Sapelo Island (SAP) NERR Nutrient Metadata
January 2002 - December 2002
Latest Update: May 22, 2025

I. Data Set and Research Descriptors

1) **Principal investigator(s) and contact persons** –

a) **Reserve contact**
Dorset Hurley
P.O. Box 15
Sapelo Island, GA 31327
Phone: 912-485-2251
e-mail: dhurley@darientel.net

b) **Laboratory contact**
Katy Austin
715 Bay Street
Marine Extension Service Laboratory
University of Georgia
Brunswick, GA 31520
Phone: 912-264-7268
e-mail: klaustin@uga.edu

c) **Other contacts and programs**
none

2) **Research objectives** – The nutrient monitoring program is designed upon vertical deployment (near benthic and near surface) of two sondes at each station in the upper and lower Duplin River. The Duplin River is a tidal basin with no freshwater influence within its headwaters apart from surficial aquifer weeping from the perched lens of water associated with Sapelo Island. This nutrient monitoring effort is tied into the Georgia Coastal Ecosystems, Long-Term Ecological Research (GCE-LTER) initiative and the University of Georgia Marine Extension Service water quality database whose collection and analysis of the water samples facilitates the database. This long-term data set is being developed to provide information on estuarine water mixing within the well-studied Duplin River basin in addition to providing a long-term characterization of water quality as related to nutrient loading within the Duplin.

a) **Monthly grab** (same objectives as above.)
b) **Diel sampling program** (same objectives as above.)

3) **Research methods**

a) **Monthly grab sampling program**

Monthly grab samples were taken at three stations within the Duplin River estuary. Surface water samples were taken at the Marsh Landing (ML) datasonde station, bottom water samples were taken at the Lower Duplin (LD) datasonde station, bottom samples were taken at Hunt Dock

(HD) and surface water samples were taken at the Flume dock (FD) using a Niskin bottle. All grab samples were taken in triplicate beginning at Marsh Landing with the collection of the last diel sample, which is collected by the ISCO sampler at low tide at the end of the tidal cycle. At the time of sample collection, latitude, longitude, time and depth were recorded. Samples were collected from the Niskin bottle into an acid-washed (10% HCl) polypropylene beaker for filtering. Two filter towers were set up, one acid-washed tower with a 0.45 um polycarbonate filter for nutrient filtering and one clean tower with a GF/F filter for chlorophyll filtering. A small amount of sample was used to rinse the nutrient filter tower and discarded. The tower was then filled to the 250-mL mark. The chlorophyll tower with the GF/F filter was also filled to the 250-mL mark and the two towers were connected by a small piece of tubing. The vacuum pump was turned on and when all 250 MS was through each filter, the vacuum was released. The nutrient sample tower was disconnected and an acid-washed 250-mL polypropylene bottle was rinsed and filled with the filtrate. Space was left in the sample bottle for expansion during freezing. If the first 250 milliliters went through the chlorophyll filter easily, the filtrate was discarded and an additional 50, 100 or 250 milliliters was filtered, depending on suspended sediment load, to concentrate the sample onto the filter. The chlorophyll filter was then removed with tweezers and placed face up in a petri dish, wrapped in aluminum foil and labeled with the volume filtered. The filter towers were rinsed between replicate grabs with distilled water and the nutrient filter tower was acid-washed between samples. Nutrient and chlorophyll filtering between grabs took approximately 10 minutes to complete. Samples were immediately placed on ice, in the dark and returned to the laboratory within six hours. Once in the laboratory, samples were frozen and processed within the specified times, except where flagged, for nutrient and chlorophyll-a concentrations. Nutrient and chlorophyll filtering between grabs took approximately 10 minutes to complete.

b) **Diel sampling program**

Tides & Currents Version 2.0c (tide window for Mud River at Old Teakettle Creek) was used to estimate low tide. An early, low, neap tide was selected each month for sampling. The ISCO sampler was deployed on the day previous to the grab sample date chosen for that particular month at 1.5 feet below the surface of the water. The ISCO sampler collected the first diel sample two hours later than low tide on the following day and continued collecting samples every two hours for the next 22 hours, representing a full tidal cycle, a total of 12 samples, and ending at low tide when grab sampling began. The ISCO sampler was secured while at Marsh Landing and the 12 samples were filter processed either in the field after completion of grab sampling at the Flume Dock or back in the laboratory. The filtration process for the diel samples follows the same process as for grab samples described above. High density polypropylene bottles were used to collect samples. A solution of 10% HCl is used for acid-washing; polypropylene bottles and filter towers are soaked in 10% HCl, then triple rinsed with distilled water; a squeeze bottle is used to acid wash (then rinse with distilled water) beakers and filter towers in the field between each sample collection.

