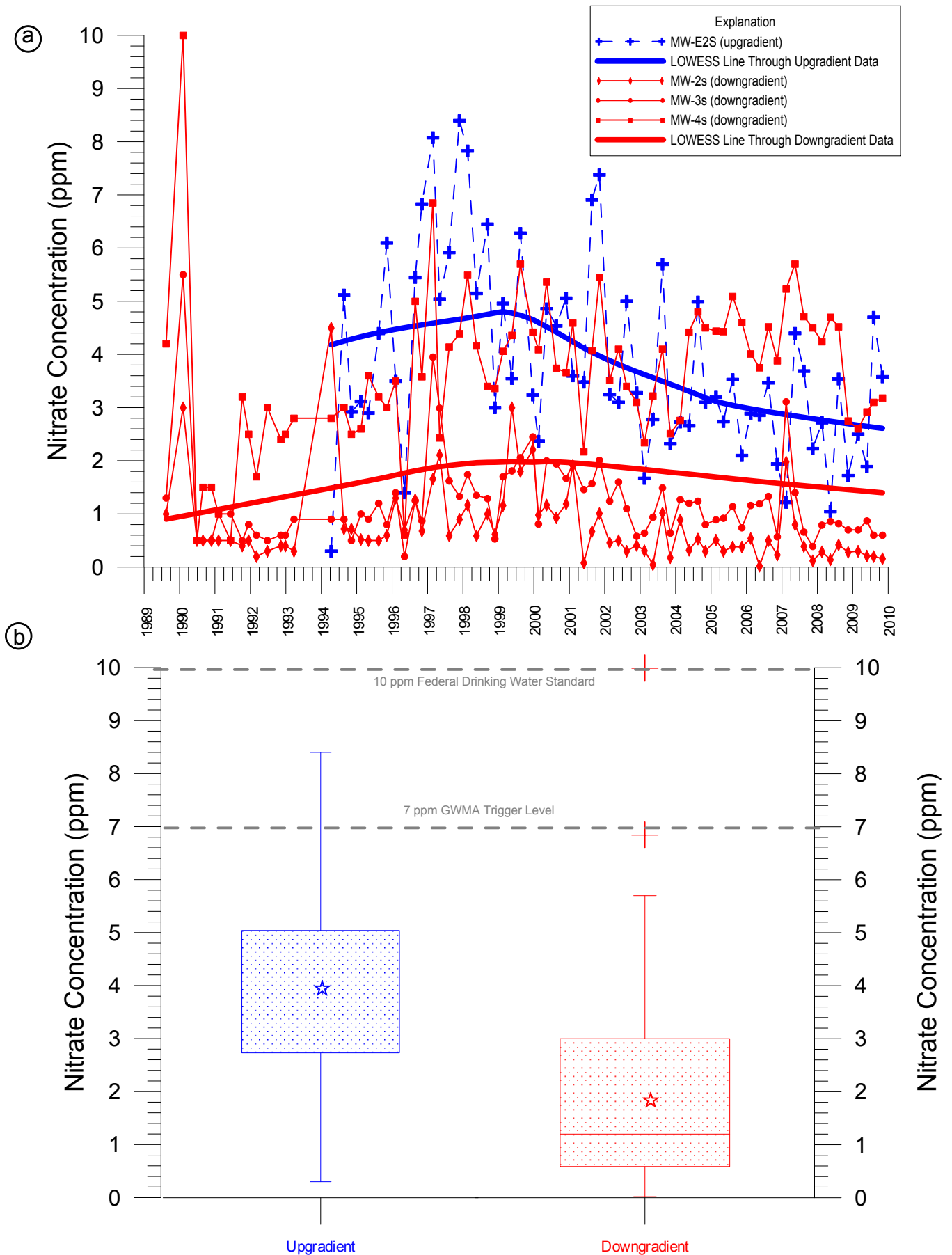


Figure 7-1
 LOWESS Lines and Trend Lines Through Nitrate Data - Snack Alliance Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUB GWMA

