VIRGINIA CHESAPEAKE BAY PROGRAM
IN VIVO FLUORESCENCE CHLOROPHYLL A
SURVEY DATA DICTIONARY

Virginia Chesapeake Bay Water Quality Monitoring Program: Mainstem and Tributary In Vivo Fluorescence Component

- Mainstem Horizontal Fluorescence Data Dictionary
- Mainstem Vertical Fluorescence Data Dictionary

NOTES:
1) THIS DICTIONARY WAS REVISED ON April 12, 2011 AND SUPERSEDES ALL OTHER DICTIONARIES FOR THE VIRGINA VIVO FLUORESCENCE DATA

PROJECT PURPOSE
The state of Virginia, in cooperation with the US EPA Chesapeake Bay Program, has used in vivo fluorescence to measure horizontal and vertical profiles of chlorophyll a between fixed monitoring stations in the Virginia Chesapeake Bay mainstem since January 1991. The program is designed to give comprehensive spatial and temporal information on phytoplankton. Sampling is performed in conjunction With the Virginia phytoplankton and water quality monitoring programs.

NAMES AND DESCRIPTIONS OF ASSOCIATED DATA DICTIONARY FILES
The 2000 Users Guide to Chesapeake Bay Program Biological and Living Resources Data

PROJECT TITLE
Virginia Chesapeake Bay Water Quality Monitoring Program: Horizontal and Vertical Fluorescence Monitoring

CURRENT PRINCIPAL INVESTIGATORS

>PROGRAM MANAGER: Fredrick Hoffman, Virginia Department of Environmental Quality
>PRINCIPAL INVESTIGATOR: Dan Dauer, Old Dominion University
>TECHNICAL STAFF: Data collected by staff of Old Dominion University. Data verified by Suzanne Doughten, Old Dominion University
>PROGRAMMER/ANALYST: TBD, Old Dominion University
>DATA COORDINATOR: Suzanne Doughten, Old Dominion University
>PREVIOUS PARTICIPATING INVESTIGATORS: Larry Hass, Virginia Institute of Marine Sciences

CURRENT FUNDING AGENCIES
USEPA CHESAPEAKE BAY PROGRAM

PROJECT COST
NOT AVAILABLE

CURRENT QA/QC OFFICER
Suzanne Doughten, Old Dominion University

#POINT OF CONTACT FOR INQUIRES
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LOCATION OF STUDY
Chesapeake Bay and its tidal tributaries in Virginia.

DATE INTERVALS
01-01-1991 THRU 12-31-2010

ABSTRACT
Vertical fluorescence profiles were measured at station in the Chesapeake Bay Mainstem. Data were typically collected monthly between 1991 and present. At all stations in vivo fluorescence readings were made at 0.5, 1.0, 2.0, and 3.0 meters below the surface and ever three meters thereafter and one meter above the bottom. From 1991-1995 the Virginia Institute of Marine Sciences and Old Dominion University performed sampling. After 1996, all sampling was performed by Old Dominion University. Note due to contract changes starting in January 1996, station LE5.5 had a coordinate change. This station move was not documented until August 2005. Due to this station relocation, all vertical fluorescence data collected at the altered location had the station name changed to LE5.5-W in August 2005.

STATION NAMES AND DESCRIPTIONS

> Vertical Profile and Horizontal Transect End Point Stations.

-Stations collected by the Virginia Institute of Marine Sciences from 1991-1995 and By Old Dominion University from 1996-TO END OF PROJECT.

CB5.4	Central Chesapeake Bay, Main Bay
CB5.4W	Mouth of Great Wicomico River, Main Bay
CB5.5	Central Chesapeake Bay off of Dividing Creek, Main Bay
CB6.1	Central Chesapeake Bay off of Rappahannock Dumping Grounds, Main Bay
CB6.2	Central Chesapeake Bay, Main Bay
CB6.3	Central Chesapeake Bay North of Wolf Trap Light, Main Bay
CB7.1	Central Chesapeake Bay, Main Bay
CB7.1N	South of Tangier Island, Central Chesapeake Bay, Main Bay
CB7.1S	Central Chesapeake Bay off of Light Buoy G49, Main Bay
CB7.2	Central Chesapeake Bay off of Light Buoy G41, Main Bay
CB7.2E	Near Mouth of Mattawomam Creek, Main Bay
EE3.4	Off of Saxis Wildlife Management Area, Pocomoke Sound, Main Bay
EE3.5	Near Light 4S off Watts Island, Main Bay
LE3.6	Off Mouth of Rappahannock River
LE3.6N	Off Windmill Point of Rappahannock River
LE3.6S	Off Stingray Point of Rappahannock River
LE3.7	Mouth of Piankatank River, Main Bay
WE4.1	Central Bay, Mobjack Bay, York River
WE4.2	Off Mouth of York River
WE4.2N	Off of Hog Island, Mouth of York River, Mobjack Bay, York River
WE4.2S	Off of Goodwin Island, Mouth of York River, Mobjack Bay , York River
WE4.3	Mouth of Posquoson River, Mobjack Bay, York River

WE4.4 Mouth of Back River, Main Bay

-Stations sampled by Old Dominion University from 1991-END OF PROJECT

CB7.3 Lower Chesapeake Bay, Near Light Buoy R20, Main Bay
CB7.3E Lower Chesapeake Bay, Off of Old Plantation Light, Main Bay
CB7.4 Baltimore Channel, Mouth of Bay, Main Bay
CB7.4N Off of Fisherman's Island, Mouth of Bay, Main Bay
CB8.1 Off of Norfolk Airport, Off of light Buoy G11, Main Bay
CB8.1E Near Cape Henry Light, Near Bell Buoy G1TS. Mouth of Bay, Main Bay
LE5.5 Mouth of James River, off of Hampton Roads, Main Bay
LE5.5-W Mouth of James River, off of Hampton Roads, Main Bay

STATION NAMES, LATITUDES (decimal degrees), LONGITUDES (decimal Degrees), TOTAL DEPTHS (meters), LATITUDES (degrees, minutes and decimal Seconds), AND LONGITUDES (degrees, minutes and decimal seconds).

>Horizontal Transect End Point Stations and Vertical Fluorescence profile Stations.
-Stations collected by the Virginia Institute of Marine Sciences from 1991-1995 and By Old Dominion University from 1996-Present. All station positions in NAD83 coordinates.

STATION	LATITUTE	LONGITUDE	AVE DEPTH	Lat	Long	LL_DATUM
CB5.4	37.8001	-76.1747	32.4	37 48' 0.36"	-77 49' 31.08"	NAD83
CB5.4W	37.8134	-76.2947	5.3	37 48' 48.24"	-77 42' 19.08"	NAD83
CB5.5	37.6918	-76.1897	19.2	37 41' 30.48"	-77 48' 37.08"	NAD83
CB6.1	37.5883	-76.1625	13.1	37 35' 17.88"	-77 50' 15"	NAD83
CB6.2	37.4867	-76.1567	11.1	37 29' 12.12"	-77 50' 35.88"	NAD83
CB6.3	37.4115	-76.1597	12.5	37 24' 41.4"	-77 50' 25.08"	NAD83
CB7.1	37.6834	-75.9897	24.9	37 41' 0.24"	-76 0' 37.08"	NAD83
CB7.1N	37.7751	-75.9747	15.9	37 46' 30.36"	-76 1' 31.08"	NAD83
CB7.1S	37.5811	-76.0583	15.9	37 34' 51.96"	-77 56' 30.12"	NAD83
CB7.2	37.4115	-76.0797	21.9	37 24' 41.4"	-77 55' 13.08"	NAD83
CB7.2E	37.4115	-76.0247	13.3	37 24' 41.4"	-77 58' 31.08"	NAD83
EE3.4	37.9084	-75.7914	4.6	37 54' 30.24"	-76 12' 30.96"	NAD83
EE3.5	37.7925	-75.8436	27.1	37 47' 33"	-76 9' 23.04"	NAD83
LE3.6	37.5968	-76.2847	9.8	37 35' 48.48"	-77 42' 55.08"	NAD83
LE3.6N	37.6067	-76.2833	3.8	37 36' 24.12"	-77 43' 0.12"	NAD83
LE3.6S	37.5726	-76.2796	4.1	37 34' 21.36"	-77 43' 13.44"	NAD83
LE3.7	37.5306	-76.3069	7.3	37 31' 50.16"	-77 41' 35.16"	NAD83
WE4.1	37.3117	-76.3467	6.0	37 18' 42.12"	-77 39' 11.88"	NAD83
WE4.2	37.2417	-76.3867	14.1	37 14' 30.12"	-77 36' 47.88"	NAD83
WE4.2N	37.2517	-76.3908	4.0	37 15' 6.12"	-77 36' 33.12"	NAD83
WE4.2S	37.2367	-76.3867	3.4	37 14' 12.12"	-77 36' 47.88"	NAD83
WE4.3	37.1767	-76.3733	5.8	37 10' 36.12"	-77 37' 36.12"	NAD83
WE4.4	37.1101	-76.2933	7.4	37 6' 36.36"	-77 42' 24.12"	NAD83

-Stations sampled by Old Dominion University from 1991-Present

STATION	LATITUTE	LONGITUDE	AVE DEPTH	Lat	Long	LL_DATUM
CB6.4	37.2364	-76.2083	10.5	37 14' 11.04"	-77 47' 30.12"	NAD83
CB7.3	37.1168	-76.1253	13.7	37 7' 0.48"	-77 52' 28.92"	NAD83
CB7.3E	37.2286	-76.0542	17.8	37 13' 42.96"	-77 56' 44.88"	NAD83

STATION	LATITUTE	LONGITUDE	AVE DEPTH	Lat	Long	LL_DATUM
CB7.4	36.9934	-76.0103	13.8	36 59' 36.24"	-77 59' 22.92"	NAD83
CB7.4N	37.0582	-75.9728	13.2	37 3' 29.52"	-76 1' 37.92"	NAD83
CB8.1	36.9875	-76.1681	10.1	36 59' 15"	-77 49' 54.84"	NAD83
CB8.1E	36.9451	-76.0247	18.5	36 56' 42.36"	-77 58' 31.08"	NAD83
LE5.5	36.9967	-76.3033	21.4	36 59' 48"	-76 41' 12"	NAD83
LE5.5	36.9967	-76.3033	6	36 59' 56"	-76 41' 49"	NAD83

Average Station depths are based on a nine-year (1985-1994) average of Virginia Department of Environmental Quality; water quality hydrographic data collected concurrently with the zooplankton Samples.

METHODOLOGY DESCRIBING CHAIN OF CUSTODY FOR LAB SAMPLES
Not Applicable for this data set.

BIOLOGICAL ENUMERATION TECHNIQUES
Fluorometer readings - Horizontal and Vertical profiles.

FORMULAS, CALCULATIONS, AND CONVERSIONS

>DETERMINATION OF FLUORESCENCE IN FIELD SURVEY
In vivo fluorescence was measured using a Turner Model 57 Fluoreometer in all Virginia programs until 1997 (Chesapeake Bay Program Analytical Method Code-CHLF102, CHL103, CHL104). After April 1997 a TURNER MODEL 10-005R Fluorometer was used for in vivo measurements (Chesapeake Bay Program Analytical Method Code-CHLF105, CHL106). Beginning in 2003 a Seabird- wet star fluorometer, was used for in-vivo measurements (Chesapeake Bay Program Analytical Method Code-CHLF107).