Table 1: 2002 Duplin River NERR surface and bottom sampling depths

Month	Site	Surface sample depth	Bottom sample depth
Jan.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	20
Feb.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	21

March	Marsh Landing (ML), Lower Duplin (LD)	just below surface	22
March	Flume Dock (FD) Hunt Dock (HD)	just below surface	15
April	Marsh Landing (ML), Lower Duplin (LD)	just below surface	20
April	Flume Dock (FD) Hunt Dock (HD)	just below surface	9
May	Marsh Landing (ML), Lower Duplin (LD)	just below surface	18
May	Flume Dock (FD) Hunt Dock (HD)	just below surface	15
June	Marsh Landing (ML), Lower Duplin (LD)	just below surface	19
June	Flume Dock (FD) Hunt Dock (HD)	just below surface	4
July	Marsh Landing (ML), Lower Duplin (LD)	just below surface	18
July	Flume Dock (FD) Hunt Dock (HD)	just below surface	13
Aug.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	19
Aug.	Flume Dock (FD) Hunt Dock (HD)	just below surface	9
Sept.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	19
Sept.	Flume Dock (FD) Hunt Dock (HD)	just below surface	14
Oct.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	20
Oct	Flume Dock (FD) Hunt Dock (HD)	just below surface	11
Nov.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	20
Nov.	Flume Dock (FD) Hunt Dock (HD)	just below surface	13
Dec.	Marsh Landing (ML), Lower Duplin (LD)	just below surface	22
Dec.	Flume Dock (FD) Hunt Dock (HD)	just below surface	11
AVG	**Marsh Landing (ML), Lower Duplin(LD)**	**just below surface**	**20**
AVG	**Flume Dock (FD) Hunt Dock (HD)**	**just below surface**	**11**

4) **Site location and character –**

The Sapelo Island National Estuarine Research Reserve is located on the Southeastern Atlantic coast of the United States in McIntosh County, Georgia. The study area encompasses the Duplin River estuary, a tidally flushed drainage system flowing into Doboy Sound from the north. The Duplin River watershed occupies most of the Reserve, which also contains various forest types, sand dunes, a section of ocean beach and minor developed areas. The Duplin River estuary covers 3,300 acres between Sapelo Island and the mainland in McIntosh County. It drains a tidal bay and an extensive network of salt marshes about 6 miles long, into which there is little upland run-off. Diverse estuarine wetlands provide extensive and complex habitat types for fish and wildlife. The island contains several small, interior brackish and freshwater marshes fed by surficial aquifer expression (interdune meadow of Nannygoat beach: south end) and anthropogenic upland ditches and dikes produced in the early 19th century (north end). The upland forests are composed of several

diverse habitats including long leaf pine/slash pine forests, climax maritime forests, small amounts of pond cypress bays and naturally regenerated loblolly pine forests which are timbered on a 70 year selectively cut harvest rotation.

Locations-

Marsh Landing: Lat: 31 25' 4" N, Long: 81 17' 46" W
Lower Duplin: Lat: 31 25' 4" N, Long: 81 17' 46" W
Flume Dock: Lat: 31 28' 58" N, Long: 81 16'03" W
Hunt Dock: Lat: 31 28' 43" N, Long: 81 16' 23" W

Water Quality site descriptions-

Salinities at all sites vary according to localized rainfall and associated runoff. Upper Duplin River sites (Flume Dock and Hunt Dock) experience slightly lower salinities associated with rainfall events (2 -3ppt) as compared to lower Duplin River sites (Marsh Landing). Average salinities range from 15 ppt to 30 ppt depending on seasonal or event rainfall. Average tidal range of diurnal tidal cycle is approximately 2.5 meters twice daily. Due to high turbidity, all sites are lacking any persistent submerged aquatic vegetation and have an unconsolidated sandy/mud bottom (soft sediment) typical of southeastern near-ocean estuaries. Marsh sediments are relatively pristine and free of pollutants based on sediment analysis conducted in 1996 by C. Alexander, Skidaway Institue of Oceanography. Watershed is dominated by oceanic tidal influences associated with Doboy Sound. Depth are as follows: Marsh Landing (ML) and Lower Duplin (LD) ranges from 1.5 meters to 6.0 meters depending on tide, Hunt Dock's maximum depth is 4.27 meters, and Flume Dock's maximum depth is 4.27 meters.

