

# Package ‘NitrogenUptake2016’

July 21, 2025

**Type** Package

**Title** Data and Source Code From: Nitrogen Uptake and Allocation  
Estimates for *Spartina Alterniflora* and *Distichlis Spicata*

**Version** 0.2.3

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**Description** Contains data, code, and figures from Hill et al. 2018a (Journal of Experimental Marine Biology and Ecology; <[DOI:10.1016/j.jembe.2018.07.006](https://doi.org/10.1016/j.jembe.2018.07.006)>) and Hill et al. 2018b (Data In Brief <[DOI:10.1016/j.dib.2018.09.133](https://doi.org/10.1016/j.dib.2018.09.133)>). Datasets include plant allometry, stem heights, nutrient and stable isotope content, and sediment denitrification enzyme assays. The data and analysis offer an examination of nitrogen uptake and allocation in two salt marsh plant species.

**License** GPL-3

**Encoding** UTF-8

**URL** <https://github.com/troyhill/NitrogenUptake2016>

**LazyData** true

**Depends** R (>= 3.0), zoo, car, MASS

**RoxygenNote** 6.1.0

**Suggests** knitr, rmarkdown, plyr, reshape2, ggplot2, scales, MuMIn, rsq

**VignetteBuilder** knitr

**NeedsCompilation** no

**Repository** CRAN

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|           |                                                                                                                       |
|-----------|-----------------------------------------------------------------------------------------------------------------------|
| allometry | <i>Data: Stem masses and heights for plants collected from Colt State Park, Rhode Island, USA, during summer 2016</i> |
|-----------|-----------------------------------------------------------------------------------------------------------------------|

---

## Description

A dataframe of masses and heights of stems of *Spartina alterniflora* and *Distichlis spicata*. Samples were collected from Colt State Park, Bristol, RI, USA, during May-July 2016. Column descriptions:

## Usage

allometry

## Format

A dataframe with 170 observations of 6 variables:

**site** Study location (Colt State Park, RI)

**samplingDate** Sampling dates

**status** Indicates whether plant was live or dead

**height\_cm** Stem height, in centimeters, from the sediment surface to the tip of the longest leaf

**sample** Biomass, grams

**spp** Species (SPAL or DISP)

## References

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Data and source code from: Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Data In Brief. 21: 466-472. <https://doi.org/10.1016/j.dib.2018.09.133>.

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Journal of Experimental Marine Biology and Ecology 507: 53-60. <https://doi.org/10.1016/j.jembe.2018.07.006>.

## Examples

```
### export to .csv:
write.csv(allometry, file = file.path(tempdir(), "allometry.csv"))
```

---

|    |                                                       |
|----|-------------------------------------------------------|
| ap | <i>Convert per mil isotope values to atom percent</i> |
|----|-------------------------------------------------------|

---

**Description**

Convert per mil isotope values to atom percent

**Usage**

```
ap(perMilValues, isotope = "15N")
```

**Arguments**

|              |                                            |
|--------------|--------------------------------------------|
| perMilValues | Value to be converted, in per mil notation |
| isotope      | can be 13C or 15N                          |

**Value**

a numeric value or vector

**Examples**

```
ap(10); ap(1000)
```

---

|     |                                                                                       |
|-----|---------------------------------------------------------------------------------------|
| bCM | <i>Parameterize Box-Cox model for mass-height allometry (based on Lu et al. 2016)</i> |
|-----|---------------------------------------------------------------------------------------|

---

**Description**

Parameterize Box-Cox model for mass-height allometry (based on Lu et al. 2016)

**Usage**

```
bCM(dat, mass = "sample", height = "height_cm", lam.avail = c(-2,
  -1.5, -1, -2/3, -1/2, -1/3, 0, 1/3, 1/2, 2/3, 1, 1.5, 2),
  lam.only = FALSE)
```

**Arguments**

|           |                                                          |
|-----------|----------------------------------------------------------|
| dat       | dataframe with data                                      |
| mass      | mass column                                              |
| height    | height column                                            |
| lam.avail | set of possible lambda values                            |
| lam.only  | if TRUE, lambda is returned. If FALSE, model is returned |

**Value**

if lam.only is FALSE, a model is returned. If lam.only is TRUE, lambda value is returned.