DETERMINATION OF CHLORPHYLL A FOR DERIVATION OF FLUORESCENCE TO CHLOROPHYLL BY REGRESSIONS FOR DATA FROM THE VIRGINIA INSTITUTE OF MARINE SCIENCES

Spectrophotometric analysis of Chlorophyll A grab samples collected on Whatman GF/F filters during the cruise is used to formulate a linear regression of chlorophyll a against in vivo fluorescence (IVF). These linear regressions are then used to convert the remaining IVF's to chlorophyll. Only the resulting chlorophyll a, and not the IVF voltage itself, is contained in this data set. Zero chlorophyll a values reflect values below detection threshold of methods. Details of how regression curves for conversions of fluorescence to chlorophyll values are currently unavailable.

> DETERMINATION OF CHLORPHYLL A FOR DERIVATION OF FLUORESCENCE TO CHLOROPHYLL REGRESSIONS FOR DATA FROM OLD DOMINION UNIVERSITY
Spectrophotometric analysis of Chlorophyll A grab samples collected on Whatman GF/F filters during the cruise is used to formulate a linear regression of chlorophyll a against in vivo fluorescence (IVF). These linear regressions are then used to convert the remaining IVF's to chlorophyll. Regression are calculated for each days cruise and applied to data. In some cases separate regression curves are calculated for both horizontal and vertical profiles to provide more accurate conversions of fluorescence to chlorophyll values.

>DETERMINATION OF LATITUDE AND LONGITUDE IN HORIZONTAL FLUORESCENCE SURVEY FOR DATA COLLECTED BY OLD DOMINION UNIVERSITY
Sampling sites along transects were determined using the simple geometry of right triangles to compute latitude and longitude, Loran-C or GPS. Fluorescence samples are collected every 30 seconds while the boat is underway. Fluorescence values are recorded directly to a data logger. The actual sampling site latitudes and longitudes recorded to the data logger from Loran-C (from 1991 to July 1995)(Chesapeake Bay Program Analytical Method Code-CHLF102) or GPS (after July 1995, CBP Method codes CHLF105 and CHLF107)(Chesapeake Bay Program Analytical Method Code-CHLF104, CHLF106) receiver every five minutes. Samples site positions collected between the five minute intervals are interpolated using the following procedures. Calculations were based on the following assumptions: a) the transect was over a

straight line from departure or bench mark station to bench mark station or destination station, b) boat speed was assumed to be constant, Equations were based on the relationship of total strip recorder tape length being proportional to actual distance between measured boat positions. Sampling position was based on the distance from the starting position of
The strip recorder tape of the at sample time against the total length of the tape at the destination station.

