

NASA Earthdata Network

- Data Discovery
- Data Centers
- Community
- Science Disciplines

ORNL DAAC

Distributed Active Archive Center for
Biogeochemical Dynamics

About Us

Products

Data

Tools

Help

[home](#) [sign in](#)

Metadata

[DAAC Home](#) > [Data](#) > [Regional/Global](#) > [Net Primary Production \(NPP\)](#) > Data Set Documentation

NPP Tundra: Point Barrow, Alaska, 1970-1972, R1

Get Data

Revision date: August 28, 2012

Summary:

This data set contains three data files. One file (.csv format) provides above- and below-ground biomass and leaf area index (LAI) data for a wet arctic tundra meadow (Biome research site 2, *Dupontia* meadow, vegetation type V) studied from 1970 to 1971 at Point Barrow, Alaska, USA, (71.30 N -156.67 W Elevation 5 m). The second file, also in .csv format, provides net primary productivity (NPP) estimates for different plant growth forms for eight vegetation types recognized in the coastal tundra at Barrow. The third file (.txt format) provides climate data from the weather station at Barrow, Alaska (71.30 N -156.78 W Elevation 31 m).

Measurements of above- and below-ground living and dead biomass were made at 10-day intervals during the growing season (mid June to end of August) by harvest methods in 6 x 6 m study plots of undisturbed vegetation. LAI was estimated at 10-day intervals with inclined point quadrats and other methods. NPP estimates are based on harvest at the period of peak above-ground vascular biomass and seasonal CO₂ gas exchange estimates in 1972. The studies were conducted as part of the International Biological Program (IBP) U.S. Tundra Biome program.

Average total NPP for the eight vegetation communities recognized for the coastal tundra at Barrow was 230 g/m²/year (110 g/m²/year ANPP plus 120 g/m²/year BNPP). Values varied by vegetation community type.

Revision Notes: This data set has been revised to correct several values of average below-ground plant standing crop. A second NPP data file has been added to provide NPP estimates for the different vegetation types at the coastal tundra study site from measurements made in 1972. Please see the [Data Set Revisions](#) section of this document for detailed information.

Additional Documentation

The NPP data collection contains field measurements of biomass, estimated NPP, and climate data for terrestrial grassland, tropical forest, boreal forest, and tundra sites worldwide. Data were compiled from published literature for intensively studied and well-documented individual field sites and from a number of previously compiled multi-site, multi-biome data sets of georeferenced NPP estimates. The principal compilation effort (Olsen et al., 2001) was sponsored by the NASA Terrestrial Ecology Program. For more information, please visit the NPP web site at http://daac.ornl.gov/NPP/npp_home.shtml.

Data Citation:

Cite this data set as follows:

Tieszen, L.L. 2013. NPP Tundra: Point Barrow, Alaska, 1970-1972, R1. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. doi.10.3334/ORNLDAAC/580.

This revised data set was originally published as:

Tieszen, L.L. 2001. NPP Tundra: Point Barrow, Alaska, 1970-1972. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

Table of Contents:

- [1 Data Set Overview](#)
- [2 Data Description](#)
- [3 Applications and Derivation](#)
- [4 Quality Assessment](#)
- [5 Acquisition Materials and Methods](#)
- [6 Data Access](#)
- [7 References](#)
- [8 Data Set Revisions](#)

1. Data Set Overview:

Project: Net Primary Productivity (NPP)

Productivity of a coastal tundra was studied from 1970 to 1972 at Point Barrow, Alaska, USA. Measurements of above- and below-ground living and dead biomass and leaf area index (LAI) were made in 6 x 6-m study plots of undisturbed vegetation in a wet arctic tundra meadow (site 2, *Dupontia* meadow, vegetation type V) from 1970 to 1971. Net primary productivity (NPP) estimates for different plant growth forms for eight vegetation types recognized in the coastal tundra at Barrow were calculated based on harvest at the period of peak above-ground vascular biomass and seasonal CO₂ gas exchange estimates in 1972.

The study area (71.30 N, 156.67 W) was located 3 km inland from the Chukchi Sea on a complex sequence of drained lakes, about 850 km north-northwest of Fairbanks, Alaska. It was thought to be fairly representative of the tundra vegetation around Barrow as a whole. The area was not glaciated during the Pleistocene, but the soil, which includes marine sediments and thin buried peat layer, is believed to be 5,000-10,000 years old.