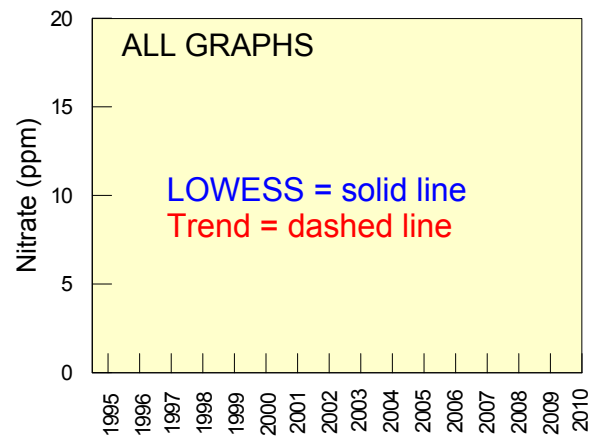
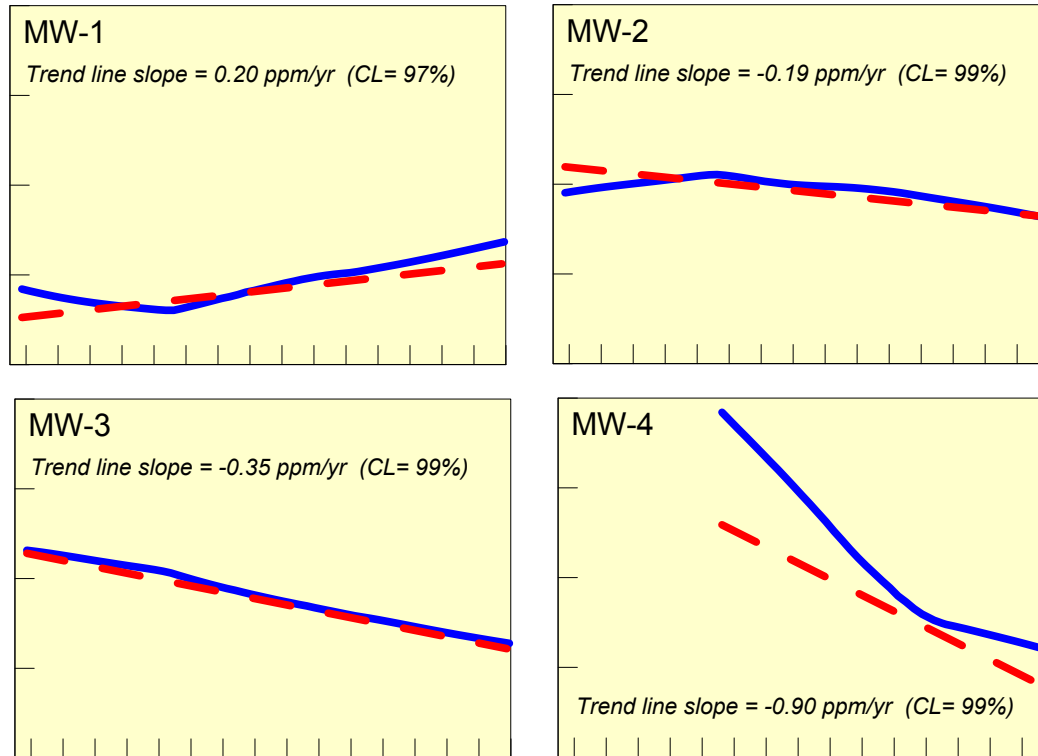


Figure 7-2
 Nitrate Trends - Snack Alliance Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