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TOT_DIST=(((LONG_DES-LONG_DEP)**2)+((LAT_DES-LAT_DEP)**2))
ALPHA= ARCTAN((LAT_DES-LAT_DEP)/(LONG_DES-LONG_DEP))
SMP_DIST = TOT_DIST * (DIS_MM / TOT_LEN);
SAMPLE LONG ~IF LONG_DEP < LONG_DES THEN
        LONG = LONG_DEP + ABS(COS(ALPHA) * SMP_DIST;
                ELSE LONG = LONG_DEP - ABS(COS(ALPHA) * SMP_DIST;
SAMPLE LAT ~IF LAT_DEP < LAT_DES THEN
       LAT = LAT_DEP + ABS(SIN(ALPHA) * SMP_DIST);
               ELSE LAT = LAT_DEP - ABS(SIN(ALPHA) * SMP_DIST);
```

WHERE
TOT_DIST- Actual Total Distance Between Departure and Destination Station
LONG_DES- Longitude Destination Station
LONG_DEP- Longitude Departure Station
LAT_DES- Latitude Destination Station
LAT_DEP- Latitude Departure Station
SMP_DIST- Actual distance of sampling site from transect Departure Station
DIS_MM- Distance from beginning of strip chart recording to sampling point
TOT_LEN- Total Length of Strip Chart Recording in millimeters

>DETERMINATION OF LATITUDE AND LONGITUDE IN THE HORIZONTAL FLUORESCENCE SURVEY CONDUCTED BY THE VIRGINIA INSTITUTE OF MARINE SCIECNES.
-Chesapeake Bay Program Analytical Method Code-CHLF103
Station positions in data set are determined in the field. Station latitudes and longitudes recorded from a Loran-C (1991- July 1995) (CHLF103) receiver when sampling occurs. The actual sampling site coordinates for each sampling event are recorded in data set.

>DETERMINATION OF LATITUDE AND LONGITUDE IN ALL MAINSTEM VERTICAL FLUORESCENCE SURVEY FROM THE VIRGINIA INSTITUTE OF MARINE SCIENCES AND OLD DOMINION UNIVERSITY.
-Chesapeake Bay Program Analytical Method Code-CHLF103
From 1991 to present, station positions in data set are approximations of actual positions in the field. The sampling station latitudes and longitudes are programmed in to a Loran-C (from 1991 to July 1995) or GPS (after July 1995) receiver and the sampling commences when the boat reaches the preset coordinates. The actual Loran or GPS coordinates for each sampling event are not recorded in data set.

MONITORING VARIABLES QA/QC PLAN FOR PROJECT
N/A

VARIABLE NAMES, MEASUREMENT UNITS AND DESCRIPTIONS

>PARAMETER: CHL_F (Fluorescence Value in Micrograms Chlorophyll a per Liter)
-COLLECTION METHODS: pump/horizontal
-SAMPLE PRESERVATIVES: none
-SAMPLE STORAGE ENVIRONMENT: none
-TIME IN STORAGE: 0 days [Discrete chlorophyll a filters in freezer 1 week - 4 months before grinding and processing]
-LAB TECHNIQUES WITH REFERENCES: In vivo fluorescence methods; fluorometer readings are calibrated with grab samples for chlorophyll a collected in the field.

Lorenzen, C.J. 1966. A method for the continuous measurement of in vivo chlorophyll concentration. Deep-Sea Res. 13:223-227.

Strickland, J. D. H. and T. R. Parsons. 1972. A practical handbook of seawater analysis. Fish. Res. Bd. Canada. Bull. 167. Ottawa. 310PP.

>PARAMETER: LATITUDE (Decimal Degrees), LONGITUDE (Decimal Degrees) VERTICAL AND HORIZONTAL SURVEYS All data is provided in NAD83 coordinates.
-COLLECTION METHODS: Calculated for Horizontal Survey Standard Position Reported for Vertical Surveys
-SAMPLE PRESERVATIVES: None
-SAMPLE STORAGE ENVIRONMENT: None
-TIME IN STORAGE: None
-LAB TECHNIQUES WITH REFERENCES: Between 1984 and 1995, station positions in data set are approximations of actual positions in the field. Loran-C, GPS and NAD-83 was used for position determination. See FORMULAS, CALCULATIONS AND CONVERSIONS for detailed explanation of position estimation in this data set.

>PARAMETER: SALZONE (Salinity Zone),-Vertical Fluorescence Only
-COLLECTION METHODS: Hydrolab CTD
-SAMPLE PRESERVATIVES: None
-SAMPLE STORAGE ENVIRONMENT: None
-TIME IN STORAGE: None
-LAB TECHNIQUES WITH REFERENCES: Water column salinity is recorded Concurrently with fluorescence measurements. Salinity values at depth are used for salinity classification. Salinity classes are as follows: Fresh 0 - 0.5 ppt (F), Oligohaline >0.5 - 5.0 ppt(O), Mesohaline >5.0 - 18.0 ppt (M) and Polyhaline >18.0 ppt (P), Not Available (N).

>PARAMETER: SAMPLE_DEPTH (Sample Collection Depth in Meters)
HORIZONTAL AND POTOMAC FLUORESCENCE SURVEYS
-COLLECTION METHODS: A hull pump mounted 0.5 meters below the boat waterline is used to pump water through the fluorometer.
-SAMPLE PRESERVATIVES: None
-SAMPLE STORAGE ENVIRONMENT: None
-TIME IN STORAGE: None
-LAB TECHNIQUES WITH REFERENCES: N/A

>PARAMETER: SAMPLE_DEPTH (Sample Collection Depth in Meters)
VERTICAL FLUORESCENCE SURVEYS
-COLLECTION METHODS: Water is pumped from depth. A Hydrolab or Seabird CTD and hose mounted on the sampling array are lowered through the water column to obtain profiles.
-SAMPLE PRESERVATIVES: None
-SAMPLE STORAGE ENVIRONMENT: None
-TIME IN STORAGE: None
-LAB TECHNIQUES WITH REFERENCES: N/A

>PARAMETER: VOLTS (Fluorometer Instrument Voltage in Mill volts)
-COLLECTION METHODS: pump/horizontal
-SAMPLE PRESERVATIVES: none
-SAMPLE STORAGE ENVIRONMENT: none
-TIME IN STORAGE: 0 days [Discrete chlorophyll a filters in freezer 1 week - 4 months before grinding and processing]
-LAB TECHNIQUES WITH REFERENCES:
For Data collected after July 1,1999, the original fluorometer readings (voltages) are retained in the database for users who wish to recalculate chlorophyll concentration data for any reason. In vivo fluorescence methods; fluorometer readings are related to chlorophyll A concentrations by a regression calibrated with grab samples for chlorophyll a collected in the field.

Lorenzen, C.J. 1966. A method for the continuous measurement of in vivo chlorophyll concentration. Deep-Sea Res. 13:223-227.

Strickland, J. D. H. and T. R. Parsons. 1972. A practical handbook of seawater analysis. Fish. Res. Bd. Canada. Bull. 167. Ottawa. 310PP.

>DATA ENTRY METHOD: Fluorescence reading recorded directly to a data logger or PC from fluorescence instrument. Manual entry of fluorometry readings employed if there is an equipment failure.
>DATA VERIFICATION: Visual comparison and parameter checking programs

SPECIES IN-HOUSE CODES AND SCIENTIFIC NAMES
Not Applicable in this data set

#VARIABLE NAMES AND DESCRIPTION FOR DATA FILES
Structure for data files on: http://www.chesapeakebay.net

Name	Type	Width	Variable Definitions
SOURCE	Text	10	Data Collection Agency
CRUISE	Text	6	Chesapeake Bay Program Cruise Number
SAMPLE_DATE	Date/Time	8	Sampling Date (YYYYMMDD)
SAMPLE_TIME	Date/Time	8	Sample Collection Time(HH:MM:SS)
LATITUDE	Number	8	Latitude in Decimal Degrees
LONGITUDE	Number	8	Longitude in Decimal Degrees
STATION	Text	15	Sampling Station
SAMPLE_TYPE	Text	7	Sample Type
SAMPLE_DEPTH	Number	4	Sample Collection Depth (Meters)
PARAMETER	Text	10	Parameter
VALUE	Number	4	Parameter Value
UNITS	Text	10	Parameter Reporting Units
QUALIFIER	Text	10	Chlorophyll a Detection Limit
METHOD	Text	5	Chlorophyll a Method Code
SALZONE	Text	2	Salinity Zone
R_DATE	Date/Time	8	Version Date of Data(YYYYMMDD)

The following field may also appear in a downloaded data set:

Name	Type	Width	Variable Definitions
BASIN	Text	20	Chesapeake Bay Basin Designation
HUC8	Text	8	USGS Eight Digit Hydrologic Unit Code
CATALOGING_UNIT_DESCRIPTION	Text	50	USGS Cataloging Unit Code Description
FIPS	Text	5	Federal Information Processing Code
STATE	Text	3	Federal Information Processing Code State Designation
COUNTY_CITY	Text	30	Federal Information Processing Code City or County Designation
LL_DATUM	Text	5	Latitude and Longitude Geographic Datum
VOLTS	Number	8	Fluorometer Voltage Reading (mill volts)

REFERENCE CODES IN DATA FILES AND TAXONOMIC KEY
See 2000 Users Guide to Chesapeake Bay Program Biological and Living Resources Data for full Listing.

>SOURCE: Data Collection Agency
ODU - Old Dominion University
VIMS- Virginia Institute of Marine Sciences.

>SAMPLE_TYPES-Sample Type

SAMPLE_TYPE	DESCRIPTION

ISM_H	In-Situ Measurement, Collected As Part Of A Horizontal Transect
ISM_V	In-Situ Measurement, Collected As Part Of A Vertical Profile

>PARAMETER and UNITS-Parameter Description and reporting units

PARAMETER	DESCRIPTION	UNITS
CHL_F	CHLOROPHYLL A FLUORESENCE	ug/l

>PROJECT- Chesapeake Bay Program Project Id

PROJECT	DESCRIPTION
MAINSTEM	CHESAPEAKE BAY MAINSTEM

>SER_NUM- Sample Serial Number

>QUALIFIER- Chlorophyll a Detection Limit Code

QUALIFIERS	DESCRIPTION
“”	Greater than zero
#	Trace (less than an unknown detectable value)
<	Less than the detection limit of the method
J	Estimated value
N	Not detected
NA	Not recorded/not applicable/parameter value acceptable

>METHOD: Chlorophyll a Method Code

PARAMETER	METHOD	DESCRIPTION
CHL_F	102	Fluorescence Is Measured With A Turner Model 57 Fluorometer, Position By Interpolation From Loran-C Fix Taken Every 5 Minutes
CHL_F	103	Fluorescence Is Measured With A Turner Model 57 Fluorometer, Position By Loran-C At Sampling Time
CHL_F	104	Measured With A Turner Model 57 Fluorometer, Position By GPS At Sampling Time
CHL_F	105	Measured With A Turner Model 10-005r Fluorometer, Position By GPS At Sampling Time
CHL_F	106	Fluorescence Is Measured With A Turner Model 10-005r Fluorometer, Position By Interpolation From GPS Fix Taken Every 5 Minutes.
CHL_F	107	Measured With A Seabird- Wet Star Fluorometer, Position by GPS taken at Sampling Time

>CRUISE: Chesapeake Bay Program Cruise Number
See 2000 Guide to Biological and Living Resources Data

>SALZONE: Salinity Zone
F - Tidal fresh (0 - 0.5 ppt)
O - Oligohaline (>0.5 - 5.0 ppt)
M - Mesohaline (>5.0 - 18.0 ppt)
P - Polyhaline (>18.0 ppt)
N - Not Available

>STATION: Sampling Station- Vertical Surveys only
See STATION NAMES, LATITUDES, LONGITUDES, and AND TOTAL DEPTHS for details.

>LL_DATUM: Latitude and Longitude Geographic Datum

LL_DATUM	DESCRIPTION
NAD27	NORTH AMERICAN DATUM 1927
NAD83	NORTH AMERICAN DATUM 1983

>BASIN - Chesapeake Bay Basin Designation
Chesapeake Bay

>HUC8 -USGS Eight Digit Hydrologic Unit Code

HUC8	CATALOGING_UNIT_DESCRIPTION
00000000	ATLANTIC OCEAN
02050306	LOWER SUSQUEHANNA
02060001	UPPER CHESAPEAKE BAY
02060004	SEVERN
02060005	CHOPTANK
02060007	BLACKWATER-WICOMICO
02060008	NANTICOKE
02070011	LOWER POTOMAC
02080101	LOWER CHESAPEAKE BAY
02080102	GREAT WICOMICO-PIANKATANK
02080104	LOWER RAPPAHANNOCK
02080105	MATTAPONI
02080106	PAMUNKEY
02080107	YORK
02080108	LYNNHAVEN-POQUOSON
02080109	WESTERN LOWER DELMARVA
02080206	LOWER JAMES
02080208	HAMPTON ROADS

>FIPS -Federal Information Processing Code

FIPS	COUNTY/CITY NAME
00000	VIRGINIA COAST
24019	DORCHESTER
24037	SAINT MARYS
24039	SOMERSET
24045	WICOMICO
51001	ACCOMACK
51036	CHARLES CITY
51073	GLOUCESTER
51093	ISLE OF WIGHT
51095	JAMES CITY
51097	KING AND QUEEN
51101	KING WILLIAM
51103	LANCASTER
51115	MATHEWS
51119	MIDDLESEX
51127	NEW KENT
51131	NORTHAMPTON
51133	NORTHUMBERLAND
51149	PRINCE GEORGE
51175	
51181	SURRY
51183	
51199	YORK
51550	CHESAPEAKE CITY
51650	HAMPTON CITY

51700 NEWPORT NEWS CITY
51710 NORFOLK CITY
51735 POQOUSON CITY
51810 VIRGINIA BEACH CITY

NUMERICAL VARIABLE NAMES - WARNING AND ERROR BOUNDS

VARIABLE	VALID RANGE
CHL_F	0.00 - 881.4
SAMPLE_DATE	19910102 – 20041230
LATITUDE	SEE STATION NAMES, LATITUDE AND LONGITUDES
LONGITUDE	SEE STATION NAMES, LATITUDE AND LONGITUDES
R_DATE	19950501 - 20041231
SAMPLE_DEPTH	0.5-36.0
SAMPLE_TIME	5:00:00 - 20:20:00 Missing Time Denoted as 00:00

IMPORTANT DATA REVISONS

THE LIVING RESOURCES DATA MANAGER RECOMMENDS THAT ALL DATA ANALYSES BE PERFORMED WITH THE MOST RECENT DATA SET VERSIONS AVAILABLE. HOWEVER, IF YOU HAVE BEEN WORKING WITH OLDER DATA SETS THE FOLLOWING ARE IMPORTANT CHANGES TO BE AWARE OF:

NOTE: Data with raw instrument voltages is currently available only by request. Please contact the Living Resources data Manager for details.

Summer 2002- All data is provided in NAD83 coordinates. Data collected under other datum's have been converted.

Note: The 1991-1995 portion of this data set does not meet current EPA sampling position policy. Sampling locations were not directly measured with GPS and latitude/longitude values in the files are estimated.

OCTOBER 1997- Salinity Zones placed in 1991-1996 Vertical Fluorescence data sets based on available Virginia DEQ Water Quality

MAY 1998- Data from the May 1998 cruises is not available due to equipment failure.

08/11/2005. Note due to contract changes starting in January 1996, station LE5.5 had a coordinate change. This station move was not documented until August 2005. Due to this station relocation, all data collected at the altered location had the station name changed to LE5.5-W in August 2005. This affects only vertical fluorescence measurements.

Note: There are numerous documented data gaps and analytical notes for this data set from July 1998 forward. Please contact the Living Resources data Manager for details.

14FEB05 -At 1007 on horizontal profile, stopped at station CB7.1S to sample. Sea conditions made it unsafe to sample, so resumed horizontal sampling at 1012. Only two stations collected on this date due to weather conditions.

15FEB05 -There was a problem with the Turner fluorometer in the field which took time to resolve through troubleshooting. For station CB7.1N there is no vertical profile. For station CB7.1 the vertical profile starts at 15 meters. There is no horizontal transect from station CB7.1N to station CB7.1. Horizontal profile starts at 0845.

14MAR05 - For station CB7.3 E, collected bottom at 17 meters because rough weather and strong current pulling on hose and could not reach 24 meter depth.15MAR05-16MAR05- Combined with days to obtain valid regression.

06April2005 and 11, 2005- There was a problem with the datalogger recording data for the Turner Fluorometer. The fluorometer readings were acceptable in the field, so the problem was not discovered until the data was downloaded back in the laboratory after the cruise. There will be no vertical fluorometry for these dates. The horizontal fluorometry will be reported from the Wet Star fluorometer.

05APR05-Horizontal transect from station CB7.3E to station CB7.2E is very low when compared to other data collected on this date. A grab chlorophyll *a* sample was not collected during this transect. This data from time 1145 to 1230 was kept in the horizontal transect, because it was close to values collected for the surface at station CB7.2, and the path the boat follows to go from station CB7.3E to CB7.2E would be in open water comparable to station CB7.2.

