Cranedale Centre

Water and Carbon Cycle

long / -0.63946545

Site: Woodland Catchment

lat / 54.304653

7th April 2016

QUADRAT NUMBER		1	2	3	4	5	Average
Location	Latitude	54.30942 485	54.3057 - 663				
	Longitude	-0.06611 227	-0.65801 2128				
Soil Moisture (%)	1	11	10.7	12.	8.0	9.3	
	2	14	7.2	1.4	9.2	9.5	
	3	7	11.1	12.4	9.9	11.7	
	4	9	8.9	8.3	10.8	9	
	Mean				9.25		
Soil Compaction (cm)	1	0.5	0.7	1	2.3	2	
	2	1.5	0.5	1.5	1	3.5	
	3	1.5	2.5	0.5	0.3	1	
	4	2	1	1	0.5	1.3	
	Mean						
Humidity		83	81				
% Bare Ground			5				
% Vegetation Species							
Leaf litter		100	99	100	100	100	99
Number of Species							

Infiltration Time (mins) = t	28 secs		
Infiltration rate (cm hour-1) (13/t) x 60 =	(5/0.28) x 60 =	(7.3/10) x 60	
Soil pH?	= 1670 cm hour	= 43.8 cm hour	
Colour Smear (5 cm depth)			

Cranedale Centre

Water and Carbon Cycle

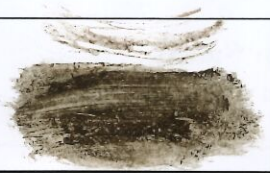
long/-0.65762669

Site: Moorland Catchment

7th Apr 2016

lat/54.307003

QUADRAT NUMBER		1	2	3	4	5	Average
Location	Latitude	54°18'36"N	54°18'52"N	54°18'36"N	54.30999799	54.30997234	
	Longitude	0°39'26"W	0°39'55"W	0°39'30"W	-0.65707851	-0.65705253	
Soil Moisture (%)	1	14.8	12.7	4.2	7.8	13.5	
	2	13.7	11	12	5.5	9	
	3	12.8	11.7	11.3	8.6	8.3	
	4	10.2	11.2	12.9	12.2	13.1	
	Mean	12.87	11.65				
Soil Compaction (cm)	1	1	0.5	2	1	0.5	
	2	1.5	1.5	1	1	0.25	
	3	1.5	1.5	2.5	2.5	3.0	
	4	1	1.5	0.5	1.5	0.25	
	Mean						
Humidity		67	64	63	55	55	
% Bare Ground		0	0	0	0	0	
% Vegetation Species							
Sphagnum moss		50	30	100	10	80	54
Common Heather		60	90	50	10	50	52
Cross-leaved Heath		10	10				10
Bracken			2				2
Fine Grass			30	10	20		20
Crowberry					40		40
Lichen						20	20
Number of Species		3	5	3	4	3	

Infiltration Time (mins) = t	12cm remain after 10 mins	11.2cm remain after 10 mins
Infiltration rate (cm hour-1) (13/t) x 60 =	$\frac{1}{10} \times 60 = 6$ cm/hr	$\frac{1.8}{10} \times 60 = 10.8$ cm/hr
Soil pH?		
Colour Smear (5 cm depth)		

01/06/16

Cranedale Centre

Water and Carbon Cycle

long / 54.304653

Site: Afforested Catchment

lat / -0.63946545

Helen, Amy, Andy

QUADRAT NUMBER		1	2	3	4	5	Average	Carbon (kg)
Location	Latitude							
	Longitude							
Soil Moisture (%)	1	11.9	7.9	0.0	7.3	3.5		
	2	13.9	7.5	1.0	2.4	4.6		
	3	12.3	9.0	5.4	8.6	4.2		
	4	9.1	7.2	2.7	5.0	0.7		
	Mean	11.8	7.9	2.3	5.8	3.3	6.2	
Humidity								
% Bare Ground								
Vegetation Species		Percentage Cover %						
Sphagnum Moss		40	30	60	40		34	~~0.95~~ 0.54
Fine Grass		10	10		70		18	~~0.29~~ 0.09
Bi Uberry		—	2				0.4	0.00
Bracken			2.5				5	0.01
Fern				10			2	
			~~50~~					
Leaf Litter		70	60	70	50	100	70	~~0.28~~ 0.88
Number of Species		2	4	2	2	0	2	

Ground Vegetation Carbon in Average Quadrat (kg)	1.45
Total Ground Vegetation Carbon in 10m² (kg) (Av x400)	579.8
Soil Carbon (See Standard Numbers Table)	700

Take these not from ipad.