5) **Coded variable definitions –** ML = Marsh Landing; LD = Lower Duplin; HD = Hunt Dock; FD = Flume Dock.

Each individual sample is given a 3 part name code in addition to other codes. The 3 part name code, "sapmlnut" for example, gives the reserve name (sap = Sapelo), station name (ml = Marsh Landing, etc), and SWMP program code (nut = nutrient monitoring program).

Sampling Site codes:
sapmlnut – Sapelo Island nutrient data for Marsh Landing
sapldnut – Sapelo Island nutrient data for Lower Duplin
saphdnut – Sapelo Island nutrient data for Hunt Dock
sapfdnut – Sapelo Island nutrient data for Flume Dock

The monitoring codes are set as "1" to indicate grab samples and "2" to indicate diel samples. Replicates are also given specific codes. Grab samples in which triplicate samples are taken utilize a "1" for the first sample, a "2" for the second sample, a "3" for the third sample, and an "S" for a sample that occurs twice at the same data and time. Diel samples are labeled with a "1"for the first sample and a "S" for the second sample that occurs on the same date and time.

6) **Data collection period -**

Diel Sampling

Site	Start Date	Start Time	End Date	End Time
ML	01/24/2002	1400	01/25/2002	1200
ML	02/18/2002	1023	02/19/2002	0823
ML	03/18/2002	0855	03/19/2002	0655
ML	04/15/2002	0800	04/16/2002	0600

ML	05/20/2002	1313	05/21/2002	1113
ML	06/17/2002	0948	06/18/2002	0748
ML	07/29/2002	0950	07/30/2002	0750
ML	08/26/2002	0821	08/27/2002	0621
ML	09/16/2002	1443	09/17/2002	1243
ML	10/28/2002	1020	10/29/2002	0820
ML	11/18/2002	1630	11/19/2002	1430
ML	12/09/2002	0904	12/10/2002	0704

Grab Sampling

Site	Start Date	Start Time	End Date	End Time
LD	01/25/2002	1228	01/25/2002	1240
LD	02/19/2002	0853	02/19/2002	0908
LD	03/19/2002	0725	03/19/2002	0737
LD	04/16/2002	0654	04/16/2002	0715
LD	05/21/2002	1145	05/21/2002	1210
LD	06/18/2002	0815	06/18/2002	0828
LD	07/30/2002	0813	07/30/2002	0827
LD	08/27/2002	0712	08/27/2002	0735
LD	09/17/2002	1308	09/17/2002	1325
LD	10/292002	0852	10/29/2002	0910
LD	11/19/2002	1424	11/19/2002	1442
LD	12/10/2002	0800	12/10/2002	0810
ML	01/25/2002	1155	01/25/2002	1214
ML	02/19/2002	0823	02/19/2002	0846
ML	03/19/2002	0656	03/19/2002	0715
ML	04/16/2002	0630	04/16/2002	0648
ML	05/21/2002	1113	05/21/2002	1140
ML	06/18/2002	0755	06/18/2002	0810
ML	07/30/2002	0746	07/30/2002	0805
ML	08/27/2002	0631	08/27/2002	0705
ML	09/17/2002	1246	09/17/2002	1302
ML	10/292002	0825	10/29/2002	0845
ML	11/19/2002	1402	11/19/2002	1417
ML	12/10/2002	0736	12/10/2002	0748
HD	03/19/2002	0802	03/19/2002	0815
HD	04/16/2002	0745	04/16/2002	0801
HD	05/21/2002	1246	05/21/2002	1310
HD	06/18/2002	0914	06/18/2002	0926
HD	07/30/2002	0855	07/30/2002	0915
HD	08/27/2002	0807	08/27/2002	0831
HD	09/17/2002	1400	09/17/2002	1420
HD	10/29/2002	0951	10/29/2002	1009
HD	11/19/2002	1511	11/19/2002	1526
HD	12/10/2002	0913	12/10/2002	0920
FD	03/19/2002	0829	03/19/2002	0840
FD	04/16/2002	0815	04/16/2002	0828
FD	05/21/2002	1335	05/21/2002	1355
FD	06/18/2002	0948	06/18/2002	1000
FD	07/30/2002	0940	07/30/2002	1004
FD	08/27/2002	0855	08/27/2002	0919
FD	09/17/2002	1433	09/17/2002	1450