09MAY05-Low values seen during part of horizontal transect indicate there may have been a flow problem for this date at some of the stations. Will use the data from the wet star fluorometer which agreed better with the horizontal chlorophyll grab samples. For the vertical data on station CB7.2E, CB6.1 and CB6.3 the 0.5 meter value was omitted.

10MAY05- On vertical profile, no data at the bottom (14 meters) on station CB5.5.

11MAY05- Could not obtain a good regression from the vertical data on this date. Will only use horizontal data from the Turner fluorometer on day 3.

14JUN05- Had to do separate regressions for the vertical and horizontal profiles. For the vertical profile hd to omit stations CB7.1, CB7.1N and CB7.1S to obtain an acceptable r^2.

15JUN05-Could not get a good r^2 for the vertical data, so will not report vertical data for this date.

27JUN05-Had trouble achieving a good r^2, deleted 5 points from the curve to achieve an acceptable correlation.

29JUN05- Could not get good regression for vertical profile. Only submitted horizontal data for this date.

1 NOV 2005- All vertical fluorescence measurements will be taken using a Seabird- Wet Star Fluorometer. Horizontal data when collected is collected using a Turner Fluorometer. Separate regressions are done for each instrument.

1 NOV 2005- No horizontal data available for month, no vertical data for EE3.4, EE3.5, CB5.4W, CB7.1, CB7.1N and CB7.1S

1 DEC 2005- Due to weather conditions data was obtained from the following stations: WE4.1, WE4.2, WE4.3, WE4.4, LE5.5-W, CB7.3 and CB6.4.

10JAN06-19JAN06 TURNER FLUOROMETER Used fluorometric probe for vertical data. R2 low due to not very much variation in chlorophyll a values. Combined first three days for regression on horizontal. Due to weather conditions the following station was not collected: EE3.4. WET STAR FLUOROMETRIC PROBE was used for Horizontal data. In horizontal profiles CB7.4N 1 meter reading, CB6.2 1 meter reading and CB7.3E 1 and 2 meter readings not valid, deleted from data set.

FEBRUARY 2006. The February Chesapeake Bay mainstem cruise was originally scheduled for February 6-9, 2006. Due to unanticipated mechanical problems with the Research Vessel Slover and shipyard commitments for the rest of the month, could not use the R/V Slover for this cruise. Rick Hoffman of Virginia

Department of Environmental Quality agreed that we will sample a second June cruise which had been cut due to lack of funds in place of the February cruise.

MARCH 2006. All fluorometery data collected is from the Turner fluorometer for both horizontal and vertical data. No salinity data is available during the horizontal profile to calculate the salzone. In addition, a GPS linked to a computer is unavailable, so the lat/long were interpolated between stations. Hardly any variety on chlorophyll a values and had problems getting a good regression due to this.

03APR06-07APR06 Horizontal data fromFROM TURNER FLUOROMETER- Higher chlorophyll a values observed between part of the horizontal transect from station CB6.2 to LE3.7 (time 1343 to 1409) were confirmed by a grab chlorophyll a sample collected during this time period. After leaving station CB5.5 en route to station CB5.4W, there was no water flowing through the fluorometer for approximately the first 13 minutes of this transect. Low values confirmed from chlorophyll a samples collected. this station on horizontal, some calculate out to be below zero (negative values).

03APR06-07APR06 Vertical data FROM WET STAR FLUOROMETRIC PROBE-Low values confirmed from chlorophyll a samples collected.Very low chlorophyll a values on station CB7.3 vertical profile and around

23MAY06-25MAY06 Vertical data FROM TURNER FLUOROMETER. Day one had Extremely rough weather. Came out of river into Chesapeake Bay, and too rough to sample stations. Headed into dock in Yorktown, VA to wait for winds and seas to die down so can safely sample. Horizontal fluorometry collected from 0930 to 1020, but turn off all instrumentation when research vessel went into safe harbor. Restart collecting fluorometry after collected first station WE4.2.
Day 2- Missing some sections of the GPS data and had to interpolate lat/long at the following times:1123 to 1135, 1535 to 1541 and 1543 to 1551. Day 3-Low chlorophyll a values seen on the horizontal profile were confirmed by chlorophyll samples collected in the field

23MAY06-25MAY06 FROM WET STAR FLUOROMETRIC PROBE-No 1 and 2 meter readings recorded on station CB6.2 and station CB6.1. No one meter recording on station LE3.6. Station WE4.2 values had to be deleted from the curve to get a good r2, and when reviewing the data this data did not agree with the chlorophyll a samples collected in the field. Deleted station WE4.2 from the vertical profile data submitted. No 1 meter reading recorded on station CB7.3E. Had trouble obtaining a good r2, so combined day 2 with day 3 for the regression. Omitted 4 samples to obtain an acceptable regression for this date. For the probe for day 3 obtained a very good regression, so for this date used the regression generated with only day 3 data.

05JUN06-07JUN06 FROM TURNER FLUOROMETER- Used fluorometric probe for vertical data. WET STAR FLUOROMETRIC PROBE was used for horizontal data combined all 3 days of data to make curve for this date. Station CB8.1E could not be sampled due to Navy activity on the station. Total depth for station CB5.4 was 33 meters, but had to sample bottom at 27 meters due to strong currents that prevented the rosette from reaching the bottom. Station CB7.2 was 22 meters but had to stop collecting the vertical profile after 9 meters (collected WTEMP and fluorometric probe data at 10 meters) because sea conditions were very rough. The cable to the rosette was under extreme stress and was "snapping", so research vessel technicians stopped the sampling so they did not damage the instruments. The bottom sample for this station was collected at 9 meters. For WET STAR FLUOROMETRIC PROBE Combined all 3 days of data to make curve for this date.

19JUN06-21JUN06 TURNER FLUOROMETER used for vertical data. WET STAR FLUOROMETRIC PROBE Had trouble obtaining a good r2 for the regression. Deleted 7 out of 29 points. When reviewed data carefully at stations deleted values from, only the chlorophyll a sample from CB7.1S surface did not match up with the calculated fluorometery value. Station CB8.1E could not be sampled due to Navy activity on the station. Research Vessel was not allowed to approach area.

10JUL06-12Jul06-Used WET STAR fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.On station CB6.1, could not get the 12 meter profile readings due to how rough the station was. Stopped profile at 11 meters and collected bottom at this depth.

11JUL06-Omitted station EE3.4 from regression. Chlorophyll a samples that were collected and analyzed are lower than the fluorometry values recorded. This is probably due to high turbidity at this station, the secchi was only 0.4 meters.

12JUL06-Not a lot of variety for the chlorophyll a values and fluorometric values on the vertical probe. The r2 for this curve was low due to this. When checking the data, it matched well with the chlorophyll a samples collected.

24JUL06-26JUL06- Used WET STAR fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

25JUL06- For stations CB7.2 and CB7.2E the surface values calculated by the fluorometer probe are low compared to the values obtained from the chlorophyll a samples collected in the field. These samples were deleted from the regression equation. Believe the fluorometric probe is underestimating fluorometry on this two stations on the surface.

26JUL06- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Underway salinity was not collected on this date, due to a problem with the computer.

14AUG06-17AUG06-Used WET STAR fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

14AUG06-Problem with computer file for CB7.4N. Do not have vertical profile date for this station. On CB7.1S do not have a value for 12 meters. Was very rough seas on this date, almost stopped sampling several times during day due to weather. r2 was low.

15AUG06-Only two stations collected on this date due to weather. No horizontal grab samples collected, so used the regression from day 3 to calculate the data. Salinity was not recorded underway on this date, so it is reported as "N" in the data file.
16AUG06- Missing portions of GPS data, for the following times lat/long values were interpolated: 0707 to 0711, 0853 to 0854 and 0857 to 0858.
Were unable to reach bottom on station CB5.4 due to currents pulling on cable.

28AUG06-30AUG06- Used WET STAR fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

28AUG06- On station CB7.4N there is no one meter fluorometry reading due to rosette bouncing so much from the seas. Air bubbles must have been present. Due to a power interruption missing 5 minutes of the horizontal profile from station CB7.4N to station CB7.3 at time 1045 to 1050. Did not collect station CB7.1 due to unsafe weather conditions.

29AUG06-Due to weather conditions, could only reach 31 meters on station CB5.4 and could only reach 17 meters on station CB7.2.

18SEP06-20SEP06-Used WET STAR fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

18SEP06-On station LE3.7, the first two meters for the vertical probe data are invalid and were not submitted. On station CB7.3, the first one meter for the vertical probe data is invalid and was not submitted. Salinity data underway was invalid until 1350. The SALZONE is recorded as N until this point. Did not collect station CB7.1 and CB7.1N due to unsafe weather conditions.

19SEP06-20SEP06-Hardly any variety for the chlorophyll a grab samples collected on this date. Combined with the grabs taken on day 2 to obtain a valid regression.

October 2006-Could not sample on October 17, 19, 20, 23, 24 and 25, 2006 due to weather conditions that made sampling unsafe. Did not collect stations WE4.2, WE4.3, WE4.4, LE5.5-W and CB6.4 due to these unsafe weather conditions.

16OCT06-18OCT06 Used TURNER FLUOROMETER probe for vertical data. Regression for horizontal profile labeled HZ. Turner fluorometer did not collect data from 1614 to 1636 on 16 0ct. On station CB5.4, the station was 34 meters but could only reach 31 meters due to currents.

14NOV06-17NOV06 Used TURNER fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

17Nov06-Salinity data underway was not collected due to a problem with the computer collecting the underway data. The SALZONE is recorded as N.

11DEC06-13DEC06- Used TURNER fluorometric probe for vertical data.

13DEC06-Salinity data underway was not collected due to a problem with the computer collecting the underway data. The SALZONE is recorded as N.

12DEC06-For station CB7.3E, do not have data for 1 and 2 meters on this station. For station LE3.6, do not have data for 1 meter on this station.

Cruise CBP 452
Sea conditions made it unsafe to sample on January 8 and 10, 2007. On January 12 were only able to sample 3 stations due to deteriorating weather conditions. Rescheduled the research vessel and sampled the remaining stations on January 18, 2007.

09JAN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Very little variety for the chlorophyll a samples collected during the horizontal profile. Combined data with day 2 to get good regression.

09JAN07 FROM WET STAR FLUOROMETRIC PROBE
For station WE4.2 there is no 1 meter reading for fluorometry.
Salinity values from the Sea Bird CTD were not valid on this date. Used the salinity collected from the YSI CTD to calculate SALZONE.

1JAN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

12JAN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Since only two stations were collected, only 2 grab samples collected. Combined with day 2 for the regression curve.

18JAN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Since this was a short day, only collected 3 grab samples. Only 3 samples were used for regression curve.

18JAN07 FROM WET STAR FLUOROMETRIC PROBE
Did not get a very good r2, no obvious outliers. Not a lot of variety with the chlorophyll a values. When compared chlorophyll a values calculated from the regression to the chlorophyll samples collected, had very good agreement, so believe the fluorometry vertical probe data is accurate.

CRUISE CBP 453
Sea conditions made it unsafe to sample on February 13-16, 2007. Rescheduled the research vessel and sampled the remaining stations on February 27 and 28, 2007.

12FEB07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Only had an r2 of 0.7, and had to delete the first grab of the morning in the regression. When comparing the beginning of the horizontal transect to the fluorometry horizontal grab and chlorophyll a surface value, the fluorometer overestimated the chlorophyll a. Deleted the horizontal data from the beginning of the day as invalid.

12FEB07 FROM WET STAR FLUOROMETRIC PROBE
Station CB7.3E 1 and 2 meter readings invalid, not reported.
Started vertical profile at 1.6 meters on CB6.4, so no 1 meter value collected. 2 meter reading is not valid, so it was not reported. Station WE4.1 1 meter reading invalid, not reported. Station WE4.2 1 and 2 meter readings invalid, not reported. Station WE4.3 1 meter reading invalid, not reported.

27FEB07 FROM TURNER FLUOROMETER
On this date there was thick fog on the Chesapeake Bay. Waited at port for fog to clear, then headed out approximately 1000. When reached the Bay the fog was too thick to safely sample, so went into a safe harbor. Turned off the fluorometer at this point at approximately 1100, and turned the fluorometer back on when went back out to sample at approximately 1230. The salinity did not record in the morning on the underway profile, so SALZONE is recorded as N for this time period. There are on chlorophyll a grab samples collected during the morning to confirm the calculated values from the fluorometer. Omitted the data at the end of the day for the transect from LE3.7 to LE3.6, because when comparing the fluorometry horizontal grab and chlorophyll a surface value, the fluorometer overestimated the chlorophyll a. Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

