Plant Biomass/Production/Consump. (FIFE)

Summary:

The focus of this study was to quantify the effects of foliage removal by cattle on plant net primary productivity (NPP). The Vegetation Biomass, Production and Consumption at Selected Sites Data Set contains mean values and their variances. During the growing season of 1987, portable cattle exclosures were used to quantify above-ground plant biomass dynamics at each of four sites. All sites had been grazed each year and burned frequently during the preceding 10 years. Biomass was measured inside portable exclosures, outside exclosures (in unprotected vegetation), and inside permanent exclosures. Exclosures were moved to previously unsampled locations within a distance of 10 m after samples were obtained, and these remained in place until the next sampling date.

Table of Contents:

1. Data Set Overview:

Data Set Identification:

Plant Biomass/Production/Consump. (FIFE)
(Vegetation Biomass, Production and Consumption at Selected Sites).

Data Set Introduction:

The Vegetation Biomass, Production and Consumption at Selected Sites Data Set contains mean biomass values and their variances. The focus of this study was to quantify the effects of foliage removal by cattle on plant net primary productivity (NPP).

Objective/Purpose:

Not available at this revision.

Summary of Parameters:

Grass dry weight, non-grass dry weight, total biomass, grass production, non-grass production, grass consumption, non-grass consumption, cumulative grass production, and cumulative grass consumption.

Discussion:

During the growing season of 1987, 10 1 x 1 x 0.5 m high portable cattle exclosures were used to quantify above-ground plant biomass dynamics at each of four sites. Three of these sites were located in uplands and the fourth site on a moderate, north-facing slope. All sites had been grazed each year and burned frequently during the preceding 10 years. Biomass was measured inside portable exclosures, outside exclosures (in unprotected vegetation), and inside permanent exclosures. Exclosures were moved to previously unsampled locations within a distance of 10 m after samples were obtained, and these remained in place until the next sampling date. The focus of this study was to quantify the effects of foliage removal by cattle on plant net primary productivity (NPP). Mean values and their variances are reported.

Related Data Sets:

- Mowing Experiment Biophysical Measurements.
- Exotech Surface Reflectances for the Mowing Experiment.
- Vegetation Species and Cover Abundance.
- Biophysical Properties of Vegetation.
- Leaf Angle Data.
- Root Biomass.

FIS Data Base Table Name:

PLANT_PRODUCTION_DATA.

2. Investigator(s):

Investigator(s) Name and Title:

Dr. C. L. Turner
Kansas State University

Title of Investigation:

The Influence of Grazing on Land Surface Climatological Variables.

Contact Information:

Contact 1:
Dr. C.L. Turner
Kansas State University
Manhattan, KS
Tel. (913) 532-7627
Email: cturner@ksuvm.ksu.edu

Contact 2:
Dr. T.R. Seastedt
University of Colorado
Boulder, CO.
(303) 492-3302
tims@culter.colorado.edu

Requested Form of Acknowledgment.

3. Theory of Measurements:

To evaluate and compare the role of grazing on plant responses of native tallgrass prairie, grazing intensity was defined as the amount of plant biomass remaining following defoliation.

4. Equipment:

Sensor/Instrument Description:

Collection Environment:

Ground-based.

Source/Platform:

Ground.

Source/Platform Mission Objectives:

Measure vegetation production and consumption.

Key Variables:

Vegetation biomass, vegetation production, and vegetation consumption.

Principles of Operation:

Sites with different cattle stocking rates were selected. Consumption of aboveground biomass was directly related to stocking intensity. Production and consumption of aboveground biomass was estimated by comparing vegetative biomass inside and outside of moveable exclosures that prevented grazing by cattle.

Sensor/Instrument Measurement Geometry:

Not applicable.

Manufacturer of Sensor/Instrument:

Not applicable.

Calibration:

Specifications:

Not applicable.

Tolerance:

Not applicable.

Frequency of Calibration:

Not applicable.

Other Calibration Information:

Not applicable.

5. Data Acquisition Methods:

Portable exclosures were used at stations 21, 29, 32, and 42 (SITEGRID_IDs 8639-PPS, 0847-PPS, 4268-PPS, and 1445-PPS, respectively) that were stocked with cattle. The number of observations were the number of exclosures used at one time at a site, up to a maximum of 10.

The exclosures were moved after each measurement to another area that was close to the previous area, within the same lawn (i.e., localized preferentially grazed area).

