**BONWR analysis March 3, 2011**

**PROC** **MIXED** data=MvNitrateBO;

CLASS collmo mpres;

MODEL nitratio = collmo mpres collmo\*mpres;

repeated collmo/sub = plotid type = un rcorr;

lsmeans collmo mpres collmo\*mpres/pdiff adjust=tukey;

|  |
| --- |
| ***The Mixed Procedure*** |

| **Model Information** | |
| --- | --- |
| **Data Set** | WORK.MVNITRATEBO |
| **Dependent Variable** | nitratio |
| **Covariance Structure** | Unstructured |
| **Subject Effect** | plotid |
| **Estimation Method** | REML |
| **Residual Variance Method** | None |
| **Fixed Effects SE Method** | Model-Based |
| **Degrees of Freedom Method** | Between-Within |

| **Class Level Information** | | |
| --- | --- | --- |
| **Class** | **Levels** | **Values** |
| **collmo** | 3 | Jul Mar Sep |
| **mpres** | 2 | M N |

| **Dimensions** | |
| --- | --- |
| **Covariance Parameters** | 6 |
| **Columns in X** | 12 |
| **Columns in Z** | 0 |
| **Subjects** | 100 |
| **Max Obs Per Subject** | 1 |

| **Number of Observations** | |
| --- | --- |
| **Number of Observations Read** | 100 |
| **Number of Observations Used** | 100 |
| **Number of Observations Not Used** | 0 |

| **Iteration History** | | | |
| --- | --- | --- | --- |
| **Iteration** | **Evaluations** | **-2 Res Log Like** | **Criterion** |
| **0** | 1 | 76.81057300 |  |
| **1** | 1 | 69.50329026 | 0.00000000 |

|  |
| --- |
| Convergence criteria met but final hessian is not positive definite. |

| **Estimated R Correlation Matrix for Subject 1** | |
| --- | --- |
| **Row** | **Col1** |
| **1** | 1.0000 |

| **Covariance Parameter Estimates** | | |
| --- | --- | --- |
| **Cov Parm** | **Subject** | **Estimate** |
| **UN(1,1)** | plotid | 0.1077 |
| **UN(2,1)** | plotid | 0 |
| **UN(2,2)** | plotid | 0.2030 |
| **UN(3,1)** | plotid | 0 |
| **UN(3,2)** | plotid | 0 |
| **UN(3,3)** | plotid | 0.07127 |

| **Fit Statistics** | |
| --- | --- |
| **-2 Res Log Likelihood** | 69.5 |
| **AIC (smaller is better)** | 81.5 |
| **AICC (smaller is better)** | 82.5 |
| **BIC (smaller is better)** | 97.1 |

| **Null Model Likelihood Ratio Test** | | |
| --- | --- | --- |
| **DF** | **Chi-Square** | **Pr > ChiSq** |
| 5 | 7.31 | 0.1988 |

| **Type 3 Tests of Fixed Effects** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **collmo** | 2 | 94 | 0.40 | 0.6713 |
| **mpres** | 1 | 94 | 11.65 | 0.0009 |
| **collmo\*mpres** | 2 | 94 | 0.05 | 0.9490 |

| **Least Squares Means** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mpres** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| **collmo** | Jul |  | 0.5706 | 0.05189 | 94 | 11.00 | <.0001 |
| **collmo** | Mar |  | 0.5485 | 0.1056 | 94 | 5.19 | <.0001 |
| **collmo** | Sep |  | 0.6212 | 0.04221 | 94 | 14.72 | <.0001 |
| **mpres** |  | M | 0.7223 | 0.06494 | 94 | 11.12 | <.0001 |
| **mpres** |  | N | 0.4378 | 0.05225 | 94 | 8.38 | <.0001 |
| **collmo\*mpres** | Jul | M | 0.7267 | 0.07338 | 94 | 9.90 | <.0001 |
| **collmo\*mpres** | Jul | N | 0.4144 | 0.07338 | 94 | 5.65 | <.0001 |
| **collmo\*mpres** | Mar | M | 0.6670 | 0.1703 | 94 | 3.92 | 0.0002 |
| **collmo\*mpres** | Mar | N | 0.4299 | 0.1250 | 94 | 3.44 | 0.0009 |
| **collmo\*mpres** | Sep | M | 0.7733 | 0.05969 | 94 | 12.95 | <.0001 |
| **collmo\*mpres** | Sep | N | 0.4692 | 0.05969 | 94 | 7.86 | <.0001 |

| **Differences of Least Squares Means** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mpres** | **collmo** | **mpres** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** | **Adjustment** | **Adj P** |
| **collmo** | Jul |  | Mar |  | 0.02211 | 0.1177 | 94 | 0.19 | 0.8514 | Tukey-Kramer | 0.9807 |
| **collmo** | Jul |  | Sep |  | -0.05069 | 0.06689 | 94 | -0.76 | 0.4505 | Tukey-Kramer | 0.7297 |
| **collmo** | Mar |  | Sep |  | -0.07280 | 0.1137 | 94 | -0.64 | 0.5237 | Tukey-Kramer | 0.7984 |
| **mpres** |  | M |  | N | 0.2845 | 0.08335 | 94 | 3.41 | 0.0009 | Tukey-Kramer | 0.0009 |
| **collmo\*mpres** | Jul | M | Jul | N | 0.3123 | 0.1038 | 94 | 3.01 | 0.0034 | Tukey-Kramer | 0.0383 |
| **collmo\*mpres** | Jul | M | Mar | M | 0.05969 | 0.1854 | 94 | 0.32 | 0.7482 | Tukey-Kramer | 0.9995 |
| **collmo\*mpres** | Jul | M | Mar | N | 0.2968 | 0.1449 | 94 | 2.05 | 0.0434 | Tukey-Kramer | 0.3238 |
| **collmo\*mpres** | Jul | M | Sep | M | -0.04664 | 0.09459 | 94 | -0.49 | 0.6231 | Tukey-Kramer | 0.9963 |
| **collmo\*mpres** | Jul | M | Sep | N | 0.2575 | 0.09459 | 94 | 2.72 | 0.0077 | Tukey-Kramer | 0.0803 |
| **collmo\*mpres** | Jul | N | Mar | M | -0.2526 | 0.1854 | 94 | -1.36 | 0.1765 | Tukey-Kramer | 0.7494 |
| **collmo\*mpres** | Jul | N | Mar | N | -0.01547 | 0.1449 | 94 | -0.11 | 0.9152 | Tukey-Kramer | 1.0000 |
| **collmo\*mpres** | Jul | N | Sep | M | -0.3589 | 0.09459 | 94 | -3.79 | 0.0003 | Tukey-Kramer | 0.0035 |
| **collmo\*mpres** | Jul | N | Sep | N | -0.05473 | 0.09459 | 94 | -0.58 | 0.5643 | Tukey-Kramer | 0.9922 |
| **collmo\*mpres** | Mar | M | Mar | N | 0.2371 | 0.2112 | 94 | 1.12 | 0.2646 | Tukey-Kramer | 0.8709 |
| **collmo\*mpres** | Mar | M | Sep | M | -0.1063 | 0.1805 | 94 | -0.59 | 0.5571 | Tukey-Kramer | 0.9915 |
| **collmo\*mpres** | Mar | M | Sep | N | 0.1978 | 0.1805 | 94 | 1.10 | 0.2758 | Tukey-Kramer | 0.8817 |
| **collmo\*mpres** | Mar | N | Sep | M | -0.3434 | 0.1385 | 94 | -2.48 | 0.0149 | Tukey-Kramer | 0.1407 |
| **collmo\*mpres** | Mar | N | Sep | N | -0.03925 | 0.1385 | 94 | -0.28 | 0.7775 | Tukey-Kramer | 0.9997 |
| **collmo\*mpres** | Sep | M | Sep | N | 0.3042 | 0.08442 | 94 | 3.60 | 0.0005 | Tukey-Kramer | 0.0065 |

