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OPTIMIZATION OF BEST MANAGEMENT PRACTICES FOR BEEF CATTLE RANCHING IN THE LAKE OKEECHOBEE BASIN

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Sponsor: Florida Department of Environmental Protection, Taufiqul Aziz, Contract Manager

PROGRESS REPORT #4 (April – September, 1999)

by John Capece¹, Ken Campbell², Ed Rawlinson², and Jorge Rodriguez²
September 30, 1999

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<http://www.agen.ufl.edu/~maerc/stocking/reports/progress4-appen.html>

Optimization of Best Management Practices for Beef Cattle Ranching in the L. Okeechobee Basin

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During recent months (April – September, 1999), project efforts have focused on the following tasks:

1. Adjustment of 1998 runoff and nutrient load data sets.
2. Compilation of the 1999 runoff and water quality data sets.
3. Modification of datalogger-sampler control program and offsets.
4. Development of a comprehensive project management website.
5. Revision of the QAPP.

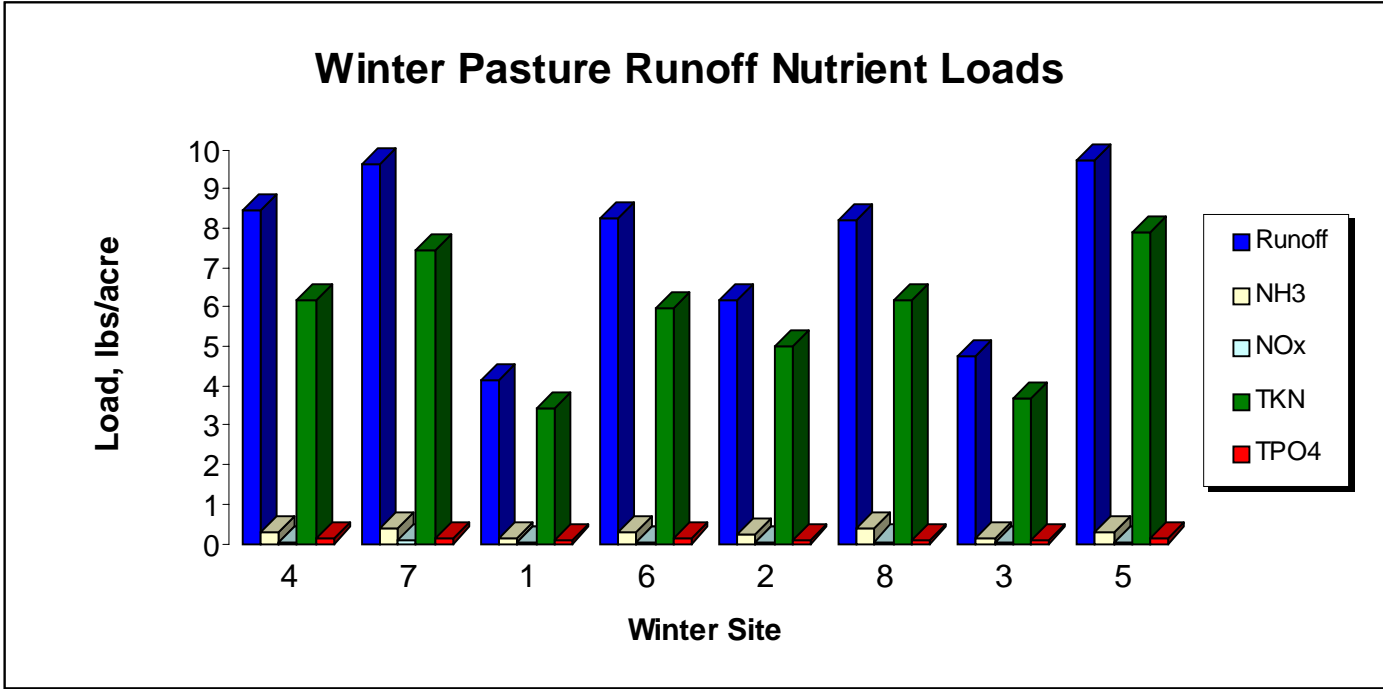
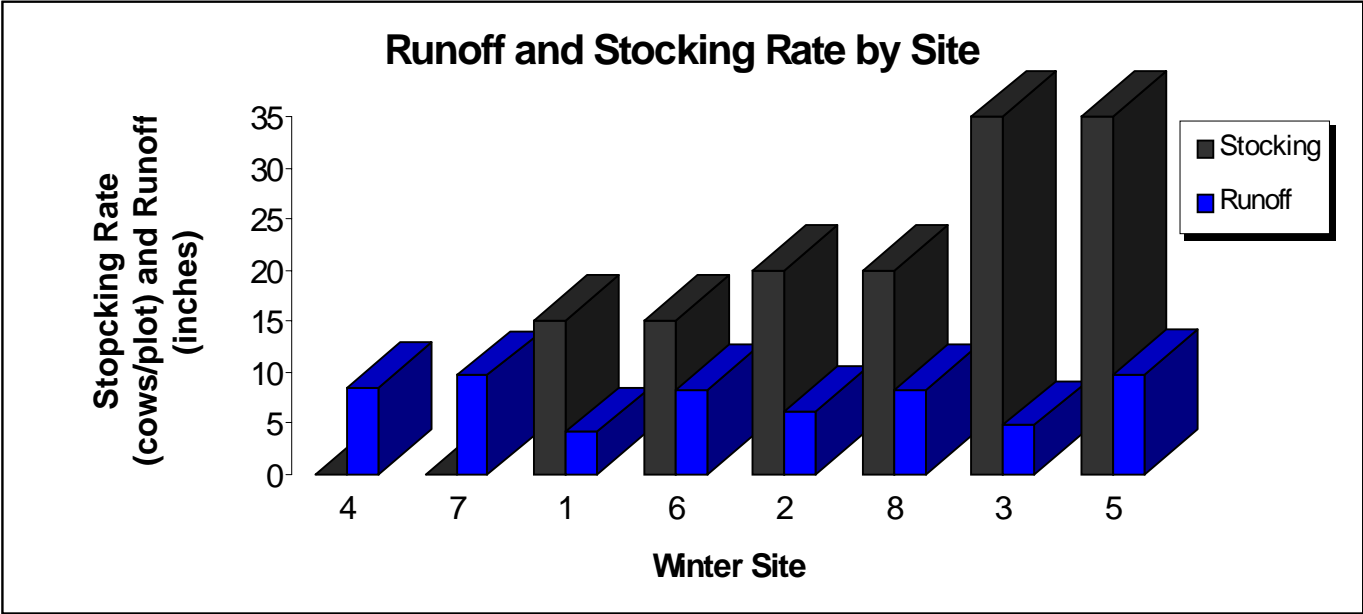
1998 RUNOFF AND NUTRIENT LOAD DATA SETS