The climate is very cold, both on an annual basis and during the short growing season (June, July, August) when the temperature rises just a few degrees above freezing. Mean annual precipitation was 112.16 mm for the 1921-1990 period. Solar irradiance is low, even on clear days during the summer season, when cloud cover averages about 85%. Graminoids vegetation at Barrow is grazed discontinuously and sometimes intensively by the brown lemming.

Annual above-ground primary productivity for the coastal tundra at Barrow was estimated to average 80-130 g/m²/yr (Dennis and Tieszen, 1972; Miller and Tieszen, 1972; Tieszen, 1972; Webber, 1978; Miller et al., 1980). Subsurface live standing crop is 534-620 g/m², to which roots contribute 375-432 g/m². Subsurface standing crop changes only slightly with season, and approximately 85% of the total occurs in the top 10 cm of soil (Dennis and Johnson, 1970; Dennis and Tieszen, 1972). Annual below-ground primary production, based on overall root turnover rate, was estimated to be 67-143 g/m²/yr (Dennis, 1968; 1977; Shaver and Billings, 1975; Tieszen, 1977; Miller et al., 1980). Estimates of NPP are reported in ORNL data sets and published literature are shown in Tables 1 and 2. Productivity values for different plant growth forms for the eight vegetation types recognized for the coastal tundra at Barrow are reported in this data set [brw_npp2.csv].

Table 1. ANPP, BNPP, and TNPP values reported in ORNL data sets

File Name or Description	Data Source(s)	Sub-Site	ANPP	BNPP	TNPP
			gC/m ² /year		
ods_npp.csv	Esser (1998) based on Bunnell et al. (1975) ^{1,2}	136	25	NA	48
		138	40	NA	95
		137	80	NA	152
		112	30	NA	95
	Esser (1998) based on Dennis et al. (1978) ^{1,2}	65	NA	NA	62
Esser (1998) based on Johnson et al. (1970) ¹	79	41	50	91	
Esser (1998) based on Tieszen (1972) ^{1,2}	384	51	NA	97	
GPPDI_ClassB_NPP_2363_R1.csv	Olson et al. (2012)	Class B 1597 (MI 2348) (ODS 112)	50	NA	NA
		Class B 1598 (MI 2349) (ODS 65)	NA	NA	60
		Class B 1598 (MI 2350) (ODS 136)	20	NA	NA

		Class B 1598 (MI 2351) (ODS 137)	80	NA	NA
		Class B 1598 (MI 2351) (ODS 384)	50	NA	NA
		Class B 1598 (MI 2351) (brw)	30	20	50

Notes: NA = Not available. MI = Measurement identification number. The differences in NPP values reported in this table are mainly due to differences in calculation methods, as explained in these notes. Please consult original references for details. Revised data sets (R1, R2, etc) are accompanied by ORNL DAAC Data Set Change Information files. Please see the corresponding documentation for reasons why the data values were revised. ¹For this table, NPP data from the original data sources were converted from grams of dry weight per meter square per year to grams of carbon per meter square per year using a conversion factor of 0.5. ²TNPP-C value is from Esser (1998).

Table 2. ANPP, BNPP, and TNPP values reported in published literature

Site (Region)	Data Source	Sampling Year	ANPP	BNPP	TNPP
			gC/m ² /year ¹		
IBP Site 2, Point Barrow, Alaska, USA	Dennis (1968); Dennis and Johnson (1970)	1964-65	41	50	91
	Dennis and Johnson (1970)	1964	36.5	NA	NA
		1965	23.5 ^a	129 (live)	NA
	Dennis (1977)	1964-65	39.3	200	NA
		1970-71	39.3	72 ² -213 ³	NA
	Tieszen (1973)	1970	51	NA	NA
	Tieszen (1977)	1971-72	53.4 ^b	71.5	NA
	Webber (1978)	1970	50.8	NA	NA
		1971	40.1	NA	NA
		1972	37.4	NA	NA
1973		28.7	NA	NA	
		1972	21.3 ^c	NA	NA
Average for Eight Vegetation Types Recognized for the Coastal Tundra at Barrow	Miller et al. (1980) based on Webber (1978)	1972 ⁴	55	60	115
Meade River Site	Johnson and Kelly (1970)	1966	41	50 ⁵	91

Notes:

NA = Not available.

¹For this table, NPP data from the original data sources were converted from grams of dry weight per meter square per year to grams of carbon per meter square per year using a conversion factor of 0.5.

²Based on modeled changes of below-ground standing crop (live vs dead) through the 1971 season.