**Bayles Rd analysis March 3, 2011**

**PROC** **MIXED** data=MvNitrateBay;

CLASS collmo mvtrt;

MODEL nh4d = collmo mvtrt collmo\*mvtrt;

repeated collmo/sub = plotid type = un rcorr;

lsmeans collmo mvtrt collmo\*mvtrt/pdiff adjust=tukey;

**PROC** **MIXED** data=MvNitrateBay;

CLASS collmo mvtrt;

MODEL no3d = collmo mvtrt collmo\*mvtrt;

repeated collmo/sub = plotid type = un rcorr;

lsmeans collmo mvtrt collmo\*mvtrt/pdiff adjust=tukey;

**PROC** **MIXED** data=MvNitrateBay;

CLASS collmo mvtrt;

MODEL nitrifd = collmo mvtrt collmo\*mvtrt;

repeated collmo/sub = plotid type = un rcorr;

lsmeans collmo mvtrt collmo\*mvtrt/pdiff adjust=tukey;

**PROC** **MIXED** data=MvNitrateBay;

CLASS collmo mvtrt;

MODEL nitratio = collmo mvtrt collmo\*mvtrt;

repeated collmo/sub = plotid type = un rcorr;

lsmeans collmo mvtrt collmo\*mvtrt/pdiff adjust=tukey;

|  |
| --- |
| ***The Mixed Procedure*** |

| **Model Information** | |
| --- | --- |
| **Data Set** | WORK.MVNITRATEBAY |
| **Dependent Variable** | nh4d |
| **Covariance Structure** | Unstructured |
| **Subject Effect** | plotid |
| **Estimation Method** | REML |
| **Residual Variance Method** | None |
| **Fixed Effects SE Method** | Model-Based |
| **Degrees of Freedom Method** | Between-Within |

| **Class Level Information** | | |
| --- | --- | --- |
| **Class** | **Levels** | **Values** |
| **collmo** | 4 | July June May Sept |
| **mvtrt** | 2 | M N |

| **Dimensions** | |
| --- | --- |
| **Covariance Parameters** | 10 |
| **Columns in X** | 15 |
| **Columns in Z** | 0 |
| **Subjects** | 256 |
| **Max Obs Per Subject** | 1 |

| **Number of Observations** | |
| --- | --- |
| **Number of Observations Read** | 257 |
| **Number of Observations Used** | 254 |
| **Number of Observations Not Used** | 3 |

| **Iteration History** | | | |
| --- | --- | --- | --- |
| **Iteration** | **Evaluations** | **-2 Res Log Like** | **Criterion** |
| **0** | 1 | 1710.66531300 |  |
| **1** | 1 | 1669.10967618 | 0.00000000 |

|  |
| --- |
| Convergence criteria met but final hessian is not positive definite. |

| **Estimated R Correlation Matrix for Subject 1** | |
| --- | --- |
| **Row** | **Col1** |
| **1** | 1.0000 |

| **Covariance Parameter Estimates** | | |
| --- | --- | --- |
| **Cov Parm** | **Subject** | **Estimate** |
| **UN(1,1)** | plotid | 15.0393 |
| **UN(2,1)** | plotid | 0 |
| **UN(2,2)** | plotid | 66.7418 |
| **UN(3,1)** | plotid | 0 |
| **UN(3,2)** | plotid | 0 |
| **UN(3,3)** | plotid | 83.0573 |
| **UN(4,1)** | plotid | 0 |
| **UN(4,2)** | plotid | 0 |
| **UN(4,3)** | plotid | 0 |
| **UN(4,4)** | plotid | 53.0599 |

| **Fit Statistics** | |
| --- | --- |
| **-2 Res Log Likelihood** | 1669.1 |
| **AIC (smaller is better)** | 1689.1 |
| **AICC (smaller is better)** | 1690.0 |
| **BIC (smaller is better)** | 1724.6 |

| **Null Model Likelihood Ratio Test** | | |
| --- | --- | --- |
| **DF** | **Chi-Square** | **Pr > ChiSq** |
| 9 | 41.56 | <.0001 |

| **Type 3 Tests of Fixed Effects** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **collmo** | 3 | 246 | 3.75 | 0.0116 |
| **mvtrt** | 1 | 246 | 2.41 | 0.1216 |
| **collmo\*mvtrt** | 3 | 246 | 0.12 | 0.9477 |