27FEB07 FROM WET STAR FLUOROMETRIC PROBE
On this date there was thick fog on the Chesapeake Bay. Waited at port for fog to clear, then headed out approximately 1000. When reached the Bay the fog was too thick to safely sample,so went into a safe harbor. Turned off the fluorometer at this point at approximately 1100, and turned the fluorometer back on when went back out to sample at approximately 1230. Did one regression for stations CB6.1, CB6.2 & CB6.3. Did a separate regression for LE3.6 & LE3.7.

28FEB07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

28FEB07 FROM WET STAR FLUOROMETRIC PROBE
On station CB5.4 the cables ran out at 33 meters due to the current. When rosette was brought on board the research vessel, there was sea grass tangled on the bottom of the rosette. 33 meters may have been the bottom at this station, even though depth gauge read 35 meters. Station CB5.4 1 meter reading invalid, not reported.

12MAR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Beginning of the day for the transect from stations CB8.1 to CB8.1E, the values were very high and not supported by a grab sample and the surface chlorophyll a samples collected. Deleted this
section from the horizontal transect on this date.

12MAR07 FROM WET STAR FLUOROMETRIC PROBE
Stations CB6.3 and LE3.6 one meter readings invalid. Not submitted.

13MAR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

13MAR07 FROM WET STAR FLUOROMETRIC PROBE
Had to delete EE3.5 B to obtain good regression. Chlorophyll a value was very high (43 ug/L)compared to the next highest values around 24 ug/L . Hit bottom on this station and FL probe is near top of rosette, so may have effected sample water more than FL probe value.

4MAR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Had trouble getting a good regression on this date. Deleted one grab sample at the beginning of the day, and r2 = 0.7. Beginning of the day for the transects from stations WE4.2 to WE4.3, and WE4.3 to CB6.4, the values were very high and not supported by a grab sample and the surface chlorophyll a samples collected. Deleted this section from the horizontal transect on this date.

14MAR07 FROM WET STAR FLUOROMETRIC PROBE
Station LE5.5-W one meter reading invalid. Not submitted.

09APR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

09APR07 FROM WET STAR FLUOROMETRIC PROBE
Stations CB6.2 and LE3.6 one meter readings invalid. Not submitted.
Station CB7.3E one and two meter readings invalid. Not submitted.
Station CB6.1 one and two meter readings invalid. Not submitted.

10APR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

10APR07 FROM WET STAR FLUOROMETRIC PROBE
On station CB5.4 the cables ran out at 24 meters because the new YSI cable was not long enough to reach the bottom at 32 meters. Purchased a new field cable which was delivered in the middle of May, so started using for the June cruises. Also on this station deleted the one and two meter readings as invalid. Station CB7.1 one meter reading invalid. Not submitted.

11APR07 FROM TURNER FLUOROMETER
It was too rough to collect samples on this date. Went back into port in Norfolk. No grab samples collected due to rough sea conditions, so used regression from April 10 for this date. Problem with underway system, and salinity data was not recorded on this date. SALZONE is labeled N for this date.

19APR07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Lat/long did not record from 1215 to the end of the cruise on this sampling date. Interpolated lat/long for this time period. Problem with underway system, and salinity data was not recorded on this date. SALZONE is labeled N for this date.

10MAY07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. On this date the horizontal grab samples only ranged from about 5 to 7 ug/L. Had to combine with the samples from day 2 grab to get an acceptable regression curve. When reviewing the data, the chlorophyll a samples collected agreed very well with the fluorometry values.

10MAY07 FROM WET STAR FLUOROMETRIC PROBE
One meter reading on station CB6.1, CB6.3, CB7.4 and CB7.3E were not valid, and were deleted from the data set.

11MAY07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

11MAY07 FROM WET STAR FLUOROMETRIC PROBE
Data for station CB5.5 did not save properly. There is no data for this station. For station CB5.4 collected bottom sample at 29 meters, although station depth was 33 meters total. New cable on the YSI 6600 V2 could not reach deeper. New longer cable had been ordered, but was not received before this cruise. One meter reading on station CB5.4 was not valid, and was deleted from the data set.

12MAY07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

12MAY07 FROM WET STAR FLUOROMETRIC PROBE
On station WE4.2 syringe with deionized water inadvertently left on seabird probes, this data was not reported.

05JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

06JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Only collected station CB6.1 on this date. Seas and winds too high to safely sample. One horizontal grab sample collected on this date. Combined with day 1 for a regression. Station EE3.4 was not collected on this cruise.

06JUN07 FROM WET STAR FLUOROMETRIC PROBE
Only collected station CB6.1 on this date. Seas and winds too high to safely sample. Station was a pycnocline station, so had 4 vertical grab samples to make a regression for this day. Station EE3.4 was not collected on this cruise.

07JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. The lat/long and SALZONE were recorded intermittently from 0746 to 0758. The SAlZONE is recorded as N where salinity was not collected, and the lat/long was interpolated for this time period.

11JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

18JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. The lat/long and SALZONE did not record from 0850 to 0852 and from 1112 to 1120. The SALZONE is recorded as N where salinity was not collected, and the lat/long was interpolated for these time periods.

18JUN07 FROM WET STAR FLUOROMETRIC PROBE
Did not collect one and two meter fluorometry readings on station CB6.1.

19JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

20JUN07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

20JUN07 FROM WET STAR FLUOROMETRIC PROBE
On station CB7.3, R/V Captain had to abort station before reaching bottom due to safety concerns with rough sea and current conditions. Station was 17 meters deep, but only reached 7 meters. Could not sample station CB8.1 E due to Navy activity. No vessels allowed into the area.
07JUL07 -Deleted one meter value for station CB7.3E from data set.
Could not sample station CB7.3 due to weather conditions which made sampling unsafe.

09JUL07-No variety on this data in fluorometry values or chlorophyll a values. Combined all 3 days of cruise to get a regression that worked on this date.

25JUL07- There was very little variety on the chlorophyll samples collected for the regression, or in the fluorometry values recorded. Only used 3 of the 5 samples collected to get an acceptable r2.

07AUG07-Computer on board the R/V Slover collecting salinity data did not have any data until 1400. The SALZONE is labeled N where no data was collected. On station CB5.4, there are some negative chlorophyll a values. This is due to extremely low chlorophyll a on this station, and it is down near the detectable limit for this analysis.

21AUG07-Salinity not registering until 0818. SALZONE is labeled with an N until this point. Extremely high chorophyll a values at the beginning of this date. These are as leaving port and heading to first Bay station CB8.1. A red tide was observed in this area (pass station LE5.5-W at Hampton Roads Bridge tunnel as head at to the mainstem Chesapeake Bay from port on the Elizabeth River) and that is what the fluorometer was reading. Also, extremely low chlorophyll a values along the Bay mouth were confirmed from chlorophyll a samples collected and analyzed in the laboratory. Data invalid for one meter reading on CB6.1, CB6.2 and CB7.2. Could not get a very good regression on this date.

22AUG07- Stations EE3.4 and EE3.5 did not work with the other stations for the regression curve. A separate regression was created for these two stations. Will label this curve EE.

23AUG07- Red tide observed around station LE5.5-W. Extremely high chorophyll a values around this station.

20SEP07-GPS did not record values for one minute at 1206. Interpolated lat/long during this time period.

24SEP07-Red tide observed around stations LE5.5-W, WE4.2 and CB8.1E.
Due to extremely high surface values on WE4.2 and LE5.5-W, when the regression was applied to the vertical probe data, many of the values had negative chlorophyll. Created a separate regression for the low values and will label this curve low. WE4.3 and WE4.4 chlorophyll a
values for fluorometry are much higher with both regressions than the grab samples collected. This date is submitted, but it may be an overestimation of the chlorophyll a present at those two
stations.
CBP 469

Day 1 15OCT07
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

Day 2 16OCT07
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. On station CB5.4 there is no fluormetery data for the bottom at 33 meters.

Day 3 17OCT07
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Red tide observed on station WE4.2 and during transits around station WE4.3. This is illustrated in some very high chlorophyll a observations.

CBP 470

Could not sample on November 6 and 7, 2007 due to rough seas and high winds which made sampling unsafe. On November 8, 2007 still too rough to sample lower Chesapeake Bay, but able to go up north and sample. Due to the shorter days and the additional travel time, could not sample stations EE3.4 and CB5.4W. Research vessel was unavailable for 3rd day of sampling on November 12 and 13, 2007 so completed cruise on November 14, 2007.

Day 1 08NOV07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

Day 2 09NOV07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Very low chlorophyll a values confirmed by samples collected in the field.

Day 3 14NOV07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

CBP 471

Could not sample stations CB7.3 and CB6.4 due to rough seas and high winds which made sampling unsafe. Very little variety for this cruise on fluorometry values or chlorophyll a values.

Day 1 10DEC07 FROM TURNER FLUOROMETER

Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Regression equation has an r2 = 0.7 because not very much variety in fluorometric readings or the chlorophyll a values for the grab samples.

Day 2 11DEC07 FROM TURNER FLUOROMETER

Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. For two shallow stations, WE4.1 and CB5.4W a separate regression had to be calculated. Will submit this regression with the extension A.

Day 3 12DEC07 FROM TURNER FLUOROMETER
Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.
CBP Cruise 473

Sea conditions made it unsafe to sample on January 15 through 18, 2008. Rescheduled the research vessel and sampled the following week. Used TURNER FLUOROMETER fluorometric probe for all vertical data. Very little variety for chlorophyll a values and fluorometry grab samples, so had to combine regression with day 1 to get a valid regression equation. Fluorometry data matched very well with surface chlorophyll a and grab samples.

CBP Cruise 474

Sampled one station on February 12, 2008, then R/V Captain determined it was unsafe to continue sampling in deteriorating weather conditions and came back into port. Sea conditions made it unsafe to sample on February 13-15 and 19-20, 2008. Sampled on February 20 - 22,
2008, but could not safely sample Bay mouth stations on these dates. Sampled Bay mouth stations on February 25, 2008. On February 22 could not sample station CB7.1 due to weather conditions, which made sampling this station unsafe. Used fluorometric probe for all vertical data.

12FEB08-Only one station sampled on this date, and only two vertical grab samples collected. There are only 4 meters for the vertical profile, and two of these have chlorophyll a grab samples associated with them. Used just two points to create the regression. Used regression from 2/20/08 for this date.

20FEB08 Very little variety on this date for chlorophyll a and fluorometery values. Hard to obtain a good regression curve. Vertical fluorometry data matched very well with the vertical chlorophyll a samples collected when data was reviewed.

21FEB08- Tried to leave dock in morning, and sea conditions made it unsafe to sample. In addition, deck was frozen. Left for first station around noon. Believe rough sea conditions effected the horizontal fluorometery sampling, and caused problems with the flow through pump during a few transects. The following data was not submitted:

- Time 1214 to 1341 during transect from dock to station CB5.5, and from station CB5.5 to station CB5.4W.
- Time 1451 to 1501 during transect from CB5.4 to CB7.1N
- Time 1541 to 1543 ,1546 to 1557, and 1610 to end of day at 1627 during transect from CB7.1N and EE3.4.

21FEB08- There is no 1.0 meter fluorometry reading for station CB5.4W, CB7.1N, CB5.5 and CB5.4. Very rough seas on this date, probe was probably coming out of the water. Very little variety on this date for chlorophyll a and fluorometery values. Hard to obtain a good regression curve. Had to combine with day 4 to obtain a valid regression curve.

22FEB08- Only 3 horizontal grab samples on this date, and no real variety. Combined with day 5 grab samples to obtain a valid regression curve. Fluorometry data matched very well with the surface chlorophyll a and samples collected when data was reviewed. There is no 1.0 meter fluorometry reading for station WE4.3.

CBP Cruise 477/478