³Derived by assuming above-ground net productivity is to the steady-state level of above-ground dead standing crop as below-ground net productivity is to the steady-state level of below-ground dead standing crop.

⁴Average sum of NPP estimates of the principal growth forms (bryophytes, monocotyledons, woody shrubs, herbaceous dicotyledons, and lichens) for the eight vegetation types recognized for the coastal tundra at Barrow.

⁵From Dennis (1968), based on an estimate of below-ground decay rates.

^aThe 1965 growing season at Barrow was less productive than average due to late onset of snow melt, subnormal July temperatures, and heavy lemming grazing.

^bFor better developed meadows.

^cObtained from 1972 plant aerial extent mapping and ANPP estimates for 110-ha area.

2. Data Description:

Spatial Coverage

Site: Point Barrow, Alaska, USA

Site Boundaries:(All latitude and longitude given in decimal degrees)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Elevation (m)
Point Barrow, Alaska, USA	-156.67	-156.67	71.30	71.30	2-5

Site Information

The study site is located 3 km inland from the Chukchi Sea on a complex sequence of drained lakes, about 850-km north-northwest of Fairbanks, Alaska, at an elevation of 5 m. Although much of the Barrow region has been severely disturbed by oil industry construction and off-road vehicle traffic, the study site represents the spectrum of undisturbed arctic tundra vegetation with discontinuous grazing. It is thought to be fairly representative of the tundra vegetation around Barrow as a whole. The area was not glaciated during the Pleistocene, but the soil, which includes marine sediments and thin buried peat layer, is believed to be 5,000-10,000 years old.

The site is typical of the polygonized wet tundra of coastal north-slope Alaska dominated by grasses and sedges. Vertical relief is less than a few meters. The immediate Barrow region is within the High Arctic Tundra Zone where there is an absence of erect shrubs on mesic sites. It is classified as a modified Bailey ecoregion Arctic tundra (#124).

When compared with other regions of the Arctic Coastal Plain, the flora and number of plant communities of the Barrow area are impoverished, due to the combined effects of severe climate and low habitat diversity. Sedge meadows cover three-quarters of the biome research area (Webber, 1978). The meadows are dominated by a single species, *Carex aquatilis*, and commonly have only a few secondary species, such as *Eriophorum angustifolium*, *E. scheucheri*, *E. russeolum*, *Calamagrostis holmii*, *Dupontia fisheri*, and *Poa arctica*. There is also a large moss component consisting of species of *Calliergon* and *Drepanocladus*. Lichens are only a minor component of these meadows. Eight vegetation community types are recognized in the biome research area (Table 3).

Table 3. The eight vegetation types in the Barrow tundra research area

VEGETATION TYPE	DOMINANT SPECIES	CHARACTERISTIC MICROTOPOGRAPHIC UNITS	AREA (%)
<i>Luzula</i> heath (I)	<i>Luzula confusa</i> , <i>Potentilla</i> , <i>Alectoria nigricans</i> , <i>Pogonatum alpinum</i> , <i>Psilopilum cavifolium</i>	Tops of high-centered polygons	3
<i>Salix</i> heath (II)	<i>Salix rotundifolia</i> , <i>Arctagrostis latifolia</i> , <i>Saxifraga nelsoniana</i> , <i>Sphaerophorus globosus</i> , <i>Brachythecium salebrosum</i>	Rims of low-centered-polygons and sloping creek banks	7
<i>Carex-Poa</i> meadow (III)	<i>Carex aquatilis</i> , <i>Poa arctica</i> , <i>Luzula arctica</i> , <i>Cetraria richardsonii</i> , <i>Pogonatum alpinum</i>	Rims of low-centered hummocky polygons and dry, flat, undeveloped polygonized sites	41
<i>Carex-Oncophorus</i> meadow (IV)	<i>Carex aquatilis</i> , <i>Oncophorus wahlenbergii</i> , <i>Dupontia fisheri</i> , <i>Peltigera aphthosa</i> , <i>Aulacomnium turgidum</i>	Moist, flat sites and drained polygon troughs	21
<i>Dupontia</i> meadow (V)	<i>Dupontia fisheri</i> , <i>Eriophorum angustifolium</i> , <i>Cerastium jenisejense</i> , <i>Peltigera canina</i> , <i>Campylium stellatum</i>	Wet, flat sites and polygon troughs	7
<i>Carex-Eriophorum</i> meadow (VI)	<i>Carex acquatilis</i> , <i>Eriophorum russeolum</i> , <i>Saxifraga foliolosa</i> , <i>Calliergon sarmentosum</i> , <i>Drepanocladus brevifolius</i>	Basins of low-centered polygons and pond margins	15
<i>Arctophila</i> pond margin (VII)	<i>Arctophila fulva</i> , <i>Ranunculus pallasii</i> , <i>R. gmelinii</i> , <i>Eriophorum russeolum</i> , <i>Calliergon giganteum</i>	Pond and stream margins	2
<i>Cochlearia</i> meadow (VIII)	<i>Cochlearia officinalis</i> , <i>Phippsia algida</i> , <i>Ranunculus pygmaeus</i> , <i>Stellaria humifusa</i> , <i>Saxifraga rivularis</i>	Snow beds, creek banks and creek sides	4