| **Least Squares Means** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| **collmo** | July |  | 5.4397 | 0.4928 | 246 | 11.04 | <.0001 |
| **collmo** | June |  | 6.7776 | 1.0212 | 246 | 6.64 | <.0001 |
| **collmo** | May |  | 7.9056 | 1.1392 | 246 | 6.94 | <.0001 |
| **collmo** | Sept |  | 3.4199 | 0.9105 | 246 | 3.76 | 0.0002 |
| **mvtrt** |  | M | 5.1684 | 0.6539 | 246 | 7.90 | <.0001 |
| **mvtrt** |  | N | 6.6030 | 0.6524 | 246 | 10.12 | <.0001 |
| **collmo\*mvtrt** | July | M | 4.4624 | 0.7080 | 246 | 6.30 | <.0001 |
| **collmo\*mvtrt** | July | N | 6.4170 | 0.6855 | 246 | 9.36 | <.0001 |
| **collmo\*mvtrt** | June | M | 5.8861 | 1.4442 | 246 | 4.08 | <.0001 |
| **collmo\*mvtrt** | June | N | 7.6691 | 1.4442 | 246 | 5.31 | <.0001 |
| **collmo\*mvtrt** | May | M | 7.2958 | 1.6111 | 246 | 4.53 | <.0001 |
| **collmo\*mvtrt** | May | N | 8.5154 | 1.6111 | 246 | 5.29 | <.0001 |
| **collmo\*mvtrt** | Sept | M | 3.0292 | 1.2877 | 246 | 2.35 | 0.0194 |
| **collmo\*mvtrt** | Sept | N | 3.8106 | 1.2877 | 246 | 2.96 | 0.0034 |

| **Differences of Least Squares Means** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** | **Adjustment** | **Adj P** |
| **collmo** | July |  | June |  | -1.3379 | 1.1339 | 246 | -1.18 | 0.2392 | Tukey-Kramer | 0.6401 |
| **collmo** | July |  | May |  | -2.4659 | 1.2412 | 246 | -1.99 | 0.0481 | Tukey-Kramer | 0.1958 |
| **collmo** | July |  | Sept |  | 2.0198 | 1.0353 | 246 | 1.95 | 0.0522 | Tukey-Kramer | 0.2097 |
| **collmo** | June |  | May |  | -1.1280 | 1.5299 | 246 | -0.74 | 0.4616 | Tukey-Kramer | 0.8820 |
| **collmo** | June |  | Sept |  | 3.3577 | 1.3682 | 246 | 2.45 | 0.0148 | Tukey-Kramer | 0.0699 |
| **collmo** | May |  | Sept |  | 4.4857 | 1.4584 | 246 | 3.08 | 0.0023 | Tukey-Kramer | 0.0124 |
| **mvtrt** |  | M |  | N | -1.4347 | 0.9236 | 246 | -1.55 | 0.1216 | Tukey-Kramer | 0.1216 |
| **collmo\*mvtrt** | July | M | July | N | -1.9546 | 0.9855 | 246 | -1.98 | 0.0485 | Tukey-Kramer | 0.4953 |
| **collmo\*mvtrt** | July | M | June | M | -1.4237 | 1.6084 | 246 | -0.89 | 0.3769 | Tukey-Kramer | 0.9872 |
| **collmo\*mvtrt** | July | M | June | N | -3.2067 | 1.6084 | 246 | -1.99 | 0.0473 | Tukey-Kramer | 0.4882 |
| **collmo\*mvtrt** | July | M | May | M | -2.8334 | 1.7598 | 246 | -1.61 | 0.1087 | Tukey-Kramer | 0.7439 |
| **collmo\*mvtrt** | July | M | May | N | -4.0530 | 1.7598 | 246 | -2.30 | 0.0221 | Tukey-Kramer | 0.2961 |
| **collmo\*mvtrt** | July | M | Sept | M | 1.4332 | 1.4695 | 246 | 0.98 | 0.3304 | Tukey-Kramer | 0.9775 |
| **collmo\*mvtrt** | July | M | Sept | N | 0.6518 | 1.4695 | 246 | 0.44 | 0.6577 | Tukey-Kramer | 0.9998 |
| **collmo\*mvtrt** | July | N | June | M | 0.5309 | 1.5986 | 246 | 0.33 | 0.7401 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | July | N | June | N | -1.2522 | 1.5986 | 246 | -0.78 | 0.4342 | Tukey-Kramer | 0.9938 |
| **collmo\*mvtrt** | July | N | May | M | -0.8788 | 1.7509 | 246 | -0.50 | 0.6162 | Tukey-Kramer | 0.9996 |
| **collmo\*mvtrt** | July | N | May | N | -2.0985 | 1.7509 | 246 | -1.20 | 0.2319 | Tukey-Kramer | 0.9318 |
| **collmo\*mvtrt** | July | N | Sept | M | 3.3877 | 1.4588 | 246 | 2.32 | 0.0210 | Tukey-Kramer | 0.2858 |
| **collmo\*mvtrt** | July | N | Sept | N | 2.6064 | 1.4588 | 246 | 1.79 | 0.0752 | Tukey-Kramer | 0.6297 |
| **collmo\*mvtrt** | June | M | June | N | -1.7831 | 2.0424 | 246 | -0.87 | 0.3835 | Tukey-Kramer | 0.9882 |
| **collmo\*mvtrt** | June | M | May | M | -1.4097 | 2.1636 | 246 | -0.65 | 0.5153 | Tukey-Kramer | 0.9981 |
| **collmo\*mvtrt** | June | M | May | N | -2.6293 | 2.1636 | 246 | -1.22 | 0.2254 | Tukey-Kramer | 0.9268 |
| **collmo\*mvtrt** | June | M | Sept | M | 2.8568 | 1.9349 | 246 | 1.48 | 0.1411 | Tukey-Kramer | 0.8193 |
| **collmo\*mvtrt** | June | M | Sept | N | 2.0755 | 1.9349 | 246 | 1.07 | 0.2845 | Tukey-Kramer | 0.9619 |
| **collmo\*mvtrt** | June | N | May | M | 0.3733 | 2.1636 | 246 | 0.17 | 0.8631 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | June | N | May | N | -0.8463 | 2.1636 | 246 | -0.39 | 0.6960 | Tukey-Kramer | 0.9999 |
| **collmo\*mvtrt** | June | N | Sept | M | 4.6399 | 1.9349 | 246 | 2.40 | 0.0172 | Tukey-Kramer | 0.2470 |
| **collmo\*mvtrt** | June | N | Sept | N | 3.8586 | 1.9349 | 246 | 1.99 | 0.0472 | Tukey-Kramer | 0.4879 |
| **collmo\*mvtrt** | May | M | May | N | -1.2196 | 2.2784 | 246 | -0.54 | 0.5929 | Tukey-Kramer | 0.9995 |
| **collmo\*mvtrt** | May | M | Sept | M | 4.2666 | 2.0624 | 246 | 2.07 | 0.0396 | Tukey-Kramer | 0.4382 |
| **collmo\*mvtrt** | May | M | Sept | N | 3.4852 | 2.0624 | 246 | 1.69 | 0.0923 | Tukey-Kramer | 0.6939 |
| **collmo\*mvtrt** | May | N | Sept | M | 5.4862 | 2.0624 | 246 | 2.66 | 0.0083 | Tukey-Kramer | 0.1401 |
| **collmo\*mvtrt** | May | N | Sept | N | 4.7048 | 2.0624 | 246 | 2.28 | 0.0234 | Tukey-Kramer | 0.3082 |
| **collmo\*mvtrt** | Sept | M | Sept | N | -0.7814 | 1.8211 | 246 | -0.43 | 0.6683 | Tukey-Kramer | 0.9999 |