FD	10/29/2002	1034	10/29/2002	1050
FD	11/19/2002	1538	11/19/2002	1550
FD	12/10/2002	0933	12/10/2002	0933

7) **Associated researchers and projects -**

For a complete viewing of associated projects visit the following website and search the collaborators links:
http://gce-lter.marsci.uga.edu/lter/
http://www.uga.edu/marine_advisory/

8) **Distribution** -

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Section 1. Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page http://cdmo.baruch.sc.edu/. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

II. Physical Structure Descriptors

9) **Entry verification** –

A Lachat QuikChem 8000 FIA+ is used to analyze nutrient concentrations. The instrument is calibrated daily for each parameter to be tested using a series of working standards. Once the calibration run is complete and satisfactory (r >/= 0.99900 up to 1.0000), the samples are set up for analysis. A set of mid-range check standards is used before the sample run, after approximately every 10 samples and at the end of the run to ensure the instrument is in control. The check standards must remain within + or – 10% of their original value during the entire run. Also, a blank sample is run and then spiked with each analyte to a known concentration, which

must come out within + or – 10% as well. Once the run is complete, the raw data is reviewed on the computer attached to the Lachat QuikChem 8000 FIA+ instrument, and the timing is checked to ensure proper integration of sample peaks. Once this is completed, the data is exported onto a floppy disk and transferred to another computer. Here the raw text file is converted to an Excel file and calculations are performed to obtain the appropriate units (ie. uM to ppm). The data file for each month is saved and the results are copied into a comprehensive file with all results. A data quality management (DQM) report is filed with the results. The data was entered and reviewed by Katy Austin, Research Coordinator I and Lab Manager at the University of Georgia Marine Extension Service.

10) **Parameter titles and variable names by data category**

Data Category	Parameter	Variable Name	Units of Measure
i) Phosphorus:	*Orthophosphate	PO4F	mg/L as P
ii) Nitrogen:	*Nitrite + Nitrate, Filtered	NO23F	mg/Las N
	*Nitrite, Filtered	NO2F	mg/L as N
	*Nitrate, Filtered	NO3F	mg/Las N
	*Ammonium, Filtered	NH4F	mg/L as N
	*Dissolved Inorganic Nitrogen	DIN	mg/Las N
iii) Plant Pigments:			
	Chlorophyll a	CHLA	µg/L
iv) Field Parameters:			
	none		

Notes:
1. Time is coded based on a 2400 hour clock and is referenced to Eastern Standard Time (EST).
2. Reserves have the option of measuring either NO23 or NO2 or NO3.

11) **Measured and calculated laboratory parameters** –

a) **Variables measured directly**

Nitrogen species:	NO2F, NO23F, NH4F
Phosphorus species:	PO4F
Other:	CHLA

b) **Computed variables**

NO3:	NO23F-NO2F
DIN:	NO23F+NH4F

12) **Limits of detection** –

Method Detection Limits (MDL), the lowest concentration of a parameter that an analytical procedure can reliably detect, have been established by the UGA Marine Extension Service Laboratory. The MDL is determined as 3 times the standard deviation of a minimum of 7 replicates of a single low concentration sample. Table 1 presents the current MDLs; these values are reviewed and revised periodically.

Table 1. Method Detection Limits (MDL) for measured water quality parameters.

Parameter	Variable	Mean Conc.	Std. Dev.	MDL	Dates in use
		mg/l as N or P		mg/l as N or P	
Ammonium	NH4F	0.047	0.001	0.003	Dec.'01 – Dec.'02
Nitrite	NO2F	0.126	0.001	0.004	Dec.'01 – Dec.'02
Nitrite + Nitrate	NO23F	0.126	0.001	0.004	Dec.'01 – Dec.'02
Orthophosphate	PO4F	0.087	0.001	0.001	Dec.'01 – Dec.'02

13) **Laboratory methods** –

i) **Parameter: NH4F**

QuikChem Method: 31-107-06-1-E

Method Reference: U.S. EPA 1983. USEPA-600/4-79-020. Method 350.1.