	Species	circumference (cm)	Diameter =(dbh)	Angle at 15m	Height (m)	Tariff Number	Volume m³	Dry Mass (kg/m³)	Carbon (kg)
Tree 1		~~113~~	36	44	14.5	~~23~~	0.65	358	179
Tree 2		199	63	58	24	25	2.53	1075	538

Average Carbon (kg)	359
Number of tress in 10 x 10	~~11~~
Total Tree Carbon (kg) (Av x total tree)	3943

Infiltration Time (mins) = t	10	10	
Water Infiltrated (cm) = M (completely infiltrated =13cm)	8	12.5	
Infiltration rate (cm hour^{-1}) (M/t) x 60=	48	75	61.5
Colour Smear (5 cm depth)			

40

19 + 19 = 38

Cranedale Centre

01/06/16

Water and Carbon Cycle

109/ -0.65762669

Site: Moorland Catchment

lat/54.307003

QUADRAT NUMBER		1	2	3	4	5	Average	Carbon (kg)
Location	Latitude							
	Longitude							
Soil Moisture (%)	1	9.8	9.6	13.4	8.4	7.2		
	2	12.2	8.2	12.5	9.6	7.7		
	3	10.2	7.9	10.9	0.9	17.0		
	4	8.6	10.7	12.2	11.0	16.6		
	Mean	10.2	8.4	12.3	7.5	12.1	10.1	
Humidity %		91	99.9	99.9	99.9	99.9	100	
% Bare Ground								
% Vegetation Species								
BILBERRY		20	60	5	10		19	0.12
COMMON HEATHER		5M	–	30 M			7	0.12
FINE GRASS		50	40	80	20		38	0.36
BRACKEN		5T	–		5 S	5M	3	0.02
SPHAGNUM MOSS		50	40	30	95	10	45	0.52
HEATH BEDSTRAW		–	5				1	
OTHER MOSS			5				1	0.01
LEAF LITTER		25	10	20	45	100	40	
Number of Species		5	4	4	4	2	~~5~~ 38	

Vegetation Carbon in Average Quadrat (kg)	1.16
Total Vegetation Carbon in 10m^2 (kg) (Av x400)	462.6
Soil Carbon (See Standard Numbers Table) kg	880

	1	3		
Infiltration Time (mins) = t	10	10		
Water Infiltrated (cm) = M (completely infiltrated =13cm)	9	0		
Infiltration rate (cm hour^{-1}) (M/t) x 60=	54	0	27	
Colour Smear (5 cm depth)				

HEATHER + BRACKEN
0~10 10~30M 30+

Cranedale Centre

Water and Carbon Cycle

05/07/16

Site: Afforested Catchment

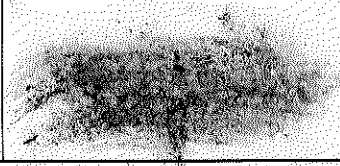
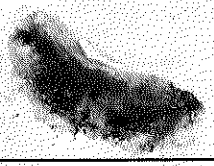
lat /54.304653 long /-0.63946545

QUADRAT NUMBER		1	2	3	4	5	Average	Carbon (kg)
Location	Latitude							
	Longitude							
Soil Moisture (%)	1	4.3	9.6	4.1	5.5	3.1		
	2	8.6	7.9	5.1	2.3	1.1		
	3	1.8	7.5	9.2	7.6	10.8		
	4	5.5	2.3	7.3	12.1	7.8		
	Mean	5.05	6.8	6.43	6.9	6.48	6.33	
Humidity								
% Bare Ground		0						
Vegetation Species		Percentage Cover %						
Sphagnum moss		95	30	65	10	35	47.5	0.95
Fine leaved grass		50	40	10	5	30	27	0.2385
Bracken			1	2			3.6	0.0342
Bilberry			3				0.6	0.0057
Leaf litter - brown			25	45	90	90	50	0.475
Number of Species		2	5	4	3	3		