***The SAS System***

|  |
| --- |
| ***The Mixed Procedure*** |

| **Model Information** | |
| --- | --- |
| **Data Set** | WORK.MVNITRATEBAY |
| **Dependent Variable** | no3d |
| **Covariance Structure** | Unstructured |
| **Subject Effect** | plotid |
| **Estimation Method** | REML |
| **Residual Variance Method** | None |
| **Fixed Effects SE Method** | Model-Based |
| **Degrees of Freedom Method** | Between-Within |

| **Class Level Information** | | |
| --- | --- | --- |
| **Class** | **Levels** | **Values** |
| **collmo** | 4 | July June May Sept |
| **mvtrt** | 2 | M N |

| **Dimensions** | |
| --- | --- |
| **Covariance Parameters** | 10 |
| **Columns in X** | 15 |
| **Columns in Z** | 0 |
| **Subjects** | 256 |
| **Max Obs Per Subject** | 1 |

| **Number of Observations** | |
| --- | --- |
| **Number of Observations Read** | 257 |
| **Number of Observations Used** | 254 |
| **Number of Observations Not Used** | 3 |

| **Iteration History** | | | |
| --- | --- | --- | --- |
| **Iteration** | **Evaluations** | **-2 Res Log Like** | **Criterion** |
| **0** | 1 | 1727.41218467 |  |
| **1** | 1 | 1611.16314582 | 0.00000000 |

|  |
| --- |
| Convergence criteria met but final hessian is not positive definite. |

| **Estimated R Correlation Matrix for Subject 1** | |
| --- | --- |
| **Row** | **Col1** |
| **1** | 1.0000 |

| **Covariance Parameter Estimates** | | |
| --- | --- | --- |
| **Cov Parm** | **Subject** | **Estimate** |
| **UN(1,1)** | plotid | 18.5056 |
| **UN(2,1)** | plotid | 0 |
| **UN(2,2)** | plotid | 103.67 |
| **UN(3,1)** | plotid | 0 |
| **UN(3,2)** | plotid | 0 |
| **UN(3,3)** | plotid | 102.23 |
| **UN(4,1)** | plotid | 0 |
| **UN(4,2)** | plotid | 0 |
| **UN(4,3)** | plotid | 0 |
| **UN(4,4)** | plotid | 8.9171 |

| **Fit Statistics** | |
| --- | --- |
| **-2 Res Log Likelihood** | 1611.2 |
| **AIC (smaller is better)** | 1631.2 |
| **AICC (smaller is better)** | 1632.1 |
| **BIC (smaller is better)** | 1666.6 |

| **Null Model Likelihood Ratio Test** | | |
| --- | --- | --- |
| **DF** | **Chi-Square** | **Pr > ChiSq** |
| 9 | 116.25 | <.0001 |

| **Type 3 Tests of Fixed Effects** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **collmo** | 3 | 246 | 31.73 | <.0001 |
| **mvtrt** | 1 | 246 | 1.43 | 0.2322 |
| **collmo\*mvtrt** | 3 | 246 | 4.23 | 0.0061 |

| **Least Squares Means** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| **collmo** | July |  | 4.6901 | 0.5466 | 246 | 8.58 | <.0001 |
| **collmo** | June |  | 12.4192 | 1.2728 | 246 | 9.76 | <.0001 |
| **collmo** | May |  | 12.9368 | 1.2639 | 246 | 10.24 | <.0001 |
| **collmo** | Sept |  | 3.2080 | 0.3733 | 246 | 8.59 | <.0001 |
| **mvtrt** |  | M | 7.7412 | 0.6768 | 246 | 11.44 | <.0001 |
| **mvtrt** |  | N | 8.8860 | 0.6751 | 246 | 13.16 | <.0001 |
| **collmo\*mvtrt** | July | M | 4.6556 | 0.7854 | 246 | 5.93 | <.0001 |
| **collmo\*mvtrt** | July | N | 4.7247 | 0.7605 | 246 | 6.21 | <.0001 |
| **collmo\*mvtrt** | June | M | 14.3645 | 1.8000 | 246 | 7.98 | <.0001 |
| **collmo\*mvtrt** | June | N | 10.4739 | 1.8000 | 246 | 5.82 | <.0001 |
| **collmo\*mvtrt** | May | M | 8.8085 | 1.7874 | 246 | 4.93 | <.0001 |
| **collmo\*mvtrt** | May | N | 17.0651 | 1.7874 | 246 | 9.55 | <.0001 |
| **collmo\*mvtrt** | Sept | M | 3.1360 | 0.5279 | 246 | 5.94 | <.0001 |
| **collmo\*mvtrt** | Sept | N | 3.2801 | 0.5279 | 246 | 6.21 | <.0001 |