Standard Methods 4500-NH_3 H.

Method Descriptor: Samples were filtered with a 0.45 µm membrane filter and subjected to hypochlorite, which in the presence of phenol, catalytic amounts of nitroprusside and excess hypochlorite, yields indophenol blue, which measured at 630 nm is proportional to the original ammonia concentration.

Preservation Method: Samples filtered and stored frozen (-18 degC).

Holding Time: 2-3 days

ii) **Parameter: NO23F**

QuikChem Method: 31-107-04-1-C

Method Reference: U.S. EPA 1974. Method 353.2.

Standard Methods 4500-NO_3 F.

Method Descriptor: Filtered sample is subjected to cadmium reduction column to reduce nitrate to nitrite. The sample nitrite is then determined by diatizing with sulfanilamide and coupling with N-(1-napthyl)-ethylenediamine dihydrochloride to form a highly colored azo dye which is measured at 520 nm and is proportional to the original nitrate + nitrite concentration. The NO2F concentration (below) is subtracted from this result to give NO3F.

Preservation Method: Samples filtered and stored frozen (-18 degC).

Holding Time: 2 weeks

iii) **Parameter: NO2F**

QuikChem Method: 31-107-04-1-C

Method Reference: U.S. EPA 1974. Method 353.2.

Standard Methods 4500-NO_3 F.

Method Descriptor: Nitrite in a filtered sample is measured by closing off the cadmium reduction column so that the nitrate is not converted and the sample follows through the same chemistry as with NO3F to yield the original nitrite concentration.

Preservation Method: Samples filtered and stored frozen (-18 degC).

Holding Time: 1-2 days

iv) **Parameter: NO3F**
QuikChem Method: 31-107-04-1-C
Method Reference: U.S. EPA 1974. Method 353.2.
Standard Methods 4500-NO_3 F.
Method Descriptor: Nitrate is calculated from NO23F minus NO2F results.
Preservation Method: Samples filtered and stored frozen (-18 degC).
Holding Time: 2 weeks

v) **Parameter: PO4F**
QuikChem Method: 31-115-01-3-A
Method Reference: U.S. EPA 1978. Method 365.1.
Standard Methods 4500-P E.
Method Descriptor: Filtered sample is subjected to ammonium molybdate and antimony potassium tartrate under acidic conditions to form a yellow complex. This complex is reduced with ascorbic acid to form a blue complex, which absorbs light at 880 nm. The absorbance is proportional to the concentration of orthophosphate in the sample.
Preservation Method: Samples filtered and stored frozen (-18 degC).
Holding Time: 30 days

vi) **Parameter: CHLA**
APHA Standard Methods: 10200 H.
Method Reference:
Method Descriptor: Suspended sediment and other material in a water sample is concentrated onto a 47 mm GF/F filter under low vacuum. The sample is stored in a petri dish wrapped in aluminum foil in an airtight plastic bag kept on ice while in the field. The samples are then kept frozen and in the dark until analysis. The acetone extraction method is used to extract the chlorophyll over 2-24 hours and a spectrophotometer is used to obtain readings, which are calculated into a final result.
Preservation Method: Filters are stored frozen (-18 degC).
Holding Time: 28 days

14) **Reporting of missing data, data with concentrations lower than method detection limits**

Nutrient/Chla comment codes and definitions are provided in the following table. Missing data are denoted by a blank cell " " and commented coded with an "M". Laboratories in the NERRS System submit data that are censored at a lower detection rate limit, called the Method Detection Limit or MDL. MDL's for specific parameters are listed in the Laboratory Methods and Detection Limits Section (Section II, Part 14) of this document. Measured concentrations that are less than this limit are replaced with the minimum detection limit value and comment coded with a "B" in the variable code comment column. For example, the measured concentration of NO23F was 0.0005 mg/L as N (MDL=0.0008), the reported value would be 0.0008 with a "B" placed in the NO23F comment code column. Calculated parameters are comment coded with a "C" and if any of the components used in the calculation are below the MDL, the calculated value is removed and also comment coded with a "B". If a calculated value is negative, the value is removed and comment coded with an "N".