The replicates and the movement of the exclosures after each measurement were always within the same lawn. The lawn at each site was selected visually, making sure to select a lawn that was large enough to have space for exclosures to be put out at different times throughout the growing season. The lawns were about 10 m in diameter. The lawns are essentially a homogeneous area in both height, and species composition and diversity.

At site 29 (SITEGRID 0847-PPS), 10 exclosures were erected before the growing season began, once plants began to grow, the grass inside the exclosure was clipped to ground level and then dried to constant dry weight. The grass immediately outside the exclosure was also clipped to the ground and dried to constant weight. The 10 exclosures were then moved to another area nearby within the same lawn where the procedures were repeated at irregular intervals until the end of the growing season.

Data were obtained by hand clipping of all vegetation within the 0.1 square meter exclosures to ground level (for standing crop estimate), oven-drying to constant weight, and weighing.

6. Observations:

Data Notes:

Not available.

Field Notes:

None.

7. Data Description:

Spatial Characteristics:

Spatial Coverage:

Data were collected at the following locations:

SITEGRID	STN	NORTHING	EASTING	LATITUDE	LONGITUDE
8639-PPS	21	4316771	712827	38 58 33	-96 32 36
0847-PPS	29	4332344	714439	39 06 57	-96 31 11
4268-PPS	32	4325626	718579	39 03 15	-96 28 27
1445-PPS	42	4331160	714090	39 06 19	-96 31 27

Spatial Coverage Map:

Not available.

Spatial Resolution:

Data were obtained within 0.1 square meter exclosures.

Projection:

Not available.

Grid Description:

Not available.

Temporal Characteristics:

Temporal Coverage:

The overall time period of data acquisition was from May 18, 1987 through October 13, 1987 during and between the IFC's.

```
  IFC#            Dates
 -----      ------------------
IFC-1       05/26/87 - 06/06/87
IFC-2       06/25/87 - 07/11/87
IFC-3       08/06/87 - 08/21/87
IFC-4       10/05/87 - 10/16/87
```

During this overall period samples were collected on 17 days, however, an individual location was sampled at most 7 times during this period.

Temporal Coverage Map:

Not available.

Temporal Resolution:

Samples were collected at 2-3 week intervals during the growing season.

Data Characteristics:

The SQL definition for this table is found in the PLANTPRO.TDF file located on FIFE CD-ROM Volume 1.

Parameter/Variable Name

Parameter/Variable Description	Range	Units	Source
SITEGRID_ID This is a FIS grid location code. Site grid codes (SSEE-III) give the south (SS) and east (EE) cell number in a 100 x 100 array of 200 m square cells. The last 3 characters (III) are an instrument identifier.			FIS
STATION_ID The station ID designating the location of the observations.	21, 29, 32, 42		FIS
OBS_DATE The date of the observations.	min = 18-MAY-87 max = 13-OCT-87		FIS
NUM_OBS The number of samples used to calculate estimate.	min = 3, max = 10		FIS
GRASS_WT The biomass of grasses at that date and site in units of grams dried matter/0.1 square meters.	min = 3.71, max = 25.18		FIS
GRASS_WT_SDEV The standard deviation of the biomass of grasses for the date and site in units of grams dried matter/0.1 square meters.	min = 0.86, max = 13.09		FIS
NONGRASS_WT The non-grass biomass at that date and site in units of grams dried matter/0.1 square meters.	min = 0.89, max = 12.37		FIS
NONGRASS_WT_SDEV The standard deviation of non-grass biomass at that date and site in units of grams dried	min = 0.63, max = 11.81		FIS

matter/0.1 square meters.

TOTAL_WT
The total biomass at that date and site in units of grams dried matter/0.1 square meters.

min = 5.08, max = 29.46

FIS

TOTAL_WT_SDEV
The standard deviation of total biomass at that date and site in units of grams dried matter/0.1 square meters.

min = 0.99, max = 15.39

FIS

GRASS_PRODCTN
The grass biomass production since previous sampling date (or beginning of growing season for initial samples) in units of grams dried matter/0.1 square meters.

min = -7.5, max = 21.43

FIS

GRASS_PRODCTN_SDEV
The standard deviation of grass biomass production since previous sampling date in units of grams dried matter/0.1 square meters.