Runoff data has been compiled for each of the 16 pasture plots for the year 1999. Results are tabulated in Table 1. These preliminary results are subject to revision as additional refinement of the runoff and water quality databases are implemented.

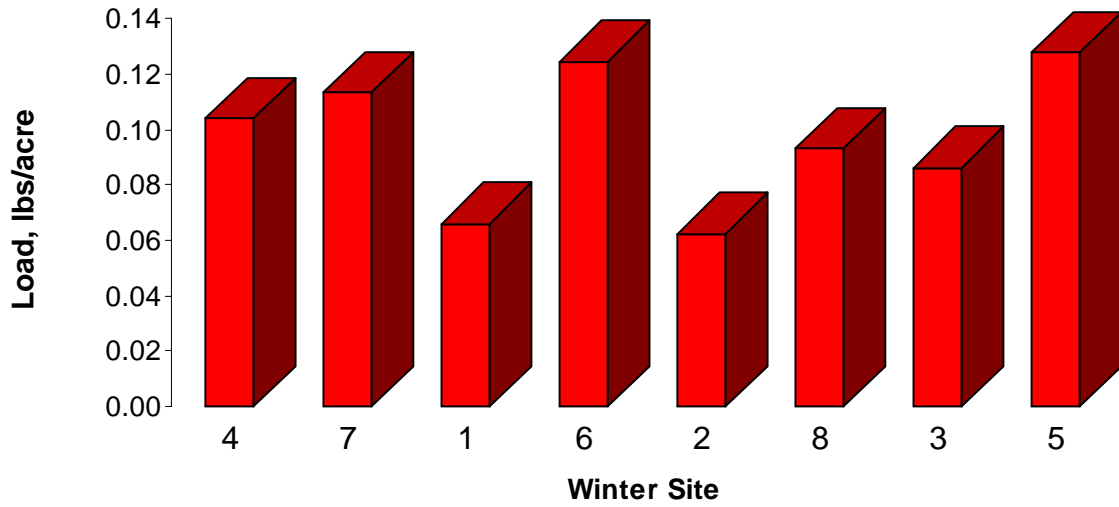
Table 1. Runoff and nutrient loading by site for the period of record in 1998.