Ground Vegetation Carbon in Average Quadrat (kg)	1.359
Total Ground Vegetation Carbon in 10m² (kg) (Av x400)	543.54
Soil Carbon (See Standard Numbers Table)	700

	Species	circumference (cm)	Diameter =(dbh)	Angle at 15m	Height (m)	Tariff Number	Volume m³	Dry Mass (kg/m³)	Carbon (kg)
Tree 1	SCOTS PINE	113	35.97	44	14.47	2.3	0.65	357.5	179
Tree 2	SITKA SPRUCE	185	59.	55	21.4	2.2	1.59	675.8	737.9

Average Carbon (kg)	258.5
Number of tress in 10 x 10	11
Total Tree Carbon (kg) (Av x total tree)	2843

Infiltration Time (mins) = t	5m 23 s = 323s	10 mins
Water Infiltrated (cm) = M (completely infiltrated =13cm)	13cm	8.5cm
Infiltration rate (cm hour^{-1}) (M/t) x 60=	3600 144.9	51 98
Colour Smear (5 cm depth)		

05/07/16

Cranedale Centre

Water and Carbon Cycle

lat/54.307003 long/0.65762669

Site: Moorland Catchment

Debbie
Sarah
Kathy

QUADRAT NUMBER		1	2	3	4	5	Average	Carbon (kg)
Location	Latitude							
	Longitude							
Soil Moisture (%)	1	13.1	10.7	12.5	10.5	12.6		
	2	11.6	8.4	8.5	10.8	13.0		
	3	11.2	11.0	12.2	7.9	12.5		
	4	13.1	8.9	18.1	11.1	12.1		
	Mean	12.25	9.75	10.8	10.1	12.7	11.17	
Humidity		78.5	87.6	91.9	93.1	98.6	59.9%	
% Bare Ground		5	0	0	5	0	2	
% Vegetation Species								
Bilberry		10		50		5	13	0.054
Star Moss		30	5	10		1	9.2	0.101
Grass		40	80		70	15	41	0.389
Other moss		20		80	5	50	31	0.36
Common sedge		30			10	5	9	0.144
peat litter			50	10	3	10	12.8	
Heath Bedstraw			5		5		1.2	
Large Bracken					1		0.3	0.0014
med. Common Heather					5		1	0.0175
large Cowa Kiana						10	2	0.138
Number of Species		5	4	4	7	7	5.4	

Vegetation Carbon in Average Quadrat (kg)	1.23
Total Vegetation Carbon in $10m^2$ (kg) (Av x400)	493.0
Soil Carbon (See Standard Numbers Table)	350

Infiltration Time (mins) = t	10 mins	10 mins
Water Infiltrated (cm) = M (completely infiltrated =13cm)	12cm / 0.12m	3cm
Infiltration rate (cm hour^{-1}) (M/t) x 60=	72	18.6
Colour Smear (5 cm depth)		

46.3

05/07/16

Cranedale Centre

Water and Carbon Cycle

lat/54.303645

long/-0.66234469

Cross sectional area = mean depth x width

Discharge = Velocity x CSA

Location 1	Dovedale
Present Flow **Width** (m)	1.51

Sample Point	Bank	2	3	4	5	6	7	8	9	10	Bank
Present Flow **Depth** (cm)	11	11	18	13	15	9	3	4	1	1	0
Mean **Depth (m)**	7.82 0.782										

Velocity	**Position in stream**	¼	½	¾
	Time (secs)	10.4	10.7	29.2
	Velocity (m/s) (from graph)			
	Mean Velocity (m/s)	(16.8 secs) → 0.225		