min = 1.02, max = 18.42

FIS

NONGRASS_PRODCTN
The non-grass biomass production since previous sampling date (or beginning of growing season for initial samples) in units of grams dried matter/0.1 square meters.

min = -5.66, max = 7.25

FIS

NONGRASS_PRODCTN_SDEV
The standard deviation of non-grass biomass production since previous sampling date in units of grams dried matter/0.1 square meters.

min = 0.63, max = 13.05

FIS

GRASS_CONSUMED
The grass biomass consumed by all herbivores since previous sampling date (or beginning of growing season for initial sample) in units of grams dried matter/0.1 square meters.

min = -1.74, max = 6.77

[grams]
[0.1 meter^-2]

FIS

GRASS_CONSUMED_SDEV

The standard deviation of grass biomass consumed by all herbivores since previous sampling date in units of grams dried matter/0.1 square meters.

min = 1.47, max = 18.22   [grams] [0.1 meter^-2]   FIS

NONGRASS_CONSUMED
The non-grass biomass consumed by all herbivores since previous sampling date (or beginning of growing season for initial sample) in units of grams dried matter/0.1 square meters.

min = -3.61, max = 5.12   [grams] [0.1 meter^-2]   FIS

NONGRASS_CONSUMED_SDEV
The standard deviation of non-grass biomass consumed by all herbivores since previous sampling date in units of grams dried matter/0.1 square meters.

min = 1.44, max = 11.78   [grams] [0.1 meter^-2]   FIS

TOTAL_GRASS_PRODCTN
The grass biomass production to date since beginning of growing seasons (cumulative production) in units of grams dried matter/0.1 square meters.

min = 8.65, max = 52.15   FIS

TOTAL_GRASS_PRODCTN_SDEV
The standard deviation of grass biomass production to date since beginning of growing seasons in units of grams dried matter/0.1 square meters.

min = 1.02, max = 47.64   FIS

TOTAL_NONGRASS_PRODCTN
The non-grass biomass production to date since beginning of growing seasons (cumulative production) in units of grams dried matter/0.1 square meters.

min = 0.89, max = 24.68   FIS

TOTAL_NONGRASS_PRODCTN_SDEV
The standard deviation of non-grass biomass production to date since beginning of growing seasons in units of grams dried matter/0.1 square meters.

min = 0.35, max = 19.99   FIS

TOTAL_GRASS_CONSUMED

The grass biomass consumed by all   min = 1.69,   [grams]   FIS
herbivores to date since beginning   max = 33.89   [0.1
of growing season (cumulative   meter^-2]
consumption) in units of grams
dried matter/0.1 square meters.

TOTAL_GRASS_CONSUMED_SDEV
The standard deviation of grass   min = 1.58,   [grams]   FIS
biomass consumed by all herbivores   max = 45.36   [0.1
to date since beginning of growing   meter^-2]
season in units of grams dried
matter/0.1 square meters.

FIFE_DATA_CRTFCN_CODE   *
The FIFE Certification Code for   CPI=Checked by   FIS
the data, in the following format: Principal
CPI (Certified by PI), CPI-???   Investigator
(CPI - questionable data).

LAST_REVISION_DATE
data, in the format (DD-MMM-YY).   max = 27-MAR-90

Footnote:

* Decode the FIFE_DATA_CRTFCN_CODE field as follows:

The primary certification codes are: EXM Example or Test data (not for release) PRE
Preliminary (unchecked, use at your own risk) CPI Checked by Principal Investigator (reviewed
for quality) CGR Checked by a group and reconciled (data comparisons and cross checks)

The certification code modifiers are: PRE-NFP Preliminary - Not for publication, at the request
of investigator. CPI-MRG PAMS data which is "merged" from two separate receiving stations to
eliminate transmission errors. CPI-??? Investigator thinks data item may be questionable.