**References**

Lu, Meng, Caplan, Joshua S., Bakker, Jonathan D., Mozdzer, Thomas J., Drake, Bert G., Megonigal, J. Patrick, and Langley, J. Adam. 2016. Allometry data and equations for coastal marsh plants. Ecology. <https://doi.org/10.1002/ecy.1600>.

**Examples**

```
### get allometry model for each species
CSP <- plyr::dlply(allometry, c("spp"), bCM)
CSP.coef <- plyr::ldply(CSP, stats::coef)
### add lambda value
CSP.coef$lam <- plyr::ddply(allometry, c("spp"), function(df)
  bCM(df, lam.only = TRUE))[, "V1"]
```

---

|              |                                                                                                             |
|--------------|-------------------------------------------------------------------------------------------------------------|
| CN_mass_data | <i>Data: Nutrient concentrations, stable isotope ratios, and biomass from destructive mesocosm harvests</i> |
|--------------|-------------------------------------------------------------------------------------------------------------|

---

**Description**

Data: Nutrient concentrations, stable isotope ratios, and biomass from destructive mesocosm harvests

**Usage**

```
CN_mass_data
```

**Format**

A dataframe with 1192 observations of 16 variables:

**time** Time point of harvest (harvested at one-week intervals)  
**new.core.id** Unique mesocosm identifier, including species (SA or DS) and mesocosm number  
**depth\_bottom** Depth at bottom of sample (only applicable for belowground data)  
**sample.type** Sample material; tissue type  
**interval** Depth interval for sample; indicates the top and bottom depths (e.g., an entry of "5\_10" covers the depth interval from 5-10 cm)  
**pool\_label** Label for each pool (combination of "sample.type" and "depth\_bottom")  
**id** Same as "pool\_label" but with mesocosm ID included  
**species** *Spartina alterniflora* (SA) or *Distichlis spicata* (DS)  
**d15n** 15-N isotope ratio in per mille units

**n\_pct** Nitrogen content, decimal fraction (0.015 = 1.5 percent)  
**d13c** 13-C isotope ratio in per mille units  
**c\_pct** Carbon content, decimal fraction (0.015 = 1.5 percent)  
**total\_volume\_cm3** Total volume of interval (only applicable for belowground data)  
**depth\_top** Depth at top of sample (only applicable for belowground data)  
**sample.type2** Simplified "sample.type" column; leaf numbers dropped, and belowground stems included as "stems"  
**g\_core** Total mass (grams) in entire pool; corrects for subsampling of depth intervals

## References

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Data and source code from: Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Data In Brief. 21: 466-472. <https://doi.org/10.1016/j.dib.2018.09.133>.  
 Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Journal of Experimental Marine Biology and Ecology 507: 53-60. <https://doi.org/10.1016/j.jembe.2018.07.006>.

## Examples

```
### export to .csv:
write.csv(CN_mass_data, file = file.path(tempdir(), "CN_mass_data.csv"))
```

---

|     |                                                                                |
|-----|--------------------------------------------------------------------------------|
| dea | <i>Data: Denitrification enzyme activity and in vitro N2O production rates</i> |
|-----|--------------------------------------------------------------------------------|

---

## Description

Data: Denitrification enzyme activity and in vitro N2O production rates

## Usage

dea

## Format

A dataframe with six rows and five columns:

**pot** Mesocosm ID; equivalent to "new.core.id" in other datasets  
**DEA** Denitrification enzyme activity (units = nanomoles N2O / gram dry mass / hour)  
**IV** "In vitro" N2O production; no nutrient solution added, just filtered seawater (units = nanomoles N2O / gram dry mass / hour)  
**mcf** Moisture correction factor (1 - gravimetric water content)  
**bd\_gcm3** Bulk density (grams per cubic centimeter)

## References

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Data and source code from: Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Data In Brief. 21: 466-472. <https://doi.org/10.1016/j.dib.2018.09.133>.

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Journal of Experimental Marine Biology and Ecology 507: 53-60. <https://doi.org/10.1016/j.jembe.2018.07.006>.