| **Differences of Least Squares Means** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** | **Adjustment** | **Adj P** |
| **collmo** | July |  | June |  | -7.7291 | 1.3852 | 246 | -5.58 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo** | July |  | May |  | -8.2467 | 1.3770 | 246 | -5.99 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo** | July |  | Sept |  | 1.4821 | 0.6619 | 246 | 2.24 | 0.0260 | Tukey-Kramer | 0.1157 |
| **collmo** | June |  | May |  | -0.5176 | 1.7937 | 246 | -0.29 | 0.7732 | Tukey-Kramer | 0.9916 |
| **collmo** | June |  | Sept |  | 9.2112 | 1.3264 | 246 | 6.94 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo** | May |  | Sept |  | 9.7288 | 1.3178 | 246 | 7.38 | <.0001 | Tukey-Kramer | <.0001 |
| **mvtrt** |  | M |  | N | -1.1448 | 0.9560 | 246 | -1.20 | 0.2322 | Tukey-Kramer | 0.2322 |
| **collmo\*mvtrt** | July | M | July | N | -0.06909 | 1.0932 | 246 | -0.06 | 0.9497 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | July | M | June | M | -9.7089 | 1.9638 | 246 | -4.94 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | July | M | June | N | -5.8183 | 1.9638 | 246 | -2.96 | 0.0033 | Tukey-Kramer | 0.0650 |
| **collmo\*mvtrt** | July | M | May | M | -4.1529 | 1.9523 | 246 | -2.13 | 0.0344 | Tukey-Kramer | 0.4004 |
| **collmo\*mvtrt** | July | M | May | N | -12.4095 | 1.9523 | 246 | -6.36 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | July | M | Sept | M | 1.5196 | 0.9463 | 246 | 1.61 | 0.1096 | Tukey-Kramer | 0.7465 |
| **collmo\*mvtrt** | July | M | Sept | N | 1.3755 | 0.9463 | 246 | 1.45 | 0.1474 | Tukey-Kramer | 0.8310 |
| **collmo\*mvtrt** | July | N | June | M | -9.6399 | 1.9540 | 246 | -4.93 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | July | N | June | N | -5.7493 | 1.9540 | 246 | -2.94 | 0.0036 | Tukey-Kramer | 0.0688 |
| **collmo\*mvtrt** | July | N | May | M | -4.0838 | 1.9424 | 246 | -2.10 | 0.0365 | Tukey-Kramer | 0.4163 |
| **collmo\*mvtrt** | July | N | May | N | -12.3404 | 1.9424 | 246 | -6.35 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | July | N | Sept | M | 1.5887 | 0.9257 | 246 | 1.72 | 0.0874 | Tukey-Kramer | 0.6767 |
| **collmo\*mvtrt** | July | N | Sept | N | 1.4446 | 0.9257 | 246 | 1.56 | 0.1199 | Tukey-Kramer | 0.7733 |
| **collmo\*mvtrt** | June | M | June | N | 3.8906 | 2.5455 | 246 | 1.53 | 0.1277 | Tukey-Kramer | 0.7914 |
| **collmo\*mvtrt** | June | M | May | M | 5.5560 | 2.5366 | 246 | 2.19 | 0.0294 | Tukey-Kramer | 0.3612 |
| **collmo\*mvtrt** | June | M | May | N | -2.7006 | 2.5366 | 246 | -1.06 | 0.2881 | Tukey-Kramer | 0.9634 |
| **collmo\*mvtrt** | June | M | Sept | M | 11.2286 | 1.8758 | 246 | 5.99 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | June | M | Sept | N | 11.0844 | 1.8758 | 246 | 5.91 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | June | N | May | M | 1.6654 | 2.5366 | 246 | 0.66 | 0.5121 | Tukey-Kramer | 0.9980 |
| **collmo\*mvtrt** | June | N | May | N | -6.5912 | 2.5366 | 246 | -2.60 | 0.0099 | Tukey-Kramer | 0.1615 |
| **collmo\*mvtrt** | June | N | Sept | M | 7.3380 | 1.8758 | 246 | 3.91 | 0.0001 | Tukey-Kramer | 0.0029 |
| **collmo\*mvtrt** | June | N | Sept | N | 7.1938 | 1.8758 | 246 | 3.84 | 0.0002 | Tukey-Kramer | 0.0039 |
| **collmo\*mvtrt** | May | M | May | N | -8.2566 | 2.5277 | 246 | -3.27 | 0.0012 | Tukey-Kramer | 0.0269 |
| **collmo\*mvtrt** | May | M | Sept | M | 5.6726 | 1.8637 | 246 | 3.04 | 0.0026 | Tukey-Kramer | 0.0519 |
| **collmo\*mvtrt** | May | M | Sept | N | 5.5284 | 1.8637 | 246 | 2.97 | 0.0033 | Tukey-Kramer | 0.0644 |
| **collmo\*mvtrt** | May | N | Sept | M | 13.9292 | 1.8637 | 246 | 7.47 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | May | N | Sept | N | 13.7850 | 1.8637 | 246 | 7.40 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | Sept | M | Sept | N | -0.1442 | 0.7465 | 246 | -0.19 | 0.8470 | Tukey-Kramer | 1.0000 |

***The SAS System***

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| --- |
| ***The Mixed Procedure*** |

| **Model Information** | |
| --- | --- |
| **Data Set** | WORK.MVNITRATEBAY |
| **Dependent Variable** | nitrifd |
| **Covariance Structure** | Unstructured |
| **Subject Effect** | plotid |
| **Estimation Method** | REML |
| **Residual Variance Method** | None |
| **Fixed Effects SE Method** | Model-Based |
| **Degrees of Freedom Method** | Between-Within |

| **Class Level Information** | | |
| --- | --- | --- |
| **Class** | **Levels** | **Values** |
| **collmo** | 4 | July June May Sept |
| **mvtrt** | 2 | M N |

| **Dimensions** | |
| --- | --- |
| **Covariance Parameters** | 10 |
| **Columns in X** | 15 |
| **Columns in Z** | 0 |
| **Subjects** | 256 |
| **Max Obs Per Subject** | 1 |

| **Number of Observations** | |
| --- | --- |
| **Number of Observations Read** | 257 |
| **Number of Observations Used** | 254 |
| **Number of Observations Not Used** | 3 |

| **Iteration History** | | | |
| --- | --- | --- | --- |
| **Iteration** | **Evaluations** | **-2 Res Log Like** | **Criterion** |
| **0** | 1 | -1056.47951705 |  |
| **1** | 1 | -1075.41671189 | 0.00000000 |

|  |
| --- |
| Convergence criteria met but final hessian is not positive definite. |

| **Estimated R Correlation Matrix for Subject 1** | |
| --- | --- |
| **Row** | **Col1** |
| **1** | 1.0000 |

| **Covariance Parameter Estimates** | | |
| --- | --- | --- |
| **Cov Parm** | **Subject** | **Estimate** |
| **UN(1,1)** | plotid | 0.000532 |
| **UN(2,1)** | plotid | 0 |
| **UN(2,2)** | plotid | 0.000567 |
| **UN(3,1)** | plotid | 0 |
| **UN(3,2)** | plotid | 0 |
| **UN(3,3)** | plotid | 0.001246 |
| **UN(4,1)** | plotid | 0 |
| **UN(4,2)** | plotid | 0 |
| **UN(4,3)** | plotid | 0 |
| **UN(4,4)** | plotid | 0.000504 |