Sample Data Record:

SITEGRID_ID	STATION_ID	OBS_DATE	NUM_OBS	GRASS_WT	GRASS_WT_SDEV
8639-PPS	21	12-JUN-87	3	11.820	3.360
8639-PPS	21	10-JUL-87	10	9.980	3.840
8639-PPS	21	25-AUG-87	5	14.170	3.790
8639-PPS	21	12-OCT-87	6	7.370	2.620

NONGRASS_WT	NONGRASS_WT_SDEV	TOTAL_WT	TOTAL_WT_SDEV	GRASS_PRODCTN
7.250	4.660	19.070	5.320	10.0800
12.370	11.810	22.350	12.340	2.9300
10.630	3.680	24.800	4.150	7.6800
6.530	2.760	13.900	2.900	-5.2500

GRASS_PRODCTN_SDEV	NONGRASS_PRODCTN	NONGRASS_PRODCTN_SDEV

GRASS_CONSUMED

```
------------------   --------------   ----------------------   -------------
-
2.110                7.2500           4.660                        -1.7400
9.640                1.8200           5.640                         3.8000
4.660                2.8200           6.790                         2.8700
2.160               -4.6400           4.550                         3.0300
```

GRASS_CONSUMED_SDEV	NONGRASS_CONSUMED	NONGRASS_CONSUMED_SDEV
1.470	1.0100	1.920
6.530	3.9000	9.590
4.790	3.2600	9.590
5.410	3.9100	5.240

TOTAL_GRASS_PRODCTN	TOTAL_GRASS_PRODCTN_SDEV	TOTAL_NONGRASS_PRODCTN
10.080	2.110	7.250
14.740	8.640	10.000
22.800	6.910	11.740
22.800	6.910	11.790

TOTAL_NONGRASS_PRODCTN_SDEV	TOTAL_GRASS_CONSUMED	TOTAL_GRASS_CONSUMED_SDEV
4.660		
4.700	6.900	9.480
1.680	8.600	9.470
1.730	9.560	8.700

FIFE_DATA_CRTFCN_CODE	LAST_REVISION_DATE
CPI	27-MAR-90
CPI	27-MAR-90
CPI	27-MAR-90
CPI	27-MAR-90

8. Data Organization:

Data Granularity:

Data were obtained within 0.1 square meter exclosures. Samples were collected at 2-3 week intervals during the growing season.

A general description of data granularity as it applies to the IMS appears in the EOSDIS Glossary.

Data Format:

The CD-ROM file format consists of numerical and character fields of varying length separated by commas. The character fields are enclosed with a single apostrophe. There are no spaces between the fields. Each file begins with five header records. Header records contain the following information: Record 1 Name of this file, its table name, number of records in this file, path and name of the document that describes the data in this file, and name of principal investigator for these data.

Record 2 Path and filename of the previous data set, and path and filename of the next data set. (Path and filenames for files that contain another set of data taken at the same site on the same day.)

Record 3 Path and filename of the previous site, and path and filename the next site. (Path and filenames for files of the same data set taken on the same day for the previous and next sites (sequentially numbered by SITEGRID_ID)).

Record 4 Path and filename of the previous date, and path and filename of the next date. (Path and filenames for files of the same data set taken at the same site for the previous and next date.)

Record 5 Column names for the data within the file, delimited by commas.

Record 6 Data records begin.

Each field represents one of the attributes listed in the chart in the *Data Characteristics Section* and described in detail in the TDF file. These fields are in the same order as in the chart.

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

At each sampling date a comparison of the amount of biomass (grass and forbs) inside the exclosure versus the amount immediately outside the exclosure at a particular site and point in time was made.

Net above-ground primary production since the last sampling date was calculated as the positive difference between mean plant biomass inside exclosures on the sampling date and mean plant biomass outside exclosures on the previous sampling date.

Grass biomass consumed since the last sampling date was calculated as the difference between grass biomass inside and outside the enclosure. Estimates of cumulative production or consumption were calculated as the sum of the positive differences from moveable exclosure data.

Total weight is the sum of grass and non-grass dry weight for a date and site.

Cumulative grass production is the sum of all previous grass consumption plus (standing crop inside an exclosure minus standing crop outside).

Data Processing Sequence:

Processing Steps:

Not available at this revision.

Processing Changes:

None.

Calculations:

Special Corrections/Adjustments:

None.

Calculated Variables:

- Net above-ground primary production,
- Grass biomass consumed,
- Estimates of cumulative production or consumption,
- Total weight, and
- Cumulative grass production.

Graphs and Plots:

None.

10. Errors:

Sources of Error:

Not available at this revision.

Quality Assessment:

Data Validation by Source:

No information on data validation was provided by the investigator.

Confidence Level/Accuracy Judgment:

The investigator places a high degree of confidence in the accuracy of these data.

Measurement Error for Parameters:

No quantitative assessment was made, see the *Confidence Level/Accuracy Judgment Section*.