Sampled nine stations on March 18, 2008. Sea conditions made it unsafe to sample on March 17 and 19-20, 2008. Rescheduled research vessel for March 26-28 but unable to sample on these dates. Rescheduled research vessel for April 1-3, but only able to sample one station on April 1 due to sea conditions, and could not sample April 2 or 3. Only completed 10 stations for this month due to unsafe sea conditions.

01APR08-Only collected station LE5.5-W for the mainstem CBP on this date. Collected Elizabeth River on this date, and used station ELI2 in regression so had 4 points.

CBP 479

Sea conditions made it unsafe to sample on April 14 through 16, 2008. Went up the Bay on April 17, 2008 because sea conditions made it unsafe to sample the lower portion of the Virginia Chesapeake Bay. Rescheduled the research vessel for April 21-22, but high winds and rough seas made it unsafe to sample on these dates. Heavy rain occurred April20-22, 2008. Completed remaining 6 stations for this cruise on April 24, 2008. Used fluorometric probe for vertical data.

17APR08- Station CB5.4 no values for 1 and 2 meters. Stations CB7.1, CB7.2, CB7.1N and CB5.5 no value for 1meter.Problem with values on station CB5.4W. Does not look like probe was turned on. Deleted this station from data set.

24APR08-Hardly any variety for chlorophyll a grab samples and fluorometry values. Had to delete 2 of the 5 points to obtain a valid regression. Station CB7.3 no value for 1 and 2 meters.

CBP Cruise 480-Sea conditions made it unsafe to sample on May 12-13, 2008. Went up the Bay on May 14, 2008 because sea conditions made it unsafe to sample the lower portion of the Virginia Chesapeake Bay. Used fluorometric probe for all vertical data.

14MAY08-EE3.41.0 meter not collected. EE3.5 1 through 4 meters appear invalid, did not submit.

15MAY08- Hardly any variety on chlorophyll a values, so hard to get a good regression equation.

CBP Cruise 482- Heat advisories on June 9 and 10, 2008. Heat index 105ø to 110ø F. Cold front moved in on June 11, 2008 and winds increased. On this date could not sample stations CB6.4, CB7.3 and LE5.5-W due to unsafe sampling conditions. Sampled these station on June 12, 2008. Used fluorometric probe for all vertical data.

09JUN08-No grab samples collected at beginning and end of day, so cannot confirm the higher chlorophyll a values seen at these times. Will submit these values, because they could be correct just no grabsamples at these times.

10JUN08- Data not saved on computer from station WE4.2 properly. No data submitted for this station. Had problems getting a good regression curve. Combined with data from day 1 and still low correlation; but when compared vertical probe values obtained to the chlorophyll a samples collected for surface, bottom and pycnocline samples they agreed fairly well. Fluorometry probe data looks representative of the chlorophyll a values present in the water column.

11JUN08- Could only collect 3 sheltered stations on this date due to rough sea and winds making it unsafe to sample open water Bay stations. Only 2 horizontal grab samples collected. Combined with day 4 for regression equation. High chlorophyll a values at beginning of day confirmed with a grab sample.

12JUN08- Collected last 3 stations on this date. Only 3 horizontal grab samples collected. Combined with day 3 for regression equation. The salinity did not record in the morning on the underway profile, so SALZONE is recorded as N for this time period (09:16 to 11:00). Had to delete station CB6.4 to get good r2. Only used data from station LE5.5-W and CB7.3. Reported all of the data for the three stations collected.

CBP 484-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

07JUL08- No 1.0 meter reading for vertical Fluorometry profile at station CB7.3E. The salinity did not record in the morning on the underway profile, so SALZONE is recorded as N for this time period (0728 to 1209).

08JUL08-Only 2 horizontal grab samples collected, since sampling day cut short due to unsafe weather conditions. Combined with day 3 for regression equation. GPS did not record from 0827 to 0832. LAT/LONG values interpolated for this time period. Negative chlorophyll a values in lower depths of station CB5.4 are confirmed by chlorophyll a grab values < 1 ug/L, and the dissolved oxygen values on this station were <1.0 mg/l below 13 meters.

09JUL08- Could only collect sheltered stations on this date due to rough sea and winds making it unsafe to sample open water Bay stations.

CBP 485- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

21JUL08- Low fluorometry values supported by low chlorophyll a values collected on this date.

22JUL08- Severe thunderstorms caused reduced sampling schedule on July 22, 2008. In the middle of the day had to go into port to seek shelter. After the storm continued sampling. Did not sample the following stations due to the thunderstorms: EE3.4, EE3.5 and CB7.1. GPS did not record for the time 1424 to 1426, interpolated lat/long for this time period. No 1.0 meter vertical fluorometeric probe data on CB7.1S.

23JUL08- No variety with the chlorophyll a values or fluorometery values on this date. Had to combine with day 2 horizontal grabs for a valid regression curve. When compared data to chlorophyll a grabs that were collected there was very good agreement.

CBP 486- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

11AUG08- For station CB7.2 no fluorometry values for 1 through 4 meters. For station CB6.3 no fluorometry for 1.0 meter.

12AUG08- For station CB7.1S no fluorometry values for 1 through 3 meters.

13AUG08- Algal bloom observed around station LE5.5-W.
For station WE4.2 no fluorometry value for 11 meters.

CBP 487- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.

25AUG08- High fluorometry values at very beginning of day confirmed by a chlorophyll a grab sample collected. No one meter readings for stations CB7.1S and CB7.2.

26AUG08- High winds and rough seas delayed time left dock until afternoon.

27AUG08- Only one station collected on this date CB7.1, so only one horizontal grab sample collected. Combined with day 2 horizontal grab samples for regression.

02SEP08- The high fluorometry values in the lower part of the profile on station CB7.3 are not confirmed by the chlorophyll a values collected at the bottom pycnocline (9 meters) and the bottom (12 meters). Did not delete these values from the data set, but the chlorophyll a samples collected in the field make this station questionable?

CBP 489- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Could not sample September 15-17, 2008 due to winds and sea conditions which made sampling unsafe. On September 18, 2008 only able to sample 5 sheltered stations. No 1.0 meter reading for station WE4.3. On September 19, 2008 gale force winds made it unsafe to sample.

Rescheduled Research Vessel for next available dates of September 24-26, 2008, but a large coastal storm entered area during this time and could not sample. Were able to sample on September 29 and 30, 2008. Due to winds in morning of September 29, 2008 delayed leaving dock, and could not sample lower Chesapeake Bay stations due to sea conditions. Could not sample stations EE3.4 and CB5.4W due to travel time heading
up to the northern portion of the Virginia Chesapeake Bay, and the delay leaving dock in the morning.

On stations CB7.1S, CB6.4, CB7.3E, CB7.2E, CB8.1E, CB6.3 and WE4.3 there was no visible algal bloom present in the water, but the surface filters at each station displayed some degree of red. Extra samples were collected for phytoplankton analysis, and they reported the red was due to ciliates. Ciliates have red photosynthetic endoysymbiotes, and are often associated with localized red discoloration of the water. The stations CB7.2E, CB7.3E and CB8.1E were the algal bloom was observed, did not work for the regression with the other stations. A separate regression curve was made for these threestations. This regression contains a B after the date to differentiate it.

17DEC08- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. At the beginning of the day the fluorometer had very high values and 2 grabs were collected.
The high values skewed the regression too high, so that when the fluorometry was calculated the Bay mouth had negative values and other areas calculated out to much higher chlorophyll a than the grab samples supported. Combined day 2 horizontal grab samples with 3 low grab samples for day 1. Used this regression for the Bay mouth and the rest of the day from 0931 to end of sampling date. This regression will be labeled 20081217HZB. Used regression with only day 1 samples with high values for the morning from 0735 to 0930.No 1.0 meter reading on CB7.4N, CB6.2, CB6.3 and CB7.2.

18DEC08-No 1.0 meter reading on CB5.4 and CB7.1N.

19DEC08-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Appeared that on station LE5.5-W, the vertical fluorometric probe was turned off. Will not report the values from this station.

October 2008-Could not sample October 20-25, 2008 due to winds and sea conditions which made sampling unsafe. On October 27, 2008 only able to sample 5 stations, because winds and seas increased in afternoon. Could not sample stations EE3.4 and CB5.4W due to travel time and short length of days. On this cruise not a lot of variety found in the fluorometry values and chlorophyll a values. Had problems getting acceptable regression curves.

27OCT08-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Not a lot of variety on the chlorophyll a and fluorometry values, so had to combine the days to get an acceptable regression curve. Could not use the data from October 30, so combined the values from October 27 and 31 for regression curve.
No 1.0 meter reading for stations CB7.3 and LE5.5-W. No 1.0 and 2.0 meter readings for stations CB7.4N, CB8.1E and CB8.1.

30OCT08- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. High seas on this date. Vertical profile readings could be more than a meter off due to seas.
Not a lot of variety on the chlorophyll a and fluorometry values, so had to combine the days to get an acceptable regression curve. Could not use the data from October 30, so combined the values from October 27 and 31 for regression curve. Rough seas may be why the values for
October 30 did not work in regression. This data is questionable.
No 1.0 meter reading for stations WE4.1, WE4.3, CB6.2, CB7.1S and LE3.7.

31OCT08- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter reading for stations EE3.5, CB7.2E, CB7.1N, CB5.4, CB5.5 and CB7.2.Not a lot of variety on the chlorophyll a and fluorometry values, so had to combine the days to get an acceptable regression curve. Could not use the data from October 30, so combined the values from October 27 and 31 for regression curve.

November 2008-Sampled 11 stations on November 17, 2008. Could not sample November 18-21 and 25, 2008 due to winds and sea conditions which made sampling unsafe. Sampled 8 stations on November 24, 2008. Due to weather conditions did not sample the following stations: EE3.4, EE3.5,CB5.4, CB5.4W, CB5.5, CB7.1, CB7.1N and CB7.1S.

17NOV08-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter reading for stations CB7.3 and LE5.5-W.

24NOV08-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. High seas on the stations CB6.2 and CB6.3 on this date. Vertical profile readings could be more than a meter off due to seas. No 1.0 meter readings for these stations. Had a difficult time obtaining a regression equation, the chlorophyll a values had very little range on this date. Combined with day 1 to obtain a regression. When comparing fluorometry values to the chlorophyll a samples collected on the vertical profile, the fluorometry values agreed very well. Even though regression was hard to obtain, believe fluorometry values are representative of the values found in the water column on this date.

13JAN09- Regression for horizontal profile labeled HZ. There are two horizontal regression equations for this date. One regression is for times 0728 to 0817 and 1304 to the end of the day, and this regression was obtained using the horizontal grab samples. The other regression equation was for the Chesapeake Bay mouth area for the time 0831 to 1247. The regression equation for the Chesapeake Bay mouth area was created using the vertical profile surface chlorophyll grab samples and matching them to the fluorometry values collected at the time the R/V Slover arrived on station. This was necessary, because using the regression obtained only from the horizontal grab samples, the fluorometry values for the Bay mouth area calculated out to very negative numbers. The regression for the Bay mouth area will have an A after the HZ extension. No 1.0 meter reading on station LE5.5-W. There are two vertical regression equations for this

date. For one regression the WE stations (WE4.1, WE4.2, WE4.3 and WE4.4) are omitted. For the second regression only the WE stations(WE4.1, WE4.2, WE4.3 and WE4.4) are used. The regression for the WE stations will contain a WE extension on the date.

30JAN09- Higher values at the beginning of the horizontal profile were not confirmed with a chlorophyll a grab sample. There was very little vertical variety in the chlorophyll a and fluorometry values. It was hard to obtain a regression equation due to this, so deleted 5 points and kept 19 to obtain a valid regression.

10FEB09- For this date chlorophyll a values for grab samples only differed by 1 ug/L for 5 samples collected. Had to combine with samples from day 3 for a valid regression equation. The horizontal profile data agreed well with the horizontal grab chlorophyll a samples collected and the surface chlorophyll a samples collected at each station. Problem getting a valid regression probably just due to no variety in the chlorophyll a data, and the horizontal profile looks representative of the values found on this date.

11FEB09-No 1.0 meter readings on stations WE4.1 and WE4.3.