Note: Species are listed in order of amount cover. The dominant vegetation types at biome site 2, the most extensively studied IBP research area, were *Carex-Oncophorus* meadow (IV) and *Dupontia* meadow (V). Source: Brown et al. (1980); Webber (1978).

The climate at Barrow is cold. The annual average temperature is about -12 C, the warmest month averages about 4 C, the coldest month averages about -28 C. In the warmest months, surface soil temperatures rarely exceed 25 C, at a depth of 10 cm the soil temperature is unlikely to exceed 6 C, and between depths of approximately 0.75 and 300 m the ground temperature remains perennially below freezing (permafrost). Average annual

precipitation is about 124 mm. Approximately half of this falls during the dormant season as snow, most of which leaves the still-frozen terrestrial system as runoff during the spring melt period. The remaining precipitation falls as rain or snow during the 8- to 13-wk long thaw season. The growing season extends from mid-June to late August, the maximum depth of soil thaw averaging about 30 cm. Climate data in this data set are from the weather station at Barrow, Alaska (71.30 N 156.78 W) at an elevation of 31 m.

Spatial Resolution

The study plots for biomass measurements in 1970-1971 were 6 m x 6 m in size. Above-ground circular quadrats were mainly 0.1 m² in size. Additional 0.0045 m² quadrats were sampled at the beginning of the growing season in 1971. Below-ground soil cores were 0.0045 m² surface area from each clipped plot. The spatial variation of standing crop and net primary production in 1972 was established by harvesting two 0.1-m² (20 x 50-cm) quadrats from each plot during the period of peak above-ground vascular biomass.

Temporal Coverage

Above- and below-ground biomass and LAI measurements were made from 1970/06/15 through 1971/08/24. NPP measurements were made during the growing season in 1972. Climate data are available from 1921/01/01 through 1990/12/31.

Temporal Resolution

Above- and below-ground biomass and LAI measurements were made at 10-day intervals during the growing seasons (June-August) in 1970 and 1971. NPP measurements were made on four occasions during the growing season of 1972. All NPP estimates are expressed as g/m² (dry matter weight). Climate data are expressed as monthly and annual precipitation amounts (mm) and monthly and annual average maximum/minimum temperature (C). Monthly and annual climatic means are provided for the 1921-1990 period.

Data File Information

Table 4. Data files in this data set archive

FILE NAME	TEMPORAL COVERAGE	FILE CONTENTS
brw_npp1_r1.csv	1970/06/15 - 1971/08/24	Above- and below-ground biomass and LAI data for a wet <i>DuPontia</i> meadow tundra at Barrow, Alaska, USA
brw_npp2.csv	1972/06/01 - 1972/09/30	Above- and below-ground NPP data for different plant growth forms for eight vegetation types recognized in the coastal tundra at Barrow, Alaska, USA
brw_cli.txt	1921/01/01 - 1990/12/31	Mean monthly and annual climate data from the weather station at Barrow, Alaska, USA

NPP Data. NPP estimates for the Point Barrow tundra site are provided in two files in comma-separated (.csv) format (Table 4). The first 14 lines are metadata; data records begin on line 16. The variable values are delimited by commas. The values -9.99 and -999 are used to denote missing values. All NPP units are expressed as g/m²/year (dry matter weight).