Site	Stocking cows/acre	Runoff inches	NH3 lbs/acre	NOx lbs/acre	TKN lbs/acre	TPO4 lbs/acre
Winter 1	15	4.1	0.11	0.021	3.4	0.07
Winter 2	20	6.2	0.22	0.027	5.0	0.06
Winter 3	35	4.7	0.12	0.021	3.7	0.09
Winter 4	0	8.5	0.26	0.038	6.2	0.10
Winter 5	35	9.7	0.26	0.038	7.9	0.13
Winter 6	15	8.2	0.27	0.025	6.0	0.13
Winter 7	0	9.6	0.36	0.063	7.4	0.11
Winter 8	20	8.2	0.39	0.050	6.2	0.09
Summer 1	0	3.4	0.11	0.022	3.6	0.52
Summer 2	20	5.3	0.15	0.017	6.2	0.45
Summer 3	35	5.7	0.09	0.025	6.1	0.53
Summer 4	15	2.6	0.11	0.008	2.1	0.59
Summer 5	35	5.8	0.31	0.034	5.9	1.04
Summer 6	15	6.0	0.23	0.011	6.4	0.41
Summer 7	20	6.3	0.25	0.012	7.4	0.58
Summer 8	0	5.6	0.23	0.013	4.7	1.11

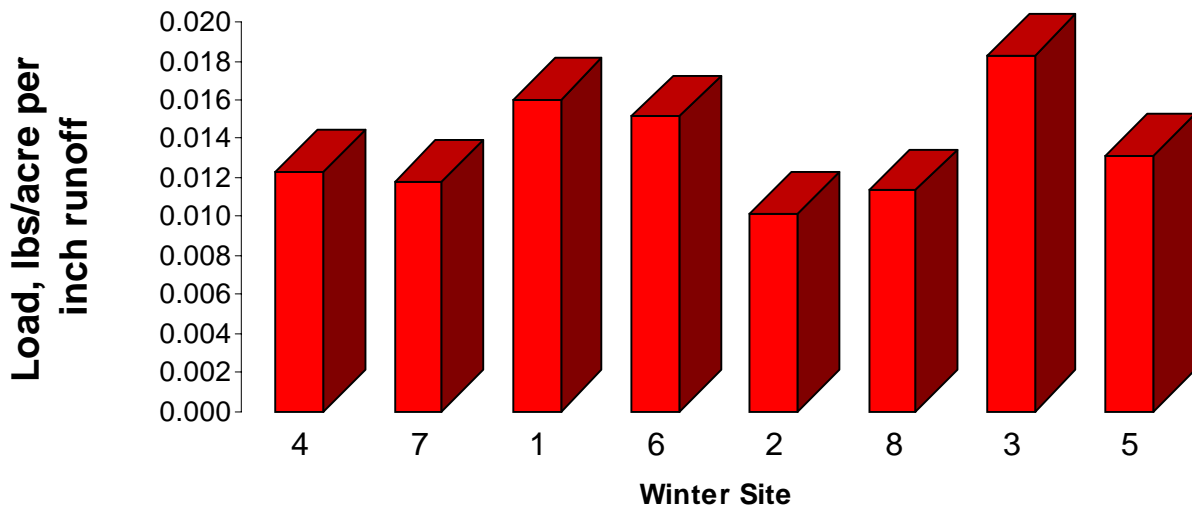
Data from Table 1 are presented in graphical form in the figures below.