Additional Quality Assessments:

FIS staff applied a general Quality Assessment (QA) procedure to the data to identify inconsistencies and problems for potential users. As a general procedure, the FIS QA consisted of examining the maximum, minimum, average, and standard deviation for each numerical field in the data table. An attempt was made to find an explanation for unexpected high or low values, values outside of the normal physical range for a variable, or standard deviations that appeared inconsistent with the mean. In some cases, histograms were examined to determine whether outliers were consistent with the shape of the data distribution.

The discrepancies, which were identified, are reported as problems in the *Known Problems with the Data Section*.

Data Verification by Data Center:

The data verification performed by the ORNL DAAC deals with the quality of the data format, media, and readability. The ORNL DAAC does not make an assessment of the quality of the data itself except during the course of performing other QA procedures as described below.

The FIFE data were transferred to the ORNL DAAC via CD-ROM. These CD-ROMs are distributed by the ORNL DAAC unmodified as a set or in individual volumes, as requested. In addition, the DAAC has incorporated each of the 98 FIFE tabular datasets from the CD-ROMs into its online data holdings. Incorporation of these data involved the following steps:

- Copying the entire FIFE Volume 1, maintaining the directory structure on the CD-ROM;
- Using data files, documentation, and SQL code provided on the CD-ROM to create a database in Statistical Analysis System (SAS); and
- Creating transfer files to transfer the SAS metadata database to Sybase tables.

Each distinct type of data (i.e. "data set" on the CD-ROM), is accompanied by a documentation file (i.e., .doc file) and a data format/structure definition file (i.e., .tdf file). The data format files on the CD-ROM are Oracle SQL commands (e.g., "create table") that can be used to set up a relational database table structure. This file provides column/variable names, character/numeric type, length, and format, and labels/comments. These SQL commands were converted to SAS code and were used to create SAS data sets and subsequently to input data files directly from the CD-ROM into a SAS dataset. During this process, file names and directory paths were captured and metadata was extracted to the extent possible electronically. No files were found to be corrupted or unreadable during the conversion process.

Additional Quality Assurance procedures were performed as follows:

- Statistical operations were performed to calculate minimum and maximum values for all numeric fields and to create a listing of all values of the character fields. During this process, it was determined that various conventions were used to represent missing values. (Note: no modifications were made to any data by the DAAC). In most cases, missing value identification conventions were discussed in the accompanying .doc file. Based on a visual check of the minimum and maximum values, no glaring errors or holes

were identified that might indicate errors introduced during CD-ROM mastering by the FIFE project or data ingest by the DAAC.

- Some minor inconsistencies and typographical errors were identified in some of the character fields and column labels, however, no modifications were made to the data by the DAAC.
- Some conversions of ASCII data were necessary to move the data from a DOS platform to a UNIX platform. Standard operating system conversion utilities were used (e.g., dos2unix).
- Much of the metadata required for archival is imbedded in the narrative documentation accompanying the data sets and extracted manually by DAAC staff who have read the .doc files provided on the CD-ROM and have hand entered this information into the metadata database maintained by the DAAC. QA procedures have been performed on these metadata to identify and eliminate typographical errors and inconsistencies in naming conventions, to ensure that all required metadata is present, and to ensure the accuracy of file names and paths for retrieval.
- Data requested for distribution to users are checked to verify that files copied from disk to other media remain uncorrupted.

As errors are discovered in the online tabular data by investigators, users, or DAAC staff, corrections are made in cooperation with the principal investigators. These corrections are then distributed to users. CD-ROM data are corrected when re-mastering occurs for replenishment of CD-ROM stock.

11. Notes:

Limitations of the Data:

Not available.

Known Problems with the Data:

None at this revision.

Usage Guidance:

The cattle stocking rates of the plots were not known, hence, there was no prior knowledge of the extent of the grazing intensity. Grazing intensity can be calculated as percent of season-long production that was consumed by the cattle.

Consumption/production = Stocking rate index.

Any Other Relevant Information about the Study:

None available at this revision.

12. Application of the Data Set:

This data set can be used was to quantify the effects of foliage removal by cattle on plant net primary productivity (NPP).

13. Future Modifications and Plans:

The FIFE field campaigns were held in 1987 and 1989 and there are no plans for new data collection. Field work continues near the FIFE site at the Long-Term Ecological Research (LTER) Network Konza research site (i.e., LTER continues to monitor the site). The FIFE investigators are continuing to analyze and model the data from the field campaigns to produce new data products.