Table 5. Column headings in NPP file [brw_npp1_r1.csv]

Column Heading	Definition	Units
Site	Site where data were gathered (code refers to site identification)	Text
Treatmt	Code refers to sub-site (site 2) where data were collected	Text
Year	Year in which data were collected	Numeric
Mn	Month in which data were collected	
Dy	Day on which data were collected	
Tyear	Date in decimal year (year plus the Julian date divided by 365)	
LAI_live+stdead	Leaf area index of living stem + blade plus senesced	
LAI_live	Leaf area index of living stem + blade	
AGTotclip	Above-ground total standing crop biomass (live + current)	

Sample NPP Data Record

```
Veg type, Stands, ANPP_gram, ANPP_forb, ANPP_wood_dicot, Tot_vasc_ANPP, Tot_vasc_BNPP,
NPP_bry, NPP_lichen, TNPP
I, 1, 9, 4, 5, 18, 57, 9, 1, 85
II, 5, 4, 5, 16, 25, 47, 4, 3, 79
III, 11, 28, 1, 10, 39, 114, 137, 4, 294
...
Av for coastal tundra., 33, 3, 6, 42, 120, 66, 2, 230
```

Climate Data. The climate data set is a text file (.txt format). The first 18 lines are metadata; data records begin on line 19. The variable values are delimited by semi-colons. The value -999.99 is used to denote missing values.

Sample Climate Data Record

```
Site;Temp;Parm; Jan; Feb; Mar; Apr; May; Jun; Jul; Aug; Sep; Oct; Nov; Dec; Year;
brr ;mean;prec; 4.52; 4.09; 3.49; 3.95; 3.50; 7.97; 22.61; 23.09; 14.81; 12.98; 6.67; 4.66; 112.16;
brr ;mean;tmax; -22.38; -24.41; -22.52; -14.27; -4.34; 3.55; 7.47; 6.08; 1.12; -6.62; -15.12; -20.66; 7.87;
brr ;mean;tmin; -29.42; -31.28; -29.82; -22.35; -10.16; -1.51; 0.80; 0.69; -2.83; -11.98; -21.44; -27.37; -
33.21;
brr ;numb;prec; 68; 68; 68; 69; 69; 69; 69; 69; 69; 69; 69; 69; 69; 69;
brr ;numb;tmax; 70; 70; 69; 70; 70; 70; 70; 70; 70; 70; 70; 70; 70; 70;
brr ;numb;tmin; 70; 70; 69; 70; 70; 70; 70; 70; 70; 70; 70; 70; 70; 70;
brr ;stdv;prec; 5.16; 4.20; 5.06; 5.19; 4.08; 6.81; 17.51; 13.68; 9.52; 8.54; 6.59; 3.73; 42.94;
brr ;stdv;tmax; 3.98; 4.27; 2.45; 2.82; 1.53; 1.58; 1.87; 2.35; 1.98; 3.04; 3.95; 3.11; 1.86;
brr ;stdv;tmin; 3.88; 3.74; 2.65; 2.91; 1.84; 0.91; 0.89; 1.69; 1.94; 3.36; 3.61; 3.14; 2.48;
brr ;1921;prec; 5.08; 7.62; 3.30; 2.03; 7.37; 7.62; 23.37; 9.14; 14.22; 13.97; 0.00; 8.13; 101.85;
brr ;1921;tmax; -23.22; -25.00; -22.33; -13.56; -3.78; 2.50; 10.28; 7.50; 1.17; -5.72; -11.39; -18.50; 10.28;
brr ;1921;tmin; -32.22; -32.11; -29.17; -24.61; -10.61; -2.22; 1.17; 1.33; -2.94; -12.28; -17.56; -27.06; -
32.22; ... Where,
Temp (temporal) - specific year or long-term statistic:
mean = mean based on all years
numb = number of years
stdv = standard deviation based on all years
Parm (parameter):
prec = precipitation for month or year (mm)
tmax = mean maximum temperature for month or year (C)
tmin = mean minimum temperature for month or year (C)
```

3. Data Application and Derivation:

Monthly biomass dynamics data were collected at US IBP Tundra Biome sites for comparison with models and estimation of NPP. Climate data are provided for use in driving ecosystem/NPP models.

The accumulation of biomass, or NPP, is the net gain of carbon by photosynthesis that remains after plant respiration. This data set accounts for dynamics of above- and below-ground vascular plants, and cryptogams in eight vegetation types recognized for the coastal tundra at Barrow.

This study was undertaken as part of the US Tundra Biome Program [initiated in 1970 under the US International Biological Program (IBP) and as such, its orientation was to study the total ecosystem. Discoveries of large oil reserves on the Arctic Slope dramatized the need for a basic understanding of the environment, flora, fauna, and vegetation of the tundra as well as specific information on the response of the system to perturbations and methods of regeneration.