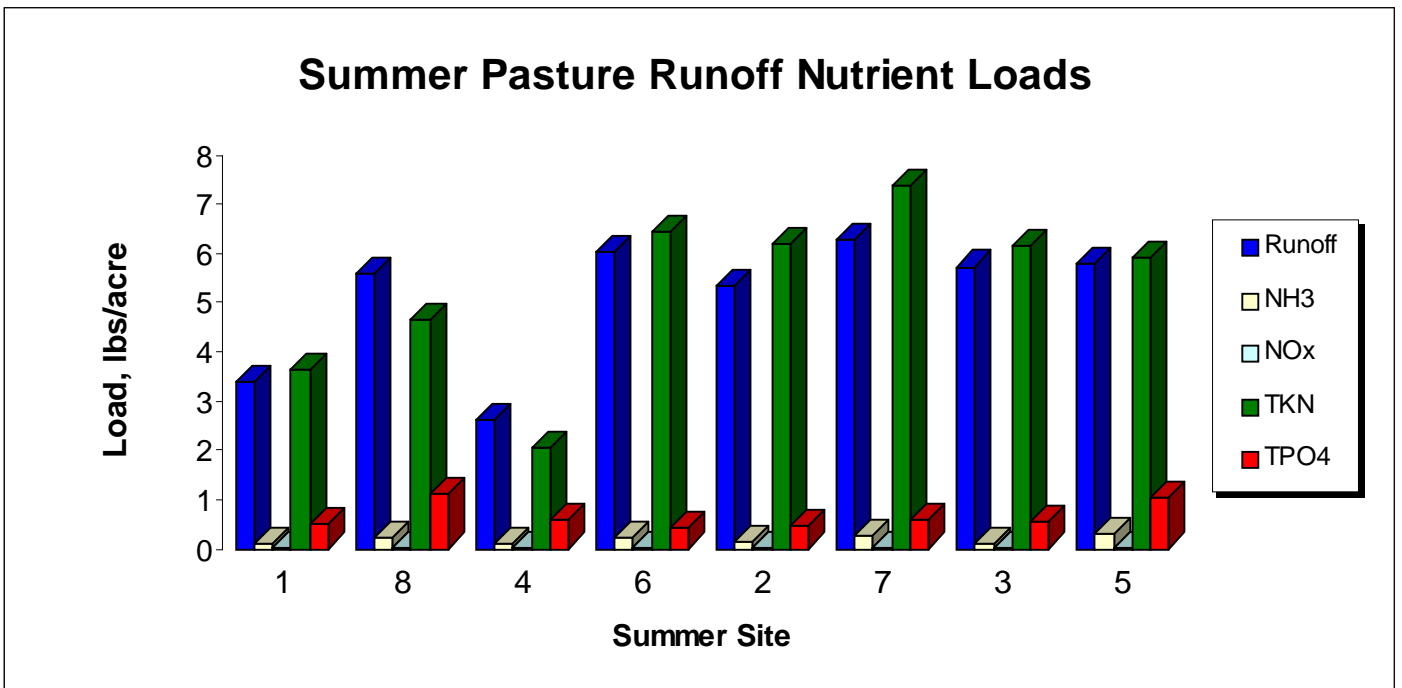
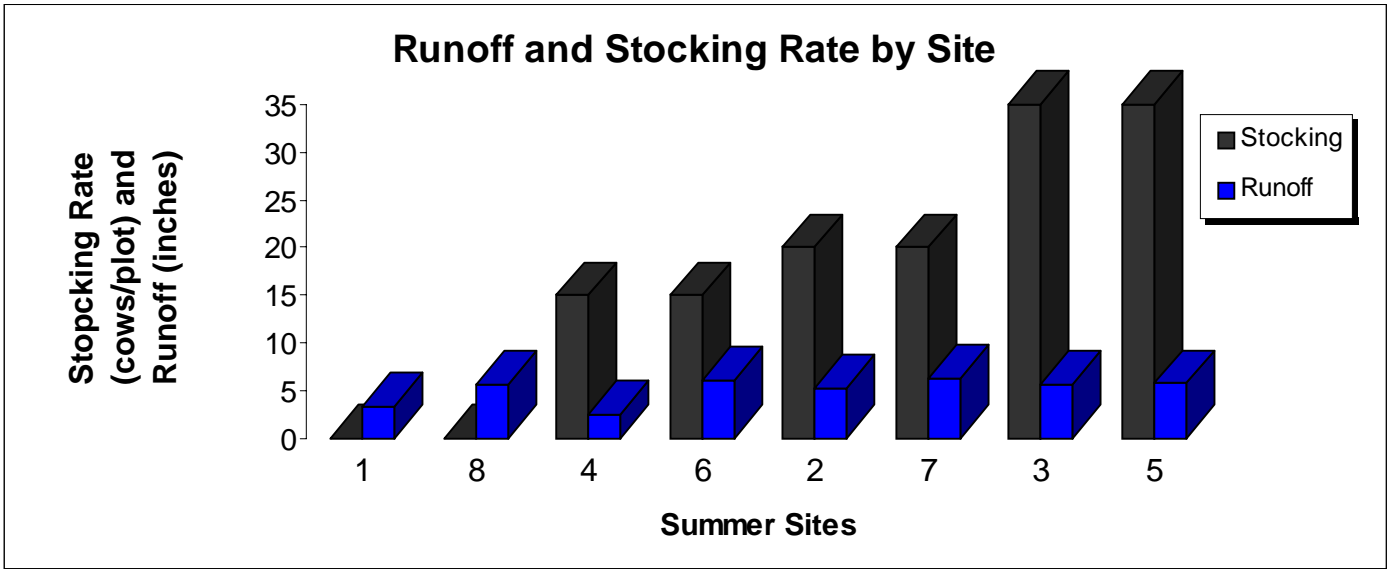