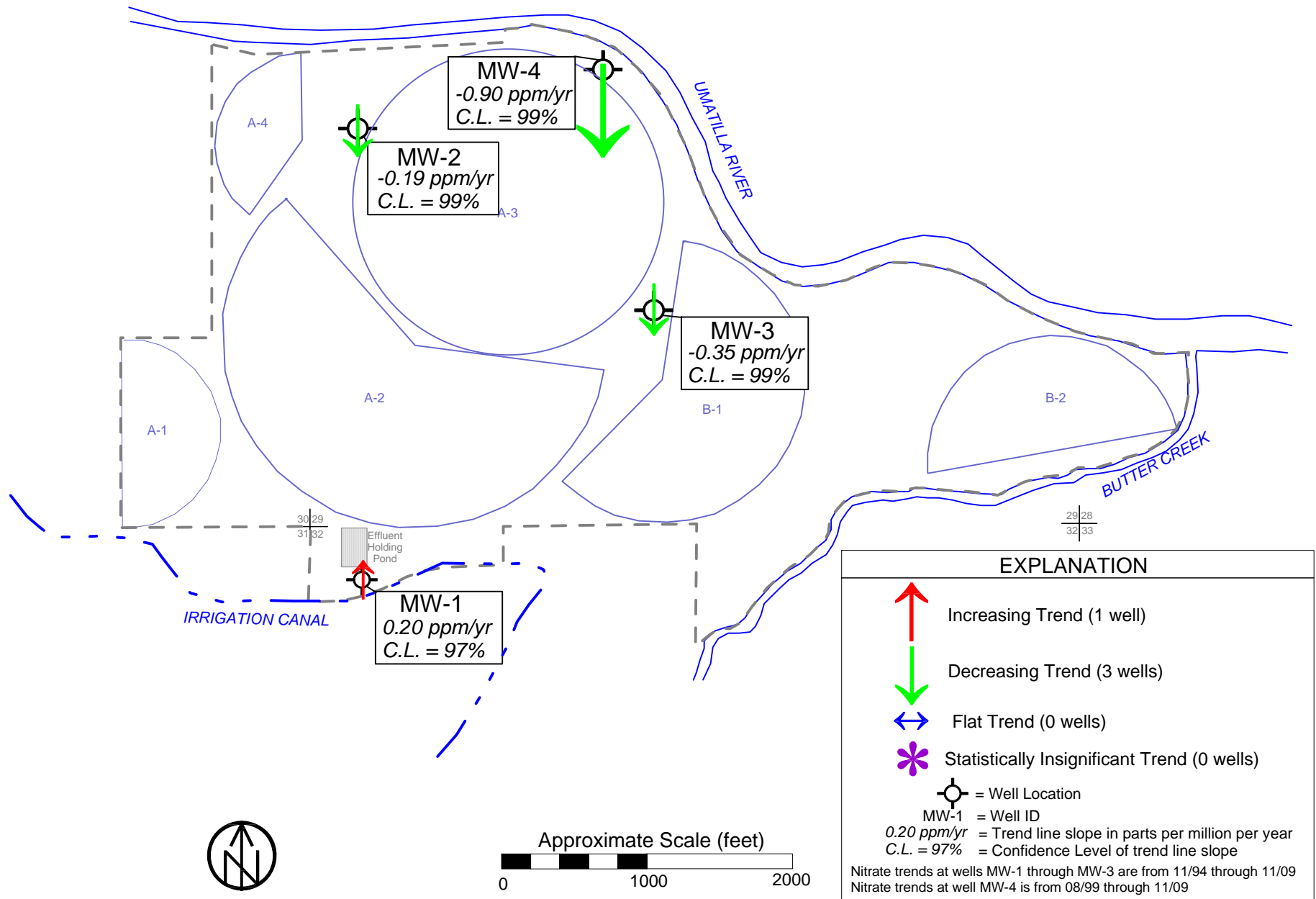


Figure 7-3
Average Nitrate Concentrations - Snack Alliance Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