Note: The way below MDL values are handled in the NERRS SWMP dataset was changed in November of 2011. Previously, below MDL data from 2002-2006 were also coded with a B, but replaced with -9999 place holders. Any 2002-2006 nutrient/pigment data downloaded from the CDMO prior to December November of 2011 will contain -9999s representing below MDL concentrations.

Comment Code	Definition
A	Value above upper limit of method detection
B	Value below method detection limit
C	Calculated value
D	Data deleted or calculated value could not be determined due to deleted data, see metadata for details
H	Sample held beyond specified holding time
K	Check metadata for further details
M	Data missing, sample never collected or calculated value could not be determined due to missing data
P	Significant precipitation (reserve defined, see metadata for further details)
U	Lab analysis from unpreserved sample
S	Data suspect, see metadata for further details

15) **QA/QC programs –**

a) **Precision**

i. **Field variability** – Field replicates are successive grab samples. These are done in triplicate. Samples are filtered and placed on ice before the next sample is grabbed (usually about 10 minutes between grabs).
ii. **Laboratory variability** – Laboratory replicates are done in duplicate.
iii. **Inter-organizational splits** –Samples were analyzed by one lab.

b) **Accuracy**

i. **Sample spikes** – A blank sample is spiked with each set for each analyte to obtain a 100 % recovery + or – 10 %. One or two sample unknowns are spiked with each set for each analyte to obtain a 100 % recovery + or – 20 percent under ideal conditions.
ii. **Standard reference material analysis –** None.
iii. **Cross calibration exercises** - None.

16) **Other remarks**

On 05/22/2025 this dataset was updated to include embedded QAQC flags and codes for anomalous/suspect, rejected, missing, and below detection limit data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than using the original single letter codes used for the nutrient and pigment dataset along with the detailed sections in the metadata document for suspect, missing, and rejected data. Please note that prior to 2007, rejected data were deleted from the dataset so they are unavailable to be used at all. Suspect, missing, rejected and below minimum detection flags and appropriate three

letter codes were embedded retroactively for dataset consistency. The QAQC flag/codes corresponding to the original letter codes are detailed below.

Flag/code	*If also C*	Historic Letter Code	Historic Code Definition
<1> [SUL]		A	Value above upper limit of method detection
<-4> [SBL]	<-4> [SCB]	B	Value below method detection limit
no need to flag/code unless combined		C	Calculated value
<-3> [GQD]	<3> [GCR]	D	Data deleted or calculated value could not be determined due to deleted data, see metadata for details
<1> (CHB)		H	Sample held beyond specified holding time
<0> (CSM) unless other flag		K	Check metadata for further details
<-2> [GDM]	<-2> [GCM]	M	Data missing, sample never collected or calculated value could not be determined due to missing data
<-3> [SNV] and <1> [SCC] for components		N	Negative calculated value
(CRE) or F_Record {CRE}		P	Significant precipitation (reserve defined, see metadata for further details)
<0> (CUS)		U	Lab analysis from unpreserved sample
<1> (CSM)		S	Data suspect, see metadata for further details

In order to process the 2002 nutrient data described in this document into the EQWin software, a few sampling times had to be changed for the following data:

Date	Time	Station Code	Monitor Program	Rep	*Time changed to*
2/19/02	8:23	sapmlnut	2	1	
2/19/02	8:23	sapmlnut	2	S	
2/19/02	**8:23**	sapmlnut	1	1	**8:24**
2/19/02	**8:23**	sapmlnut	1	S	**8:24**
5/21/02	11:13	sapmlnut	2	1	
5/21/02	11:13	sapmlnut	2	S	
5/21/02	**11:13**	sapmlnut	1	1	**11:14**
5/21/02	**11:13**	sapmlnut	1	S	**11:14**
12/10/2002	9:33	sapfdnut	1	1	
12/10/2002	9:33	sapfdnut	1	S	
12/10/2002	**9:33**	sapfdnut	1	2	**9:34**
12/10/2002	**9:33**	sapfdnut	1	S	**9:34**
12/10/2002	**9:33**	sapfdnut	1	3	**9:35**
12/10/2002	**9:33**	sapfdnut	1	S	**9:35**