| **Fit Statistics** | |
| --- | --- |
| **-2 Res Log Likelihood** | -1075.4 |
| **AIC (smaller is better)** | -1055.4 |
| **AICC (smaller is better)** | -1054.5 |
| **BIC (smaller is better)** | -1020.0 |

| **Null Model Likelihood Ratio Test** | | |
| --- | --- | --- |
| **DF** | **Chi-Square** | **Pr > ChiSq** |
| 9 | 18.94 | 0.0257 |

| **Type 3 Tests of Fixed Effects** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **collmo** | 3 | 246 | 5.74 | 0.0008 |
| **mvtrt** | 1 | 246 | 12.43 | 0.0005 |
| **collmo\*mvtrt** | 3 | 246 | 2.57 | 0.0547 |

| **Least Squares Means** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| **collmo** | July |  | 0.02937 | 0.002932 | 246 | 10.02 | <.0001 |
| **collmo** | June |  | 0.01442 | 0.002976 | 246 | 4.85 | <.0001 |
| **collmo** | May |  | 0.03196 | 0.004413 | 246 | 7.24 | <.0001 |
| **collmo** | Sept |  | 0.02214 | 0.002805 | 246 | 7.89 | <.0001 |
| **mvtrt** |  | M | 0.03037 | 0.002374 | 246 | 12.80 | <.0001 |
| **mvtrt** |  | N | 0.01858 | 0.002359 | 246 | 7.87 | <.0001 |
| **collmo\*mvtrt** | July | M | 0.03221 | 0.004213 | 246 | 7.65 | <.0001 |
| **collmo\*mvtrt** | July | N | 0.02653 | 0.004079 | 246 | 6.50 | <.0001 |
| **collmo\*mvtrt** | June | M | 0.01615 | 0.004209 | 246 | 3.84 | 0.0002 |
| **collmo\*mvtrt** | June | N | 0.01269 | 0.004209 | 246 | 3.01 | 0.0028 |
| **collmo\*mvtrt** | May | M | 0.04761 | 0.006241 | 246 | 7.63 | <.0001 |
| **collmo\*mvtrt** | May | N | 0.01631 | 0.006241 | 246 | 2.61 | 0.0095 |
| **collmo\*mvtrt** | Sept | M | 0.02551 | 0.003967 | 246 | 6.43 | <.0001 |
| **collmo\*mvtrt** | Sept | N | 0.01877 | 0.003967 | 246 | 4.73 | <.0001 |

| **Differences of Least Squares Means** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** | **Adjustment** | **Adj P** |
| **collmo** | July |  | June |  | 0.01495 | 0.004178 | 246 | 3.58 | 0.0004 | Tukey-Kramer | 0.0023 |
| **collmo** | July |  | May |  | -0.00259 | 0.005298 | 246 | -0.49 | 0.6253 | Tukey-Kramer | 0.9615 |
| **collmo** | July |  | Sept |  | 0.007230 | 0.004058 | 246 | 1.78 | 0.0760 | Tukey-Kramer | 0.2846 |
| **collmo** | June |  | May |  | -0.01754 | 0.005323 | 246 | -3.30 | 0.0011 | Tukey-Kramer | 0.0062 |
| **collmo** | June |  | Sept |  | -0.00772 | 0.004090 | 246 | -1.89 | 0.0602 | Tukey-Kramer | 0.2359 |
| **collmo** | May |  | Sept |  | 0.009820 | 0.005229 | 246 | 1.88 | 0.0616 | Tukey-Kramer | 0.2402 |
| **mvtrt** |  | M |  | N | 0.01180 | 0.003347 | 246 | 3.53 | 0.0005 | Tukey | 0.0005 |
| **collmo\*mvtrt** | July | M | July | N | 0.005682 | 0.005864 | 246 | 0.97 | 0.3335 | Tukey-Kramer | 0.9783 |
| **collmo\*mvtrt** | July | M | June | M | 0.01606 | 0.005955 | 246 | 2.70 | 0.0075 | Tukey-Kramer | 0.1285 |
| **collmo\*mvtrt** | July | M | June | N | 0.01952 | 0.005955 | 246 | 3.28 | 0.0012 | Tukey-Kramer | 0.0259 |
| **collmo\*mvtrt** | July | M | May | M | -0.01540 | 0.007530 | 246 | -2.04 | 0.0419 | Tukey-Kramer | 0.4539 |
| **collmo\*mvtrt** | July | M | May | N | 0.01590 | 0.007530 | 246 | 2.11 | 0.0357 | Tukey-Kramer | 0.4104 |
| **collmo\*mvtrt** | July | M | Sept | M | 0.006699 | 0.005787 | 246 | 1.16 | 0.2481 | Tukey-Kramer | 0.9429 |
| **collmo\*mvtrt** | July | M | Sept | N | 0.01344 | 0.005787 | 246 | 2.32 | 0.0210 | Tukey-Kramer | 0.2854 |
| **collmo\*mvtrt** | July | N | June | M | 0.01038 | 0.005861 | 246 | 1.77 | 0.0779 | Tukey-Kramer | 0.6406 |
| **collmo\*mvtrt** | July | N | June | N | 0.01384 | 0.005861 | 246 | 2.36 | 0.0190 | Tukey-Kramer | 0.2652 |
| **collmo\*mvtrt** | July | N | May | M | -0.02108 | 0.007456 | 246 | -2.83 | 0.0051 | Tukey-Kramer | 0.0930 |
| **collmo\*mvtrt** | July | N | May | N | 0.01022 | 0.007456 | 246 | 1.37 | 0.1718 | Tukey-Kramer | 0.8698 |
| **collmo\*mvtrt** | July | N | Sept | M | 0.001017 | 0.005690 | 246 | 0.18 | 0.8583 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | July | N | Sept | N | 0.007760 | 0.005690 | 246 | 1.36 | 0.1739 | Tukey-Kramer | 0.8727 |
| **collmo\*mvtrt** | June | M | June | N | 0.003464 | 0.005952 | 246 | 0.58 | 0.5611 | Tukey-Kramer | 0.9991 |
| **collmo\*mvtrt** | June | M | May | M | -0.03146 | 0.007527 | 246 | -4.18 | <.0001 | Tukey-Kramer | 0.0010 |
| **collmo\*mvtrt** | June | M | May | N | -0.00016 | 0.007527 | 246 | -0.02 | 0.9830 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | June | M | Sept | M | -0.00936 | 0.005784 | 246 | -1.62 | 0.1069 | Tukey-Kramer | 0.7388 |
| **collmo\*mvtrt** | June | M | Sept | N | -0.00262 | 0.005784 | 246 | -0.45 | 0.6513 | Tukey-Kramer | 0.9998 |
| **collmo\*mvtrt** | June | N | May | M | -0.03492 | 0.007527 | 246 | -4.64 | <.0001 | Tukey-Kramer | 0.0002 |
| **collmo\*mvtrt** | June | N | May | N | -0.00362 | 0.007527 | 246 | -0.48 | 0.6306 | Tukey-Kramer | 0.9997 |
| **collmo\*mvtrt** | June | N | Sept | M | -0.01282 | 0.005784 | 246 | -2.22 | 0.0275 | Tukey-Kramer | 0.3450 |
| **collmo\*mvtrt** | June | N | Sept | N | -0.00608 | 0.005784 | 246 | -1.05 | 0.2941 | Tukey-Kramer | 0.9658 |
| **collmo\*mvtrt** | May | M | May | N | 0.03130 | 0.008826 | 246 | 3.55 | 0.0005 | Tukey-Kramer | 0.0109 |
| **collmo\*mvtrt** | May | M | Sept | M | 0.02210 | 0.007395 | 246 | 2.99 | 0.0031 | Tukey-Kramer | 0.0607 |
| **collmo\*mvtrt** | May | M | Sept | N | 0.02884 | 0.007395 | 246 | 3.90 | 0.0001 | Tukey-Kramer | 0.0031 |
| **collmo\*mvtrt** | May | N | Sept | M | -0.00920 | 0.007395 | 246 | -1.24 | 0.2147 | Tukey-Kramer | 0.9178 |
| **collmo\*mvtrt** | May | N | Sept | N | -0.00246 | 0.007395 | 246 | -0.33 | 0.7400 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | Sept | M | Sept | N | 0.006743 | 0.005611 | 246 | 1.20 | 0.2306 | Tukey-Kramer | 0.9308 |