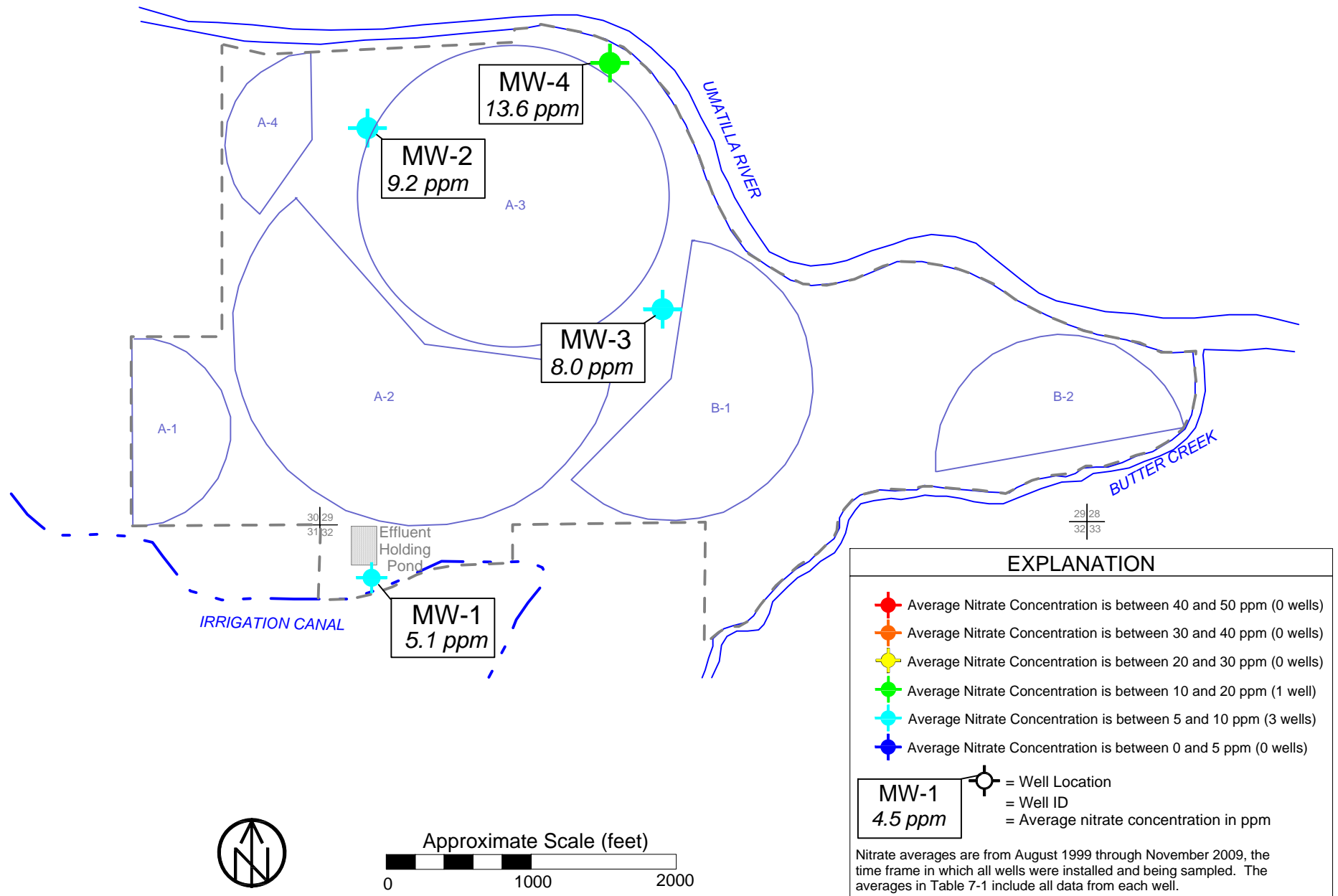


Figure 7-4
 Site-Wide Trends - Snack Alliance Site
 Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