Prior to the support of the IBP, analysis of primary production in US tundra ecosystems were limited primarily to above-ground standing crop and thus underestimated the magnitude of total standing crop and production (since below-ground standing crops are large). The IBP-supported analysis of primary production at Barrow was undertaken to provide a more detailed description of seasonal events and to increase knowledge of the control of this production by such factors as climatological conditions, soil and nutrient limitations, and the effect of consumers.

4. Quality Assessment:

Above-ground primary production at this Barrow site, where moisture is in all likelihood not limiting, is probably best estimated from harvest data by using the sum of the dry weights of all species at the period of peak production for the community (Tieszen, 1972). The seasonal maxima of above-ground, current year standing crops from this study are in agreement with and near the middle of the range of those reported by Bliss (1962) in his review of production data for several tundra communities at Point Barrow. Below-to-above-ground standing crop ratios are in agreement with those compiled by Bliss (1970) for regions of cold temperatures.

Primary productivity estimates for the *Carex-Oncophorus* meadow vegetation type (biome research site 2) measured by different methods (i.e., cuvette

photosynthesis measurements on vascular plants and mosses, by canopy photosynthesis models for vascular plants and mosses and by the aerodynamic method) were in general agreement (Miller et al., 1980). This assessment gives support to the calculations for the other vegetation types and for the coastal tundra at Barrow as a whole.

Sources of Error

The standard errors are large as a result of differences among plots. Interpretations must be made with this error in mind.

5. Data Acquisition Materials and Methods:

Above- and Below-ground Biomass

Study plots, each 6 x 6 m centered on a flat polygon center, were chosen subjectively in an area of relatively flat polygons. Sampling of the plots for both production and LAI occurred at approximately 10-day intervals from mid-June to the end of August in both 1970 and 1971.

LAI was estimated with inclined point quadrats, and leaf inclination was estimated with a protractor. In addition, one to several quadrats from plots scattered in other sites that represented wet meadow, polygon tops and troughs, low polygons, and pure species stands were sampled for LAI at the peak season of both years.

Above-ground standing crop was sampled by harvest method. Two previously uncoupled, circular quadrats of approximately 0.1-m² area were clipped from each of five control plots, except for 5 June, 15 June, and 24 August 1971, when eight 0.0045-m² quadrats from one plot, five 0.1-m² quadrats from one plot, and six 0.1-m² quadrats from four plots, respectively, were clipped. All aboveground vascular plant material was clipped with scissors at the base of the live moss layer, collected, taken to the laboratory, and sorted to species within at least a few hours. Species separations were based on leaf and stem structural features when reproductive or other diagnostic characters were not present. The dead material from previous years was removed. Two sub samples, one for chlorophyll content, and the other for analysis of either carbohydrates or caloric content, were removed (Dennis et al., 1978). The remainder was oven dried.

Below-ground standing crop was sampled in 1971 by means of soil cores of 0.0045-m² surface area from each clipped plot. Plant material was separated manually into compartment fractions including live stem base, dead stem base, live rhizome, dead rhizome, live tan root (from prior year), live white root (from current year), and dead root. The stem base consisted of vertically oriented below-ground stem material extending from the air-moss interface down to the rhizome. Live material was distinguished from dead material on the basis of light rather than dark color, shiny rather than dull surface, high versus low tensile strength, and dense rather than vacuous appearance. Depth of soil thaw was determined concurrently from the soil cores.

NPP Measurements

Above-ground NPP of vascular plants at Barrow in 1972 was estimated by harvest method and averaged according to relative surface area of the different vegetation types (Webber, 1978). Below-ground NPP was estimated from below-ground biomass (Webber, 1978) and from longevity of below-ground plant parts (Shaver and Billings, 1975; Billings et al., 1978). Bryophyte production was calculated as 56% of green biomass (Oechel and Sveinbjornsson, 1978).