***The SAS System***

|  |
| --- |
| ***The Mixed Procedure*** |

| **Model Information** | |
| --- | --- |
| **Data Set** | WORK.MVNITRATEBAY |
| **Dependent Variable** | nitratio |
| **Covariance Structure** | Unstructured |
| **Subject Effect** | plotid |
| **Estimation Method** | REML |
| **Residual Variance Method** | None |
| **Fixed Effects SE Method** | Model-Based |
| **Degrees of Freedom Method** | Between-Within |

| **Class Level Information** | | |
| --- | --- | --- |
| **Class** | **Levels** | **Values** |
| **collmo** | 4 | July June May Sept |
| **mvtrt** | 2 | M N |

| **Dimensions** | |
| --- | --- |
| **Covariance Parameters** | 10 |
| **Columns in X** | 15 |
| **Columns in Z** | 0 |
| **Subjects** | 256 |
| **Max Obs Per Subject** | 1 |

| **Number of Observations** | |
| --- | --- |
| **Number of Observations Read** | 257 |
| **Number of Observations Used** | 254 |
| **Number of Observations Not Used** | 3 |

| **Iteration History** | | | |
| --- | --- | --- | --- |
| **Iteration** | **Evaluations** | **-2 Res Log Like** | **Criterion** |
| **0** | 1 | 94.75555756 |  |
| **1** | 1 | 94.25751300 | 0.00000000 |

|  |
| --- |
| Convergence criteria met but final hessian is not positive definite. |

| **Estimated R Correlation Matrix for Subject 1** | |
| --- | --- |
| **Row** | **Col1** |
| **1** | 1.0000 |

| **Covariance Parameter Estimates** | | |
| --- | --- | --- |
| **Cov Parm** | **Subject** | **Estimate** |
| **UN(1,1)** | plotid | 0.07292 |
| **UN(2,1)** | plotid | 0 |
| **UN(2,2)** | plotid | 0.07359 |
| **UN(3,1)** | plotid | 0 |
| **UN(3,2)** | plotid | 0 |
| **UN(3,3)** | plotid | 0.07566 |
| **UN(4,1)** | plotid | 0 |
| **UN(4,2)** | plotid | 0 |
| **UN(4,3)** | plotid | 0 |
| **UN(4,4)** | plotid | 0.08533 |

| **Fit Statistics** | |
| --- | --- |
| **-2 Res Log Likelihood** | 94.3 |
| **AIC (smaller is better)** | 114.3 |
| **AICC (smaller is better)** | 115.2 |
| **BIC (smaller is better)** | 149.7 |

| **Null Model Likelihood Ratio Test** | | |
| --- | --- | --- |
| **DF** | **Chi-Square** | **Pr > ChiSq** |
| 9 | 0.50 | 1.0000 |

| **Type 3 Tests of Fixed Effects** | | | | |
| --- | --- | --- | --- | --- |
| **Effect** | **Num DF** | **Den DF** | **F Value** | **Pr > F** |
| **collmo** | 3 | 246 | 7.06 | 0.0001 |
| **mvtrt** | 1 | 246 | 0.42 | 0.5180 |
| **collmo\*mvtrt** | 3 | 246 | 3.69 | 0.0126 |

| **Least Squares Means** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** |
| **collmo** | July |  | 0.4437 | 0.03431 | 246 | 12.93 | <.0001 |
| **collmo** | June |  | 0.6399 | 0.03391 | 246 | 18.87 | <.0001 |
| **collmo** | May |  | 0.6018 | 0.03438 | 246 | 17.50 | <.0001 |
| **collmo** | Sept |  | 0.4945 | 0.03651 | 246 | 13.54 | <.0001 |
| **mvtrt** |  | M | 0.5562 | 0.02470 | 246 | 22.52 | <.0001 |
| **mvtrt** |  | N | 0.5337 | 0.02451 | 246 | 21.78 | <.0001 |
| **collmo\*mvtrt** | July | M | 0.4919 | 0.04930 | 246 | 9.98 | <.0001 |
| **collmo\*mvtrt** | July | N | 0.3955 | 0.04774 | 246 | 8.28 | <.0001 |
| **collmo\*mvtrt** | June | M | 0.7237 | 0.04795 | 246 | 15.09 | <.0001 |
| **collmo\*mvtrt** | June | N | 0.5562 | 0.04795 | 246 | 11.60 | <.0001 |
| **collmo\*mvtrt** | May | M | 0.5425 | 0.04863 | 246 | 11.16 | <.0001 |
| **collmo\*mvtrt** | May | N | 0.6612 | 0.04863 | 246 | 13.60 | <.0001 |
| **collmo\*mvtrt** | Sept | M | 0.4669 | 0.05164 | 246 | 9.04 | <.0001 |
| **collmo\*mvtrt** | Sept | N | 0.5221 | 0.05164 | 246 | 10.11 | <.0001 |