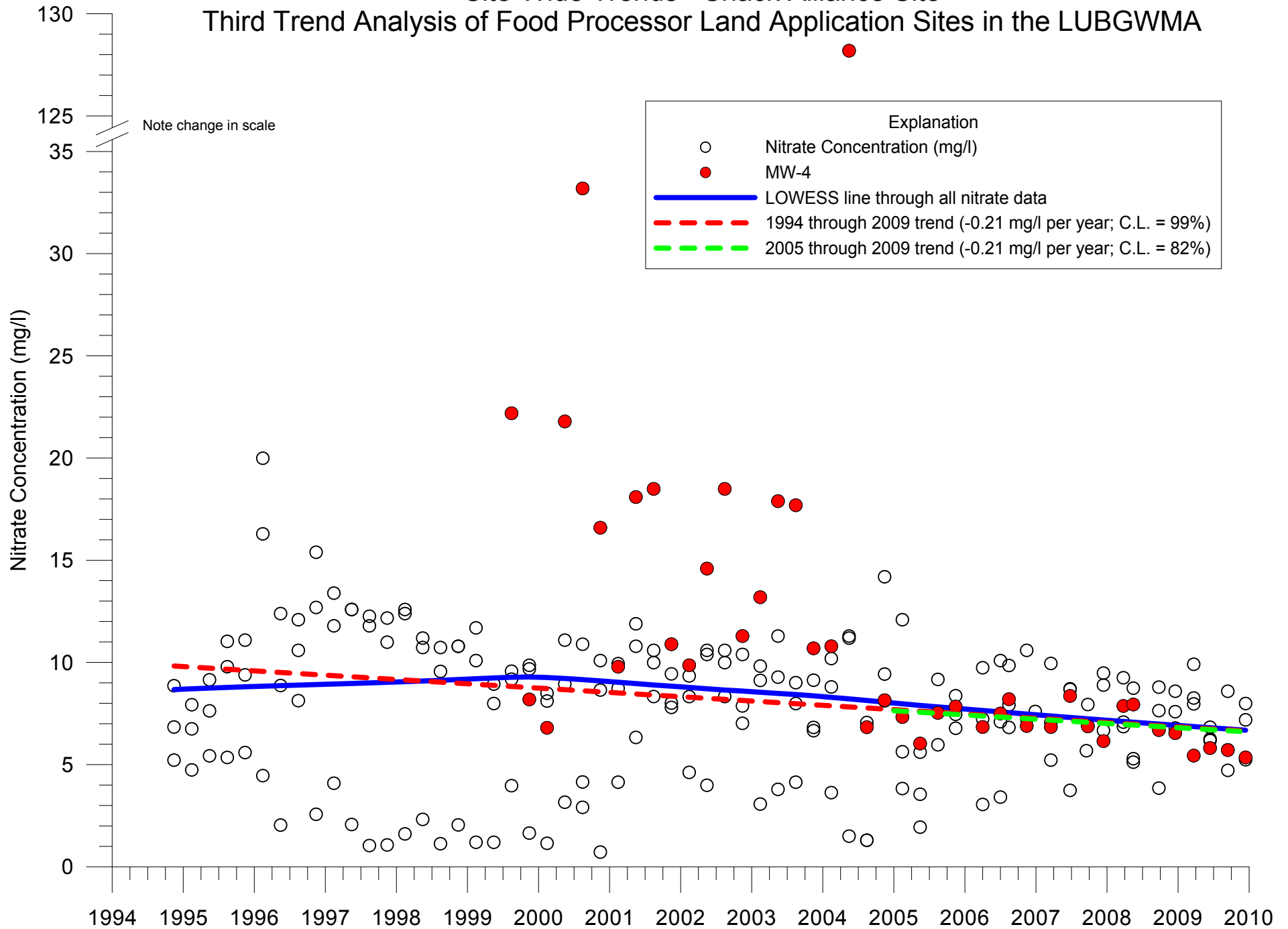


Figure 7-5

Upgradient vs. Downgradient Nitrate Comparisons - Snack Alliance Site
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