6. Data Access:

This data set is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Data Archive Center:

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov

Telephone: +1 (865) 241-3952

7. References:

- Brown, J., K.R. Everett, P.J. Webber, S.F. MacLean, and D.F. Murray. 1980. The coastal tundra at Barrow, pp. 1-29. IN: Brown, J., P.C. Miller, L.L. Tieszen, and F.L. Bunnell (eds.). An Arctic Ecosystem: The Coastal Tundra at Barrow, Alaska. US/IBP Synthesis Series 12. Dowden, Hutchinson and Ross, Inc., Stroudsburg, PA, U.S.A. 571 pp.
- Dennis, J.G., L.L. Tieszen, and M.A. Vetter. 1978. Seasonal dynamics of above- and below-ground production of vascular plants at Barrow, Alaska, pp. 113-140. IN: Tieszen, L.L. (ed.). Vegetation and Production Ecology of an Alaskan Arctic Tundra. Springer-Verlag, New York. 686 pp.
- Miller, P.C., P.J. Webber, W.C. Oechel, and L.L. Tieszen. 1980. Biophysical processes and primary production, pp. 66-101. IN: Brown, J., P.C. Miller, L.L. Tieszen, and F.L. Bunnell (eds.). An Arctic Ecosystem: The Coastal Tundra at Barrow, Alaska. US/IBP Synthesis Series 12. Dowden, Hutchinson and Ross, Inc., Stroudsburg, PA, U.S.A. 571 pp.
- Olson, R.J., K.R. Johnson, D.L. Zheng, and J.M.O. Scurlock. 2001. Global and Regional Ecosystem Modeling: Databases of Model Drivers and Validation Measurements. ORNL Technical Memorandum TM-2001/196. Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.
- Tieszen, L.L. 1972. The seasonal course of aboveground production and chlorophyll distribution in a wet arctic tundra at Barrow, Alaska. Arctic and Alpine Research 4: 307-324.
- Webber, P.J. 1978. Spatial and temporal variation of the vegetation and its production, Barrow, Alaska, pp. 37-112. IN: Tieszen, L. L., ed. 1978.

Vegetation and Production Ecology of an Alaskan Arctic Tundra. Springer-Verlag, New York. 686 pp.

Additional Sources of Information:

Bliss, L.C. 1962. Adaptations of arctic and alpine plants to environmental conditions. *Arctic* 15: 117-144.

Bliss, L.C. 1970. Primary production within arctic tundra ecosystems, pp. 77-85. IN: Fuller, W. A., and P.G. Kevan (eds.). *Proceedings of the Conference on Productivity and Conservation in Northern Circumpolar Lands*. Union Conserv. Natur., Publ. 16, Morges, Switzerland.

Brown, J., P.C. Miller, L.L. Tieszen, and F.L. Bunnell (eds.). 1980. *An Arctic Ecosystem: The Coastal Tundra at Barrow, Alaska*. US/IBP Synthesis Series 12. Dowden, Hutchinson and Ross, Inc., Stroudsburg, PA, U.S.A. 571 pp.

Bunnell, F.L., S.F. MacLean, Jr., and J. Brown. 1975. Structure and function of tundra ecosystems. Swedish Natural Science Research Council, *Ecological Bulletin*, Stockholm. pp. 73-124.

Caldwell, M.M., L.L. Tieszen, and M. Fareed. 1974. The canopy structure of tundra plant communities at Barrow, Alaska, and Niwot Ridge, Colorado. *Arctic and Alpine Research* 6: 151-159.

Dennis, J.G. 1968. Plant growth in relation to tundra microenvironments at Pt. Barrow, Alaska. Ph.D. Thesis. Duke University, Durham, N.C. 288 pp.

Dennis, J.G. 1977. Distribution patterns of belowground standing crop in Arctic Tundra at Barrow, Alaska. *Arctic and Alpine Research* 9(2): 113-127.

Dennis, J.G., and P.L. Johnson. 1970. Shoot and rhizome-root standing crops of tundra vegetation at Barrow, Alaska. *Arctic and Alpine Research* 2: 253-266.

Dennis, J.G., and L.L. Tieszen. 1972. Seasonal course of dry matter and chlorophyll by species at Barrow, Alaska, pp. 16-21. IN: Bowen, S. (ed.). *Proceedings 1972 U.S. Tundra Biome Symposium*. U.S. Tundra Biome. 211 pp.

Esser, G. 1998. NPP Multi-Biome: Global Osnabruck Data, 1937-1981. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/214

Johnson, P.L., and J.J. Kelley, Jr. 1970. Dynamics of carbon dioxide and productivity in an Arctic biosphere. *Ecology* 51(1): 73-80.

Miller, P.C., and L.L. Tieszen. 1972. A preliminary model of processes affecting primary production in the Arctic tundra. *Arct. Alp. Res.* 4: 1-18.