Co2 content (units)	0.37
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

Cross sectional area $(m)^2$	1.18 m^2
Discharge (m^3/s)	0.2655

0.37 x 50 = 18.5 mg/l

---

lat/54.301628

long/-0.64255267

Cross sectional area = mean depth x width

Discharge = Velocity x CSA

Location 2	Wood(ard
Present Flow **Width** (m)	0.30

Sample Point	Bank	2	3	4	5	6	7	8	9	10	Bank
Present Flow **Depth** (cm)	6.5	5	6.3	5.3	5.8	4.5	4.8	6.4	5.9	6.5	6.7
Mean **Depth (m)**	5.79cm 0.0579m										

Velocity	**Position in stream**	¼	½	¾
	Time (secs)	11.5	7.18	23.7
	Velocity (m/s) (from graph)			
	Mean Velocity (m/s)	(14.33 secs) → 0.26 m/s		

Co2 content (units)	0.9
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

48 mg/l

Cross sectional area (m)	0.17 m^2
Discharge (m^3/s)	~~5.48~~ 0.0442

Water and Carbon Cycle

7/04/16 Lat/ 54.303645
long/ -0.55234469 (CSA)

Location 1 DOVEDALE

Cross sectional area = mean depth x width

Present Flow **Width** (m)	~~1.5~~ 1.43 · 1.43

Discharge = Velocity x CSA

Sample Point	Bank	2	3	4	Bank
Present Flow **Depth** (cm)	2.6	8.8	7.9	8.4	2.3
Mean **Depth (m)**	0.06				

0.29 x 50

Velocity	**Position in stream**	¼	½	¾
	Time (secs)	7.2	54.4	–
	Velocity (m/s) (from graph)			0.08
	Mean Velocity (m/s)			

CO_2 content (mg/L) PPM	14.5
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

Cross sectional area (m)	0.096
Discharge (m^3/s)	

Lat/ 54.301628
long/ -0.64255267

Location 2 NETTLEY GRIFF

Cross sectional area = mean depth x width

Present Flow **Width** (m)	0.70

Discharge = Velocity x CSA

Sample Point	Bank	2	3	4	Bank
Present Flow **Depth** (cm)	0.5	4	6	4	2.5
Mean **Depth (m)**	0.034				

Velocity	**Position in stream**	¼	½	¾
	Time (secs)		28.7	
	Velocity (m/s) (from graph)	0.08		0.08
	Mean Velocity (m/s)			

CO_2 content (mg/L)	50
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

Cross sectional area (m)	0.024
Discharge (m^3/s)	

Rainy + Cold Day

Water and Carbon Cycle

01/06/16

Lat / 54.303645
long / -0.66234469

Cross sectional area = mean depth x width

Discharge = Velocity x CSA

Location 1	Mooring stream
Present Flow **Width** (m)	1.65

41 82.5 123.75

Sample Point	Bank	2	3	4	Bank
Present Flow **Depth** (cm)	0.9	7.6	10.9	16.5	4.0
Mean **Depth (m)**	8cm (ish)				

39.9

Velocity	**Position in stream**	¼	½	¾
	Time (secs)	60+	26	30
	Velocity (m/s) (from graph)			
	Mean Velocity (m/s)			

CO_2 content (mg/L)	14.5
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

Cross sectional area (m)	
Discharge (m^3/s)	

Lat / 54.301628
long / -0.64255267

Cross sectional area = mean depth x width

Discharge = Velocity x CSA

Location 2	Nathley Gill
Present Flow **Width** (m)	0.40

Sample Point	Bank	2	3	4	Bank
Present Flow **Depth** (cm)	6.3	5.5	4.4	4.4	3.0
Mean **Depth (m)**	4.1/12 = 0.42m				

23.6 / 5

Velocity	**Position in stream**	¼	½	¾
	Time (secs)	60+	26	60+
	Velocity (m/s) (from graph)			
	Mean Velocity (m/s)			