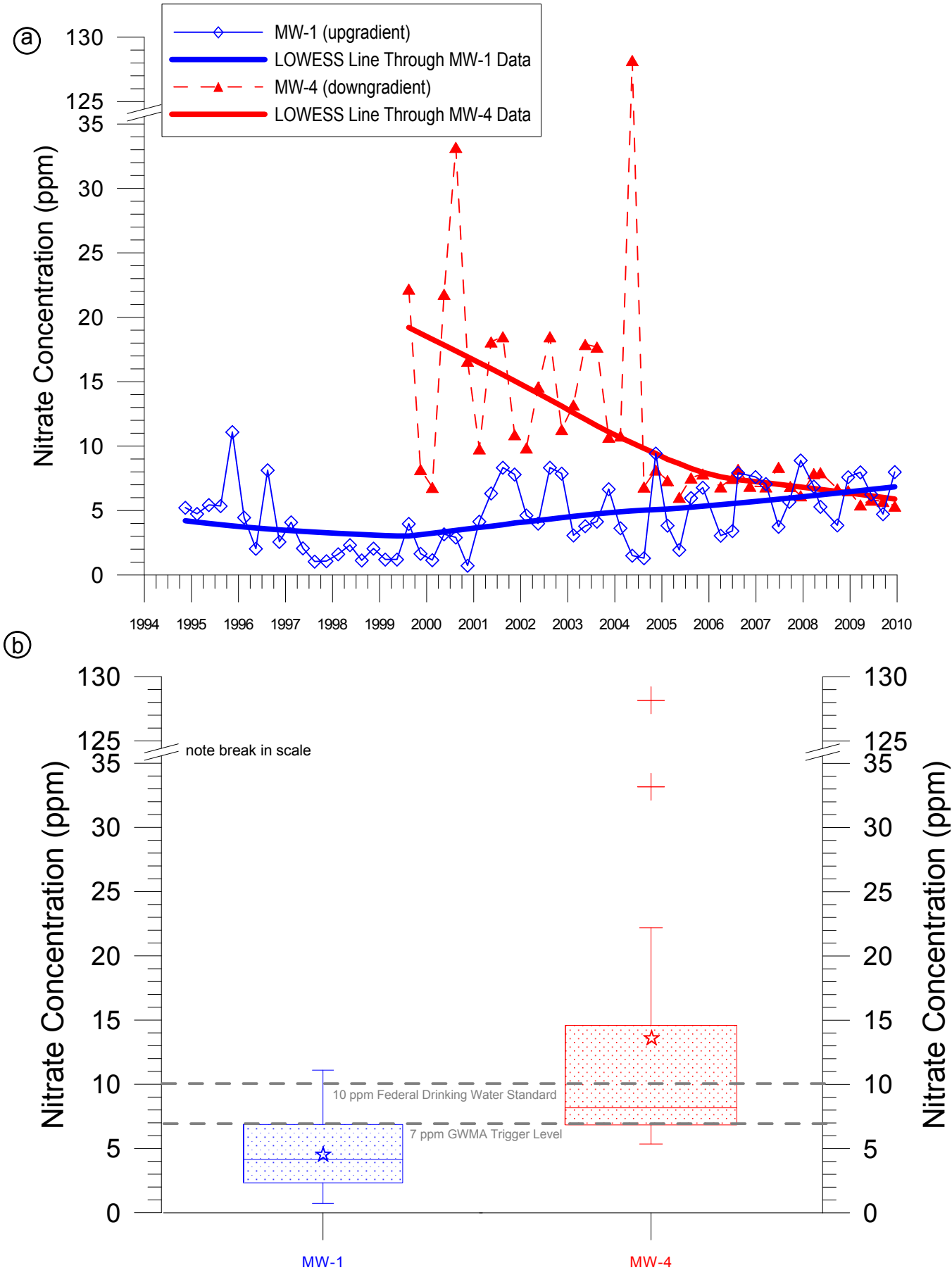


Figure 8-1
Summary of All Trends

Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