| **Differences of Least Squares Means** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **collmo** | **mvtrt** | **collmo** | **mvtrt** | **Estimate** | **Standard Error** | **DF** | **t Value** | **Pr > |t|** | **Adjustment** | **Adj P** |
| **collmo** | July |  | June |  | -0.1962 | 0.04824 | 246 | -4.07 | <.0001 | Tukey-Kramer | 0.0004 |
| **collmo** | July |  | May |  | -0.1581 | 0.04858 | 246 | -3.26 | 0.0013 | Tukey-Kramer | 0.0070 |
| **collmo** | July |  | Sept |  | -0.05077 | 0.05011 | 246 | -1.01 | 0.3119 | Tukey-Kramer | 0.7418 |
| **collmo** | June |  | May |  | 0.03810 | 0.04829 | 246 | 0.79 | 0.4309 | Tukey-Kramer | 0.8594 |
| **collmo** | June |  | Sept |  | 0.1455 | 0.04983 | 246 | 2.92 | 0.0038 | Tukey-Kramer | 0.0199 |
| **collmo** | May |  | Sept |  | 0.1074 | 0.05016 | 246 | 2.14 | 0.0333 | Tukey-Kramer | 0.1432 |
| **mvtrt** |  | M |  | N | 0.02252 | 0.03479 | 246 | 0.65 | 0.5180 | Tukey-Kramer | 0.5180 |
| **collmo\*mvtrt** | July | M | July | N | 0.09644 | 0.06863 | 246 | 1.41 | 0.1612 | Tukey-Kramer | 0.8542 |
| **collmo\*mvtrt** | July | M | June | M | -0.2317 | 0.06878 | 246 | -3.37 | 0.0009 | Tukey-Kramer | 0.0195 |
| **collmo\*mvtrt** | July | M | June | N | -0.06429 | 0.06878 | 246 | -0.93 | 0.3508 | Tukey-Kramer | 0.9824 |
| **collmo\*mvtrt** | July | M | May | M | -0.05060 | 0.06925 | 246 | -0.73 | 0.4656 | Tukey-Kramer | 0.9960 |
| **collmo\*mvtrt** | July | M | May | N | -0.1692 | 0.06925 | 246 | -2.44 | 0.0152 | Tukey-Kramer | 0.2252 |
| **collmo\*mvtrt** | July | M | Sept | M | 0.02504 | 0.07140 | 246 | 0.35 | 0.7261 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | July | M | Sept | N | -0.03014 | 0.07140 | 246 | -0.42 | 0.6733 | Tukey-Kramer | 0.9999 |
| **collmo\*mvtrt** | July | N | June | M | -0.3282 | 0.06766 | 246 | -4.85 | <.0001 | Tukey-Kramer | <.0001 |
| **collmo\*mvtrt** | July | N | June | N | -0.1607 | 0.06766 | 246 | -2.38 | 0.0183 | Tukey-Kramer | 0.2582 |
| **collmo\*mvtrt** | July | N | May | M | -0.1470 | 0.06814 | 246 | -2.16 | 0.0319 | Tukey-Kramer | 0.3811 |
| **collmo\*mvtrt** | July | N | May | N | -0.2657 | 0.06814 | 246 | -3.90 | 0.0001 | Tukey-Kramer | 0.0031 |
| **collmo\*mvtrt** | July | N | Sept | M | -0.07140 | 0.07032 | 246 | -1.02 | 0.3109 | Tukey-Kramer | 0.9718 |
| **collmo\*mvtrt** | July | N | Sept | N | -0.1266 | 0.07032 | 246 | -1.80 | 0.0731 | Tukey-Kramer | 0.6207 |
| **collmo\*mvtrt** | June | M | June | N | 0.1675 | 0.06782 | 246 | 2.47 | 0.0142 | Tukey-Kramer | 0.2137 |
| **collmo\*mvtrt** | June | M | May | M | 0.1811 | 0.06829 | 246 | 2.65 | 0.0085 | Tukey-Kramer | 0.1427 |
| **collmo\*mvtrt** | June | M | May | N | 0.06251 | 0.06829 | 246 | 0.92 | 0.3609 | Tukey-Kramer | 0.9844 |
| **collmo\*mvtrt** | June | M | Sept | M | 0.2568 | 0.07047 | 246 | 3.64 | 0.0003 | Tukey-Kramer | 0.0078 |
| **collmo\*mvtrt** | June | M | Sept | N | 0.2016 | 0.07047 | 246 | 2.86 | 0.0046 | Tukey-Kramer | 0.0853 |
| **collmo\*mvtrt** | June | N | May | M | 0.01369 | 0.06829 | 246 | 0.20 | 0.8413 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | June | N | May | N | -0.1049 | 0.06829 | 246 | -1.54 | 0.1257 | Tukey-Kramer | 0.7868 |
| **collmo\*mvtrt** | June | N | Sept | M | 0.08932 | 0.07047 | 246 | 1.27 | 0.2062 | Tukey-Kramer | 0.9099 |
| **collmo\*mvtrt** | June | N | Sept | N | 0.03415 | 0.07047 | 246 | 0.48 | 0.6284 | Tukey-Kramer | 0.9997 |
| **collmo\*mvtrt** | May | M | May | N | -0.1186 | 0.06877 | 246 | -1.73 | 0.0858 | Tukey-Kramer | 0.6709 |
| **collmo\*mvtrt** | May | M | Sept | M | 0.07564 | 0.07093 | 246 | 1.07 | 0.2873 | Tukey-Kramer | 0.9631 |
| **collmo\*mvtrt** | May | M | Sept | N | 0.02046 | 0.07093 | 246 | 0.29 | 0.7732 | Tukey-Kramer | 1.0000 |
| **collmo\*mvtrt** | May | N | Sept | M | 0.1943 | 0.07093 | 246 | 2.74 | 0.0066 | Tukey-Kramer | 0.1161 |
| **collmo\*mvtrt** | May | N | Sept | N | 0.1391 | 0.07093 | 246 | 1.96 | 0.0510 | Tukey-Kramer | 0.5105 |
| **collmo\*mvtrt** | Sept | M | Sept | N | -0.05518 | 0.07303 | 246 | -0.76 | 0.4506 | Tukey-Kramer | 0.9951 |