Olson, R.J., J.M.O. Scurlock, S.D. Prince, D.L. Zheng, and K.R. Johnson (eds.). 2012a. NPP Multi-Biome: Global Primary Production Data Initiative Products, R2. Data set. Available on-line [<http://daac.ornl.gov>] from the Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/617

Olson, R.J., J.M.O. Scurlock, S.D. Prince, D.L. Zheng, and K.R. Johnson (eds.). 2012b. NPP Multi-Biome: NPP and Driver Data for Ecosystem Model-Data Intercomparison, R2. Data set. Available on-line [<http://daac.ornl.gov>] from the Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/615

Shaver, J.R., and W.D. Billings. 1975. Root production and root turnover in a wet tundra ecosystem, Barrow, Alaska. *Ecology* 56(2): 401-409.

Tieszen, L.L. 1973. Photosynthesis and respiration in arctic tundra grasses: field light sensitivity and temperature responses. *Arctic and Alpine Research* 5: 239-251.

Tieszen, L.L. 1978. Introduction, pp. 3-18. IN: Tieszen, L.L. (ed.). *Vegetation and Production Ecology of an Alaskan Arctic Tundra*. Springer-Verlag, New York. 686 pp.

8. Data Set Revisions:

Revision Summary:

Some of the average below-ground plant standing crop values in the in the original data file, **brw_npp.txt**, have been corrected to agree with the values reported in Table 4 on Page 127 of Dennis et al. (1978). BNPP values in the data file are consistent with Table 4. Average above-ground plant standing crop (ANPP) values are not affected. The data file was converted to .csv format [**brw_npp1_r1.csv**].

A second NPP data file, **brw_npp2.csv**, has been added to provide NPP estimates for the different vegetation types at the coastal tundra study site from measurements made in 1972 by Miller et al. (1980).

Data File Changes:

Several BNPP data values have been corrected by replacing them with values in Table 4 on Page 127 of Dennis et al. (1978). The data values in **brw_npp1_r1.csv** are now correct.

Note: "Uncorrected Average" refers to the file **brw_npp.txt**, and "Corrected Average" refers to the file **brw_npp1_r1.csv**.

Parameter in Data Set*	Sampling Date	Uncorrected Average	Corrected Average
crown (g/m ²)	1971/07/04	42	52
2			

Dedrt (g/m)	1971/07/04	959	960
BGtotded (g/m ²)	1971/07/04	1110	1111
BGtotMatter (g/m ²)	1971/07/04	1632	1633
Rhzm (g/m ²)	1971/08/03	87	88

* = See Guide document for parameter definitions.

Related Data Sets:

This Point Barrow data set is cited in Olson et al. (2001) as being part of (1) the combined Global Primary Production Data Initiative (GPPDI) data, Class B Tundra Biome sites (Olson et al., 2012a) and (2) the Ecosystem Model-Data Intercomparison (EMDI) worldwide NPP data set and driver data for comparison with models, Class B Tundra Biome sites (Olson et al., 2012b). However, the revisions described herein do not affect data values in Class B GPPDI or Class B EMDI data files. Therefore, no Class B files were changed (see file list below).

There are no Tundra Biome sites in Class A site or Class C site data files of either GPPDI or EMDI. Thus, no Class A or Class C files are affected.

- EMDI_ClassB_NPP_933_v2.csv-no change
- EMDI_ClassB_Site_933_v2.csv-no change
- EMDI_ClassB_Summary_933.csv-nochange
- GPPDI_ClassB_NPP_2363_R1.csv-nochange
- I_ClassB_Flags_2363.csv-nochange

Data User Action: If you downloaded the referenced data set from the ORNL DAAC on-line archive before August 28, 2013, you should download it again from the ORNL DAAC.

Revision History:

Original Citation:

Tieszen, L. L. 2001. NPP Tundra: Point Barrow, Alaska, 1970-1971. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.



[Privacy Policy](#) | [Feedback](#) | [FAQs](#) | [Site Map](#)

Home

About Us

- About ORNL DAAC
- Who We Are
- User Working Group
- Biogeochemical Dynamics
- Data Citation Policy
- News
- Newsletters
- Workshops

Products

- Products and Services
- Product Overview
- Field Campaigns
- Validation
- Regional/Global
- Model Archive

Data

- How to Get Data
- Complete Data Set List
- Search for Data
- Field Campaigns
- Validation
- Regional/Global
- Model Archive

Tools

- Data Tools
- Advanced Data Search
- Website Search
- Search by DOI
- WebGIS
- SDAT
- MODIS Land Subsets
- THREDDS

Help

- ORNL DAAC Help
- FAQs
- Tutorials
- Data Management

Contact Us