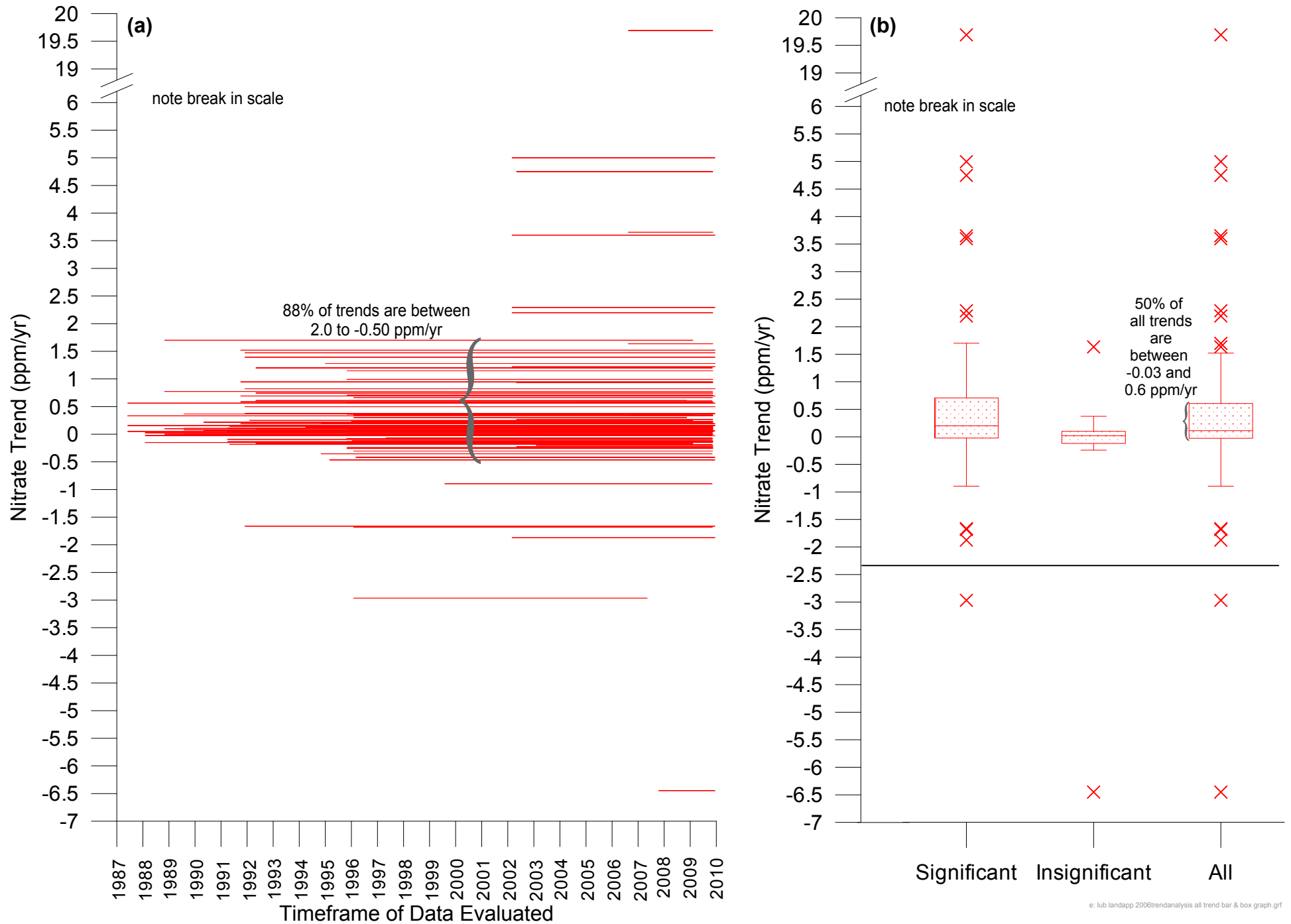


Figure 8-2
Trends at Wells Analyzed Three Times
Third Trend Analysis of Food Processor Land Application Sites in the LUBGWMA