CBP Cruise 501- Only have vertical fluorometry data for March 18, 2009. Only have horizontal fluorometry data for March 18 and 19, 2009. The horizontal fluorometry is from the Wet Star fluorometer on the R/V Slover, because the data collected with the Turner digital fluorometer was invalid for these dates. Cruise was originally scheduled for March 16-19, 2009. Could not sample on March 16 and 17, 2009 due to weather conditions. On March 18, 2009 a heavy fog blanketed the water, so left dock later in the morning and went slow to first station. Did not start collecting stations until the afternoon. On March 19, 2009 while on route to first station one of the R/V Slover's engines went out. Were unable to repair in the field, so collected no stations and returned to port in Norfolk. Completed the cruise the following week on another boat, and were unable to collect fluorometry on this vessel.

18MAR09- Data from the Turner fluorometer did not result in a valid regression equation. Submitted data from the horizontal fluorometer aboard the R/V Slover. No 1.0 meter reading for stations CB6.1 and CB6.2.

19MAR09-Only one horizontal grab sample collected on this date, so combined with day 1 for regression.

CBP Cruise 502- Collected 7 stations on April 13, 2009. Could not sample on April 14 through 16, 2009 due to weather conditions. Completed the cruise the following week on April 21, 22 and 24, 2009. Salinity values did not record properly for this Cruise. SALZONE is recorded as N.

13APR09- Not a lot of variety in chlorophyll a values. Hard to obtain a valid regression. The bottom values for chlorophyll a from the fluorometer on stations CB7.3 and WE4.2 are much higher than the chlorophyll a grab samples collected at these two stations.

21APR09- Very low chlorophyll a values observed on fluorometry are confirmed by chlorophyll a samples collected in those areas. Rosette malfunctioned on station CB7.1S, so no vertical fluorometry for this station

24APR09-Rosette malfunctioned on station CB7.4N, so no vertical fluorometry for this station. No value for 14 meters (bottom) on station CB7.4.

CBP Cruise 504- Could not sample on May 11, 2009 due to weather conditions which made sampling unsafe. Collected 22 stations on May 12-13, 2009. On May 14, 2009 went to first station CB6.4. Collected surface water and flurometery and went to bottom of station and collected water and fluorometery; then there was a complete power failure on the R/V Slover. Could not complete
station and had to manually bring rosette back on board vessel. R/V Slover came back into port and had generator fixed. Rescheduled for the following week to complete remaining 5 stations (including station CB6.4 since it was only partially collected on May 14). R/V Slover developed additional problems and had to go back in the yard, so rescheduled for June 1, 2009. Due to weather conditions could not sample Chesapeake Bay on June 1, so completed the cruise on June 2, 2009.

12MAY09-Salinity and lat/long values did not record properly during the following time periods: 1110 to 1111, 1218 to 1222, 1347 to 1349, 1443 to 1509 and 1633 to 1644. SALZONE is recorded as N and lat/long are interpolated. No 1.0 meter reading for station CB7.4N. High chlorophyll a values seen in the middle of the profile on station CB6.1 were confirmed by
the chlorophyll a samples collected at this station.

13MAY09-Salinity and lat/long values did not record properly during the following time periods: 0856 TO 0905, 0946 to 1009, 1039 to 1051, 1053 to 1102, 1151 to 1152, 1338 to 1404, 1411 to 1422,1505 to 1508, 1517 to 1521, 1526 to 1530, 1608 to 1612 and 1652 to 1710. SALZONE is recorded as N and lat/long are interpolated. No 1.0 meter reading for station CB5.4. High chlorophyll a values seen in the middle of the profile on station CB5.4 were confirmed by the chlorophyll a samples collected at this station.

14MAY09-Only collected one partial station (CB6.4) on this date due to power failure on research vessel. Only one grab sample collected before power failure, so combined with day 2 for regression on this date. Salinity and lat/long values did not record properly during the time period: 0920 TO 0925. SALZONE is recorded as N and lat/long are interpolated.

02JUN09-Salinity and lat/long values did not record properly during the following time periods: 1100 to 1105, 1115 to 1117, 1147 to 1150 and 1419 to 1431. SALZONE is recorded as N and lat/long are interpolated. Very little variety on chlorophyll a values on this date. Could not obtain a very good regression. The data for station LE5.5-W was not supported by the chlorophyll a values collected, and will not submit the data from this station. No 1.0 or 2.0 meter readings at station CB7.3. No 1.0, 2.0 or 3.0 meter readings at station CB6.4.

CBP Cruise 506 - Collected 22 stations on June 15 and 16, 2009. Could not sample on June 17, 2009 due to weather conditions which made sampling unsafe. Collected 4 stations on June 18, 2009, but could not safely sample station CB6.4 on either June 16 or 18, 2009.

15JUN09- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Computer did not record for a portion of the transect from CB7.2E to CB7.2. High chlorophyll a values at beginning of the day confirmed with chlorophyll a grab sample collected. No 1.0 meter vertical reading for stations CB6.1, CB6.2, CB6.3, CB7.2, CB7.2E, CB7.3 and LE3.6. Fluorometry and chlorophyll a values did not have very much range on this date. Hard to get a good r2.

16JUN09- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Computer did not record lat/long values and salinity values for the following times: 0740 to 0755, 0818 to 0824 and 1254 to 1305. Interpolated lat/long values for these time periods, and SALZONE reported as N. On station WE4.2 the fluorometry chlorophyll a values stay high the entire station (>10 g/L),but the bottom WE4.2 chlorophyll a sample analyzed in the laboratory was low (3.36 g/L).

18JUN09-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. High chlorophyll a values at end of the day confirmed with chlorophyll a grab sample collected.

13JUL09-Computer did not record lat/long values for the time 1224 to 1227. Interpolated lat/long values for this time period. No 1.0 meter reading for station CB6.1. Problems getting a good regression on this date due to very little variability in chlorophyll a and fluorometery values. Deleted all the stations around the Bay mouth as invalid and will not report data for these stations: CB8.1E, CB7.3, CB7.4 and CB7.4N.

14JUL09-Could not collect samples on July 14, 2009 due to high winds and rough seas which made sampling unsafe. Could not collect station EE3.4 due to a time delay on the R/V fixing an overheated engine.

15JUL09- Computer did not record lat/long values for the time 0730 to 0732. Interpolated lat/long values for this time period. No 1.0 meter reading for station CB7.1. Very low chlorophyll a values on station CB5.4 confirmed from grab samples.

16JUL09- For station WE4.1 there appears to be something wrong with the fluorometry probe data, so this station data is not reported.

27JUL09-Hard to get a good regression equation on this date. Had to delete points and combine with day 2 and r2 still only 0.63. After reviewing the data, most of the data agreed with the chlorophyll a grab samples collected.
Station CB8.1 was deleted from the vertical profile as invalid, but all other vertical profile stations from this date were submitted.

28JUL09-No 1.0 meter reading for station CB7.1. Negative values for lower depths on CB5.4 are a result of the regression equation, the chlorophyll a was very low. The chlorophyll a grab samples were 1 ug/L or less, and the DO was 1 mg/L or less.

29JUL09-Hard to get a good regression on this date. After reviewing the data, most of the data agreed with the chlorophyll a grab samples collected.
Station LE5.5-W was deleted from the vertical profile as invalid, but all other vertical profile stations from this date were submitted.

10AUG09-Power was off from 1358 to 1403 and 1429 to 1432.From 1558 to 1617 at end of day SALZONE did not record properly. These values are reported as N.
Did not get a very good r2 on this date, reviewed data carefully to ensure acceptable.

11AUG09-Did not get a very good r2 on this date, reviewed data carefully to ensure acceptable. Data from stations CB5.5, CB5.4W, and CB7.1N was deleted from the regression equation, and after reviewing the vertical profile these stations were deleted because the results did not agree with the chlorophyll a samples collected at these stations.

12AUG09- Turner fluorometer datalogger did not record data on this date. Submit data from Wet Star fluorometer on board R/V Slover. Very good regression on this date.

CBP 511-Weekend prior to this cruise there was heavy rain, high winds and high seas due to Hurricane Bill off of the coast. Week prior to this cruise algal blooms were reported in the lower Chesapeake Bay. None were seen on this cruise, so believe rain and wind from Hurricane Bill caused blooms to dissipate.

24AUG09- Power was off on research vessel from 1358 to 1403 and 1429 to 1432.
Fluorometry probe did not work properly on the following stations: LE3.6, LE3.7, CB6.1,CB6.2, CB6.3 and part of station CB8.1 (1 through 6 meters).
No 1 meter value for CB7.3E and CB7.2E. No 2 meter value for CB7.4.
Had a low correlation value for the regression equation on this date. Believe it is because there was not a lot of variety in the chlorophyll a and fluorometry values. Vertical profile data agrees with chlorophyll a values collected at the stations.

25AUG09-Fluorometry probe did not work properly on the first two stations collected on this date:CB5.4W and CB5.5.No 1 meter value for CB5.4, CB6.4 and EE3.5.

26AUG09- the generator on the R/V Slover ceased putting out power to the boat, so only 2 stations collected on this date. The R/V Slover had to go into the yard to repair the generator. Very high chlorophyll a values when leaving the dock in the morning in Yorktown, VA. A chlorophyll a sample was not collected at this time, so there is no collaboration on these high chlorophyll a values.Rescheduled the remaining 4 stations to be collected with the Elizabeth River on September 1, 2009, but high winds and rough seas made sampling unsafe except for station LE5.5-W. Stations WE4.3, WE4.4 and CB7.3 were not collected on this cruise.

01SEP09-Only collected station LE5.5-W on this date. Also collected September Elizabeth River samples on this date, so used ELI2 station to help make a valid regression. No 1 meter value for LE5.5-W, so only 3 points in this regression curve.

14SEP09-Data did not record for 5 minutes when leaving station CB7.2E and went to station CB7.2. Part of this transect is missing from data set.
No 1.0 meter reading for stations CB8.1E and CB6.3. For several of the stations the surface readings are somewhat low compared to the chlorophyll a samples collected., but not enough difference to justify deleting the data.

15SEP09-Regression had a low correlation, but there was not a lot of variety in the chlorophyll a and fluorometry values. After comparing fluorometry values to the chlorophyll a horizontal grab samples and surface samples collected, there was very good agreement with them. Do not believe there is a problem with the data. No 1.0 meter reading for stations CB7.1 and CB7.1N.

CBP 515

Due to radar problems with the R/V Slover another boat was used for the October 2009 Chesapeake Bay Mainstem cruise. Due to the last minute arrangements, fluorometry was not collected on this cruise.

CBP 517

Due to unsafe weather conditions on November 17-18 and 23-24, 2009 only two days were sampled in November. The following stations were not collected: CB7.3E, CB5.4, CB5.4W,CB5.5, CB6.1, LE3.6 and LE3.7. No 1.0 meter reading for station CB6.2.

CBP 518

Due to unsafe weather conditions on December 8-11, 14, and 16-14, 2009 only two days were sampled in December. The following stations were not collected: EE3.4, EE3.5, CB5.4, CB5.4W, CB5.5, CB7.1, CB7.1N and CB7.1S.

Day 1 07DEC09
The salinity did not record properly underway during the following times: 0839 to 0844, 1128 to 1129 and 1638 to 1647. The SALZONE was recorded using the surrounding data. The lat/long had to be interpolated between time period 0839 and 0844, and time period 1128 to 1129.

The horizontal transect between stations WE4.3 and WE4.4 (time 1458 to 1542) and part of the transect from WE4.4 to LE5.5-W (time 1551 to 1606) was not supported by the chlorophyll a samples collected. These times were deleted from the horizontal transect.

No 1.0 meter vertical reading for station CB7.3E.
No 1.0 and 2.0 meter readings for station CB8.1.

Very little variety in the fluorometer and chlorophyll a values. Had to delete some values for regression, and only could obtain a low r2 value. Looked at data closely and fluorometry values agreed well with the chlorophyll a samples collected on the stations.

15DEC09 -No 1.0 meter reading for stations LE3.7 and LE3.6. On some stations salinity did not record properly from the Seabird sonde. For all stations on this date used data collected from the YSI 6600 sonde to calculate SALZONE. For depths not collected on YSI 6600 profile, the depths before and after were the same SALZONE, so that SALZONE value was used.

Very little variety in the fluorometer and chlorophyll a values. Had to delete some values for regression, and only could obtain a low r2 value. Looked at data closely and fluorometry values agreed well with the chlorophyll a samples collected on the stations.

CBP 520- Due to sea conditions making it too rough to sample Chesapeake Bay mouth stations on the first day, sampled stations in the North. Could not sample stations CB5.4W or EE3.4 on this cruise due to ice on route to these stations that made passage impossible. Due to weather conditions it took 4 days to complete cruise. Very cold temperatures on this cruise and weeks preceding this cruise.

11JAN10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. On station EE3.5 water temperature was < 0 C near the surface. Could not obtain a valid regression equation with the grab samples collected on this date. There was very little difference in the chlorophyll a values on this date. Also tried the data from the R/V Slover fluorometer with same result. Used the regression equation from the third day of this cruise.