Winter Pasture Runoff TPO4 Loads

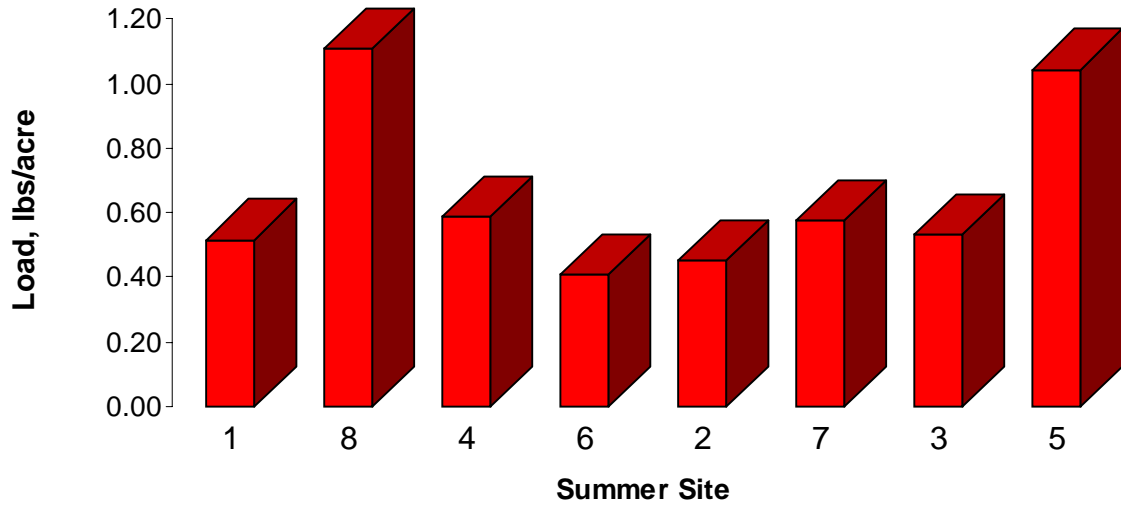


Winter Pasture Runoff TPO4 Loads

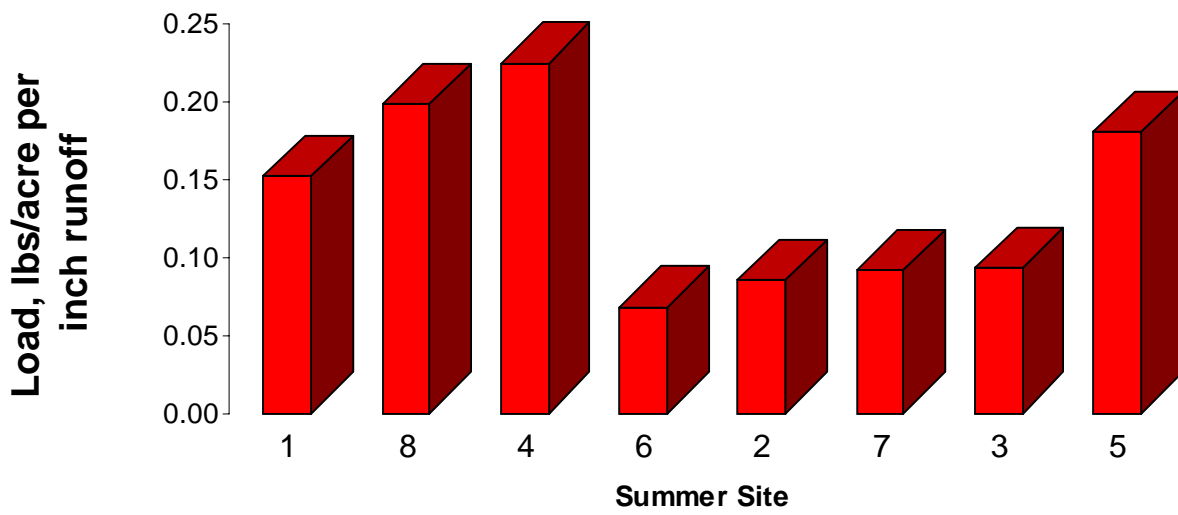




Summer Pasture Runoff TPO4 Loads



Summer Pasture Runoff TPO4 Loads



Results for each site are described in the graphs attached as Appendix 1. Five graphs for each site are provided:

1. Data gaps
2. Stage and runoff
3. Cumulative nutrient loads
4. Flow rate and corresponding water samples timing
5. Nutrient concentrations

All graphs are also available on the project website at:

<http://www.agen.ufl.edu/~maerc/stocking/reports/progress4-appen.html>

Explanations for each data gap are provided below:

- S4: JD 342-365, Data download error, data lost.
- S5: JD 273-279, Data download error, data lost.
- S6: JD 273-279, Data download error, data lost.
- W3 - W6, W8: JD 231-234, New Cr10 program load w/o prior data download, lost data.
- W2: JD 226-231, Bad Cr10 program.
- W2: JD 264-267, ABS network crash, lost files.
- W8: JD 267-269, ABS network crash, lost files. W8: JD 273-280, JD 286-288, Low voltage issue (bad battery).

Data gaps previous to Julian Day 240 at the summer pastures in 1998 can be attributed to program modifications and lack of intermediate downloads during new program uploads. Data gaps previous to Julian Day 215 at the winter pastures can be contributed to program modifications and lack of intermediate downloads during new program uploads.

1999 RUNOFF AND WATER QUALITY DATA

Appendix 2 presents the current status of the 1999 stage and runoff data sets for each pasture site. These graphs are available on the project website at:

<http://www.agen.ufl.edu/~maerc/stocking/reports/progress4-appen.html>

Explanations for each data gap are provided below:

- W4: JD 201-224, Wiring error disabled entire station.
- W1: JD 228-237,
- W5: JD 144-155,
- W6: JD 164-173,
- W7: JD 152-159,
- W8: JD 256-273, Data for the above 5 sites are missing but I feel confident they will be found and added to their corresponding database.
- S4: JD 1-14, Data download error, lost data.
- S1: JD 159-170, Data download error, lost data
- S7: JD 193-224, Data for this site is missing but I feel confident it can be found and added to their corresponding database.

Data gaps between JD 130-135 at the winter pasture sites can be attributed to program modifications and lack of intermediate downloads during new program uploads. Data gaps between JD 130-135 and JD 172-177 at the summer pasture sites can be attributed to program modifications and lack of intermediate downloads during new program uploads.

DATALOGGER-SAMPLER CONTROL PROGRAM

Automated Water Sampler Reset System

Errors in the resetting of flags and counters in the datalogger software were resulting in water sample collection errors by the automated ISCO samplers. Previously the technicians used a portable computer to manually reset the flags and counters each time the ISCO sampler is serviced. To address these problems reset switches with audible and visual confirmation indicators were built and installed. This hardware upgrade was accompanied by changes in the datalogger controller software (see web site for software code at:

<http://www.gen.ufl.edu/~maerc/stocking/maintenance/pgms.html>

The new system allows the technician to simply press a button to reset the datalogger after changing the ISCO bottles. The same button will also activate the ISCO to trigger an automatic water sample simultaneous to a manual grab water sample. Accompanying this upgrade has been the development of improved field data forms for field notes.

Offset Errors

Discrepancies between electronic and manual measurements of water levels continue to be a problem at many sites. A list of possible causes are described in Progress Report #3. One additional source of error (flume slope) was identified at a few sites. Some of the flumes have a non-zero bottom slope measuring as much as 0.03 feet. In these cases, the flume slope error is sufficient to introduce significant errors in the offset values and thus, flow depth measurements. The offset values must therefore be adjusted to compensate for these slope situations. Attempts to recalculate and calibrate offsets have been repeatedly attempted. A report on such attempts is posted on the website at:

<http://www.gen.ufl.edu/~maerc/stocking/reports/StepTest990628.pdf>

Project Management Website

The project website has been dramatically expanded into a comprehensive project data repository, tasks progress documentation, and public outreach tool. Most additions to the webpage have focused on the tasks component of the website at:

<http://www.gen.ufl.edu/~maerc/stocking/maintenance/frames.html>

QAPP Revision

Changes in the Quality Assurance Project Plan (QAPP) were necessitated by changes in the water quality sample processing lab from Harbor Branch Environmental Laboratory to a new contract lab, Tennessee Valley Authority – Environmental Chemistry Laboratory. The revised QAPP is attached as Appendix 3 and is posted on the website at:

<http://www.gen.ufl.edu/~maerc/stocking/reports/qapp991015.pdf>