## Examples

```
### export to .csv:
write.csv(dea, file = file.path(tempdir(), "dea.csv"))
```

---

nappCalc2

---

*Calculate net aboveground primary production*


---

## Description

Calculate net aboveground primary production

## Usage

```
nappCalc2(dataset, liveCol = "mass", deadCol = "dead",
  yearCol = "year", siteCol = "pot2", timeCol = "day",
  annualReset = "TRUE", MilnerHughes = "TRUE", EOS = "FALSE",
  EOS_window = 1, summarize = "TRUE")
```

## Arguments

|              |                                                                                       |
|--------------|---------------------------------------------------------------------------------------|
| dataset      | data                                                                                  |
| liveCol      | live biomass                                                                          |
| deadCol      | dead biomass                                                                          |
| yearCol      | year                                                                                  |
| siteCol      | site/plot/experimental unit identifier                                                |
| timeCol      | time column (sequential measurements within each year)                                |
| annualReset  | should data be reset to zero each year                                                |
| MilnerHughes | If "TRUE", Milner-Hughes NAPP is calculated                                           |
| EOS          | If "TRUE", end-of-season live biomass is reported                                     |
| EOS_window   | window for EOSL                                                                       |
| summarize    | If "TRUE", output will be a list with two elements: incremental data and summary data |

## Value

list

---

|              |                                                                                    |
|--------------|------------------------------------------------------------------------------------|
| nmolHr_mgDay | <i>Convert N2O units from nanomoles of N2O per hour to milligrams of N per day</i> |
|--------------|------------------------------------------------------------------------------------|

---

**Description**

Convert N2O units from nanomoles of N2O per hour to milligrams of N per day

**Usage**

```
nmolHr_mgDay(x)
```

**Arguments**

|   |                             |
|---|-----------------------------|
| x | numeric or integer value(s) |
|---|-----------------------------|

**Value**

numeric value

**Examples**

```
nmolHr_mgDay(dea$DEA)
```

---

|    |                                  |
|----|----------------------------------|
| se | <i>Calculates standard error</i> |
|----|----------------------------------|

---

**Description**

Calculates standard error

**Usage**

```
se(x)
```

**Arguments**

|   |                    |
|---|--------------------|
| x | numeric or integer |
|---|--------------------|

**Value**

value

**Examples**

```
se(CN_mass_data$n_pct)
plyr::ddply(CN_mass_data, plyr::.(species, pool_label), plyr::summarise, se = se(n_pct))
```

---

stemHeights

*Data: Stem heights for each mesocosm and each measurement date*


---

## Description

A dataframe of *Spartina alterniflora* and *Distichlis spicata* stem heights, from the mesocosms used in 15N study. Samples were collected from Colt State Park, Bristol, RI, USA, and grown in the US EPA Atlantic Ecology Division greenhouse.

## Usage

```
stemHeights
```

## Format

A dataframe with 3315 observations of 10 variables:

**date** Measurement date

**core\_num** Mesocosm number

**species** Species, either *Spartina alterniflora* (SA) or *Distichlis spicata* (DS)

**dead\_live** Indicates whether plant was live or dead

**plant\_num** Plants were tagged to permit growth rate calculations; this is the plant tag number

**height\_cm** Stem height, in centimeters, from the sediment surface to the tip of the longest leaf

**id** Unique plant identifier, combining species, mesocosm number, and plant tag number

**day** Measurement date expressed in YYYY-MM-DD format (and structured as a POSIXct column in R)

**timeSinceLast** Days since last measurement

**new.core.id** Mesocosm ID, including species and a unique mesocosm number (time-zero mesocosms re-numbered as mesocosms 13, 14, and 15)

## References

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Data and source code from: Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Data In Brief. 21: 466-472. <https://doi.org/10.1016/j.dib.2018.09.133>.

Hill, T.D., N.R. Sommer, C.R. Kanaskie, E.A. Santos, A.J. Oczkowski. 2018. Nitrogen uptake and allocation estimates for *Spartina alterniflora* and *Distichlis spicata*. Journal of Experimental Marine Biology and Ecology 507: 53-60. <https://doi.org/10.1016/j.jembe.2018.07.006>.

## Examples

```
### export to .csv:
write.csv(stemHeights, file = file.path(tempdir(), "stemHeights.csv"))
```

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