At the end of the day for transects CB7.1N to CB5.4 and CB5.4 to CB5.5, the fluorometery on the horizontal profile was not supported by the chlorophyll a samples collected. The data from time 1425 to the end of the day was not submitted. The horizontal transect data that is submitted for this date agrees with the chlorophyll a surface and grab samples collected.

Veritical profiles-No 1.0 meter value for stations EE3.5, CB7.1, CB7.1N, CB7.1S, CB7.2E, CB7.3E and CB5.5. No 1.0, 2.0 or 3.0 meter values for station CB7.2.

12JAN10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations WE4.1. WE4.3 and WE4.4.

13JAN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Station LE5.5-W problem with fluorometer probe in the field, do not report data for this station. No 1.0 meter value for stations CB6.1 and CB6.4. There was very little variety on the chlorophyll a values, so could not obtain a valid regression equation. Combined with day 4 values to obtain a valid regression.

14JAN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Salinity did not record properly at the beginning of the day for time 0839 to 0918. LAT/LONG did not record for one minute at 0922. LAT/LONG were interpolated for these two records.
Station CB8.1 problem with fluorometer probe in the field, do not report data for this station.

CBP 522- Due to sea conditions making it too rough to sample the Chesapeake Bay, we were only able to sample on one day. Tried to complete cruise for three weeks. Could not sample stations CB5.4,CB5.5, CB5.4W, CB6.1, CB6.2, CB6.3, CB7.1, CB7.1N, CB7.1S, CB7.2, CB7.2E, EE3.4, EE3.5, LE3.5 and LE3.7 due to weather conditions. Very cold temperatures on this cruise and weeks preceding this cruise. Large amounts of precipitation and snow prior to this cruise.

09FEB10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations CB6.4 and WE4.2
No 1.0 and 2.0 meter values for stations CB7.3 and CB7.3E

CBP 525- Due to sea conditions making it too rough to sample Chesapeake Bay mouth stations on the first day, sampled stations in the North.

17MAR10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations EE3.4, EE3.5, CB5.4W, CB5.5, CB7.1, CB7.1N and CB7.1S.

18MAR10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ.No 1.0 meter value for stations CB6.1, CB6.2, CB6.3, CB7.2E, CB7.3E, WE4.1 and WE4.2. No 1.0 and 2.0 meter

values for station CB7.2. No 1.0, 2.0 and 3.0 meter values for station CB6.4. Station LE3.7 problem with fluorometer probe in the field, do not report data for this station.

19MAR10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Very little variety in the chlorophyll a grab samples and fluorometry values on this date. Combined with day 2 to obtain a valid regression. Station WE4.4 problem with fluorometer probe in the field, do not report data for this station. No 1.0 meter value for stations CB7.4N, CB8.1, CB8.1E, LE5.5-W and WE4.3.

12APR10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Used data from hand written field sheets for some of the SALZONE calculations. Had trouble with the regression on this date. Evaluated data carefully to ensure it looks representative of the chlorophyll content in the water column compared to the chlorophyll a samples collected.
No 1.0 meter value for stations CB7.3E, CB8.1E, WE4.2 and WE4.3. No 1.0, 2.0 or 3.0 meter values for station CB6.4. No 1.0 and 2.0 meter values for station CB7.4N. Had to omit the bottom samples from this station for the regression curve to obtain a good r2. WE4.1and WE4.4 fluorometry probe did not record data properly. These stations were deleted from the database.

15APR10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations CB5.4W, CB6.1, EE3.4 and EE3.5. No 1.0 and 2.0 meter values for stations CB5.4. CB7.1 and LE3.7.

16APR10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations CB8.1, CB6.3 and CB7.3.

CBP 528- Only 2 days and 12 stations collected on this cruise. Due to weather could not sample on May 10, 12, 13, 17, 18 and 19, 2010. Due to engine problems with the research vessel could not sample on May 24 and 25, 2010. The following stations were not collected: EE3.4, EE3.5,CB5.4W, CB5.4, CB5.5, CB6.1, CB6.2, CB6.3, CB7.1, CB7.1N, CB7.1S, CB7.2, CB7.2E,LE3.6 and LE3.7.

11MAY10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Salinity did not record properly for first 13 minutes of the underway profile (time 0723 to 0736). No 1.0 meter reading for station CB7.3. No 1.0 and 2.0 meter readings for station CB8.1E. The fluorometric probe did not record properly on stations WE4.4 and LE5.5-W. This data was not submitted.

14MAY10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter reading for stations WE4.1, WE4.2 and WE4.3.

02JUN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for stations CB6.1, CB6.2 and CB7.2E. Station LE3.7 the probe was not functioning properly. This station was not submitted.

03JUN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. For horizontal grab samples collected on this date, there was no variety in the chlorophyll a values. Chlorophyll a ranged from 7.21 ug/L to 8.01 ug/L. Combined with day 3 to obtain a valid regression curve. No 1.0 meter value for station CB7.1.

04JUN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for station WE4.4.

CBP 531- On June 22, 2010 on route to first station, engine room had a fire. Repairs done the week before had left paint on exhaust which caught on fire. Returned to dock for assessment of damage and repairs. Crew was able to fix problem and were back underway at 0930. On June 24, 2010 on route to last station, research vessel hit a submerged object which seemed to damage one propeller. Returned to dock on one engine. Did not collect station LE5.5-W.

22JUN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. GPS did not record properly for the times 1230 to 1234 and 1302 to 1321. Lat/Long values were interpolated for this time period. No 1.0 meter value for stations CB6.2 and CB7.4N. No 1.0 and 2.0 meter values for CB7.2E. Negative values at bottom of station CB7.2 are due to very low chlorophyll a at bottom.

23JUN10-Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for station CB7.1S.

24JUN10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. No 1.0 meter value for station WE4.2.

12JUL10 -High chlorophyll a values are where possible algal blooms were noted. The low chlorophyll a values at the Chesapeake Bay mouth are confirmed by chlorophyll a samples collected. No 1.0 meter value for station CB6.1.

13JUL10-No depths 12 and 13 meters for station CB7.1S. 13 meters was where the bottom sample wascollected.

14JUL10- Used fluorometric probe for vertical data. Regression for horizontal profile labeled HZ. Did not collect station CB7.3 due to rough seas on 3rd day of cruise.

CBP 534- Saw several areas where it appeared to be algal blooms in the Bay. When speaking with Dr. Marshall's phytoplankton laboratory at ODU the bloom samples were mainly composed of monospecific Cochlodinium polykrikoides, the same as reported this time of year for the last several years.

02AUG10- For the time periods 0851 to 0854, 0926 to 0930 and 0934 to 0945; the underway GPS and salinity did not record. The LAT/LONG for these time periods were interpolated. The SALZONE is reported as N. High values seen on horizontal profile were due to algal blooms. Due to algal blooms there was one extremely high surface chlorophyll a value, and some values that were higher than most. This skewed the regression curve so that low fluorometry values converted to negative chlorophyll a values. A second curve excluding the high values from the regression was made, and the data was compared to the depths where chlorophyll a samples were collected and analyzed. The regression curve with the high chlorophyll a values was used for the entire EE3.5 station and for CB7.1S for 1 through 9 meters. This regression curve will be labeled A. The regression curve without the high chlorophyll a values was used for the rest of the data on this date. On station EE3.4, it appears the fluorometer probe was not collecting data properly. This station is not submitted as part of the data set.

03AUG10- No 1.0 meter value for station WE4.1. Slightly negative values for chlorophyll a on station CB5.4 at deeper depths. The dissolved oxygen was very low for these depths. For station LE3.6, the surface fluorometry chlorophyll a value is much lower then the grab sample (Grab = 31.86 ug/l vs. Fl = 13.58 ug/L). This may be due to the patchiness of algal blooms of where the probe read versus where the grab is taken.

04AUG10-No 1.0 meter value for station WE4.4.

CBP 535

Due to boat maintenance issues, could not collect samples on August 23-25, 2010. Could not sample on August 27, 2010 due to weather conditions which made sampling unsafe.

26AUG10- On August 26, 2010 went up to the Northern part of the Virginia Chesapeake Bay to ensure sampling of the deep channel stations within the 4 day window, and to be within the sampling period of Maryland's second August cruise. Due to travel time and a forecast of bad weather on August 27 so the boat had to come back to Norfolk to dock, could not sample stations CB5.4W and EE3.4. Completed remainder of stations on August 30 and 31, 2010. No 1.0 meter value for stations EE3.5, CB7.1 and CB7.1N.

30AUG10-No 1.0 meter value for stations LE3.7, CB6.1, CB6.3, CB7.3, CB7.4N and CB7.2E.

31AUG10-No 1.0 meter value for stations WE4.1 and WE4.3. Regression for curve on this data had a lower r2 value due to very few samples and not a lot of variety in the chlorophyll a and fluorometry values.

CBP 537

Hurricane Igor passed off the coast September 19 and 20, 2010. Due to sea conditions making it too rough to sample Chesapeake Bay mouth stations on the first day, sampled stations in the North. On the second day of the cruise, September 22, 2010, collected station LE3.7 and LE3.6 than returned to port in Deltaville, VA around 0830 to wait for wind and sea conditions to calm down
enough to continue sampling. Around 1300 continued with collection of samples.

21SEP10- Fluorometer did not record during time 0850 to 0853. No 1.0 meter value for stations EE3.5, CB5.4 and CB5.5.

22SEP10-No fluorometry for time 0830 to 1307, waiting in port for seas and winds to die down to be able to continue sampling. No 1.0 meter value for stations CB6.1 and WE4.1.

23SEP10-No 1.0 meter value for station CB8.1.

18OCT10- On first station CB8.1, R/V Slover experienced electrical problems. Were on station approximately an hour while boat crew fixed the problem. No 1.0 meter reading for stations CB6.2, CB7.3 and CB7.3E. Could not collect station CB8.1E due to Naval ship on station.

19OCT10 On the second day of the cruise, October 19, 2010, collected station CB5.4W than returned to port in Reedville, VA around 0930 to wait for wind and sea conditions to calm down enough to continue sampling. Around 1200 continued with collection of samples. Computer which records salinity and lat/long did not record properly for the time 0904 to 0907. The lat/long was interpolated and the salinity was recorded as a N for this time period. No 1.0 meter reading for CB5.5.

CBP Cruise 541-Did not sample on November 15, 2010 due to a problem with the winch on the R/V Slover which needed to be repaired. Sampled 16 stations on November 16 and 18, 2010. Could not sample on November 17 and 19, 2010 due to rough seas and high winds which made sampling unsafe. Rescheduled for December 1-3, 2010 which was the next time the R/V Slover was available. Could not sample on December 1, 2010 due to a storm front which moved in with gale force winds. Sampled 7 stations on December 2, 2010. On December 3, 2010 another front moved in with high winds and rough seas. As R/V Slover was heading to the first station, CB7.1N, Captain determined it was unsafe to sample. Headed back into Norfolk. Due to weather did not collect the following stations: CB5.4, CB5.4W, CB5.5 and CB7.1N.

16NOV10- There is no 1 meter reading for station CB7.4N. There are no readings for 1 through 4 meters for station CB7.3. Did not submit data from station CB7.2E. The fluorometry values were not supported by the chlorophyll a samples collected at this station. There was a low r2 value for this regression (r2=0.49). This is because there was very little variety in the FL probe and chlorophyll a grab sample values collected. The data was carefully reviewed, and the data submitted appears to be valid.

18NOV10-There is no 1 meter reading for stations WE4.1, WE4.2 and WE4.3.

02DEC10-There was a low r2 value for this regression (r2=0.67). Believe this is because there was very little variety in the FL probe and chlorophyll a grab sample values collected, because the fluorometry probe values submitted corresponded well with the chlorophyll a grab samples collected in the field. There are no readings for 1 through 2 meters for station LE3.7. There is no 1 meter reading for station CB6.1. Data from station EE3.4 was not submitted, because the calculated fluorometry values did not agree with the chlorophyll a samples collected for this station.

17DEC10- Only sampled one day on cruise 543 due to weather conditions which made sampling unsafe. These were a large winter storm with gale force winds and then snow with accumulation of a few inches. On the one day sampled the conditions were too rough to sample the Chesapeake Bay mouth stations. Due to weather did not collect the following stations: EE3.4, EE3.5, CB5.4,CB5.4W, CB5.5, CB6.1, CB6.2, CB6.3, CB7.1, CB7.1N, CB7.1S, CB7.2, CB7.2E, LE3.7, LE3.6, CB7.3E, CB7.4, CB7.4N and CB8.1E. Deleted transect from the end of the day between stations WE4.4 to LE5.5-W. The fluorometry values were extremely high, and this was not supported by the chlorophyll a samples collected in this area.

KEY WORDS (EXCLUDING VARIABLE NAMES)
In vivo fluorescence
Fluorometer
Chlorophyll a

THIS IS THE END OF THE VIRGINIA CHESAPEAKE BAY PROGRAM IN VIVO FLUORESCENCE CHLOROPHYLL A DATA DICTIONARY