14. Software:

Software to access the data set is available on the all volumes of the FIFE CD-ROM set. For a detailed description of the available software see the *Software Description Document*.

15. Data Access:

Contact Information:

ORNL DAAC User Services
Oak Ridge National Laboratory

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Data Center Identification:

ORNL Distributed Active Archive Center
Oak Ridge National Laboratory
USA

Telephone: (865) 241-3952
FAX: (865) 574-4665

Email: ornldaac@ornl.gov

Procedures for Obtaining Data:

Users may place requests by telephone, electronic mail, or FAX. Data is also available via the World Wide Web at http://daac.ornl.gov.

Data Center Status/Plans:

FIFE data are available from the ORNL DAAC. Please contact the ORNL DAAC User Services Office for the most current information about these data.

16. Output Products and Availability:

The Vegetation Biomass, Production and Consumption at Selected Sites data are available on FIFE CD-ROM Volume 1. The CD-ROM filename is as follows:

\DATA\BIOLOGY\PLANTPRO\1987grid.PPD

Note: capital letters indicate fixed values that appear on the CD-ROM exactly as shown here, lower case indicates characters (values) that change for each path and file.

The format used for the filenames is: *1987grid.sfx*, where *grid* is the four-number code for the location within the FIFE site grid. The filename extension (*.sfx*), identifies the data set content for the file (see the *Data Characteristics Section*) and is equal to .PPD for this data set.

17. References:

Satellite/Instrument/Data Processing Documentation.

See the *Journal Articles and Study Reports Section*.

Journal Articles and Study Reports.

Sellers, P.J., F.G. Hall, G. Asrar, D.E. Strebel, and R.E. Murphy. 1988. The First ISLSCP Field Experiment (FIFE). Bull. of the Am. Meteorological Soc. 69:22-27.

Turner, C.L., T.R. Seastedt, M.I. Dyer, T.G.F. Kittel, and D.S. Schimel.1992. Effects of management and topography on the radiometric response of a tallgrass prairie. J. Geophys. Res. 97:18,855-18,866.

Turner, C.L., T.R. Seastedt, and M.I. Dyer. 1993. Maximization of above-ground production: the role of defoliation frequency, intensity and history. Ecol. Appl. 3:175-186.

Archive/DBMS Usage Documentation.

Contact the EOS Distributed Active Archive Center (DAAC) at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee (see the *Data Center Identification Section*). Documentation

about using the archive and/or online access to the data at the ORNL DAAC is not available at this revision.

18. Glossary of Terms:

A general glossary for the DAAC is located at Glossary.

19. List of Acronyms:

CD-ROM Compact Disk (optical), Read-Only Memory DAAC Distributed Active Archive Center EOSDIS Earth Observing System Data and Information System FIFE First ISLSCP Field Experiment FIS FIFE Information System ISLSCP International Satellite Land Surface Climatology Project KSU Kansas State University ORNL Oak Ridge National Laboratory SQL Structured Query Language URL Uniform Resource Locator UTM Universal Transverse Mercator

A general list of acronyms for the DAAC is available at Acronyms.

20. Document Information:

May 9, 1994 (citation revised on October 14, 2002).

Warning: This document has not been checked for technical or editorial accuracy by the FIFE Information Scientist. There may be inconsistencies with other documents, technical or editorial errors that were inadvertently introduced when the document was compiled or references to preliminary data that were not included on the final CD-ROM.

Previous versions of this document have been reviewed by the Principal Investigator, the person who transmitted the data to FIS, a FIS staff member, or a FIFE scientist generally familiar with the data.

Document Review Date:

December 10, 1996.

Document ID:

ORNL-FIFE_PLANTPRO.

Citation:

Cite this data set as follows:

Turner, C. L. 1994. Plant Biomass/Production/Consump[tion]. (FIFE). Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/69. Also published in D. E. Strebel, D. R. Landis, K. F. Huemmrich, and B. W. Meeson (eds.), Collected Data of the First ISLSCP Field Experiment, Vol. 1: Surface Observations and Non-Image Data Sets. CD-ROM. National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, U.S.A. (available from http://www.daac.ornl.gov).

Document Curator:

DAAC Staff

Document URL:

http://daac.ornl.gov