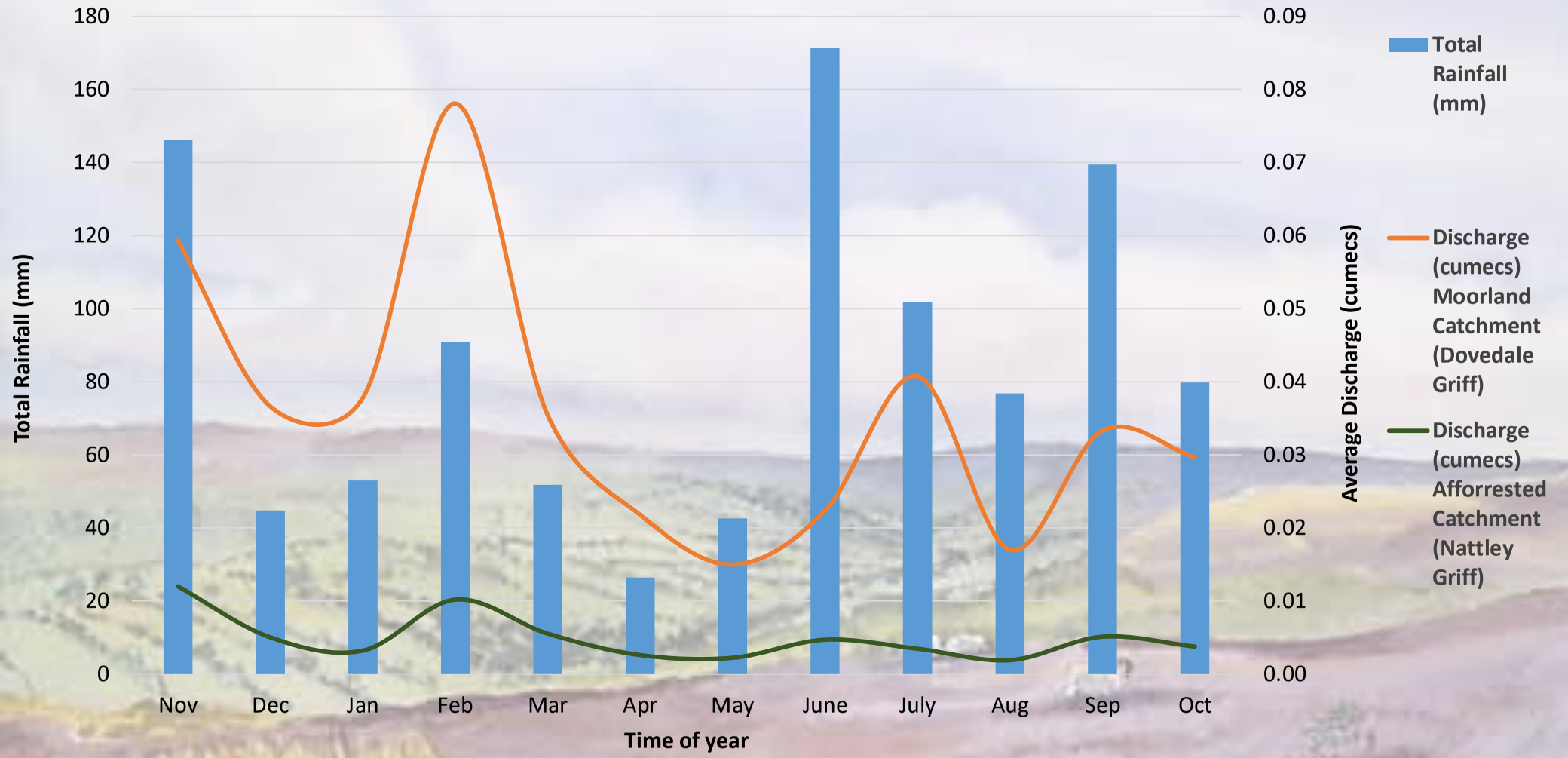
13

CO_2 content (mg/L)	
pH?	
Dissolved Load (µs)?	
Suspended Load (mg/l)?	

Cross sectional area (m)	
Discharge (m^3/s)	

Cranedale Centre

Average discharge of two catchments in Dalby Forest North York Moors National Park (2016 – 2017)

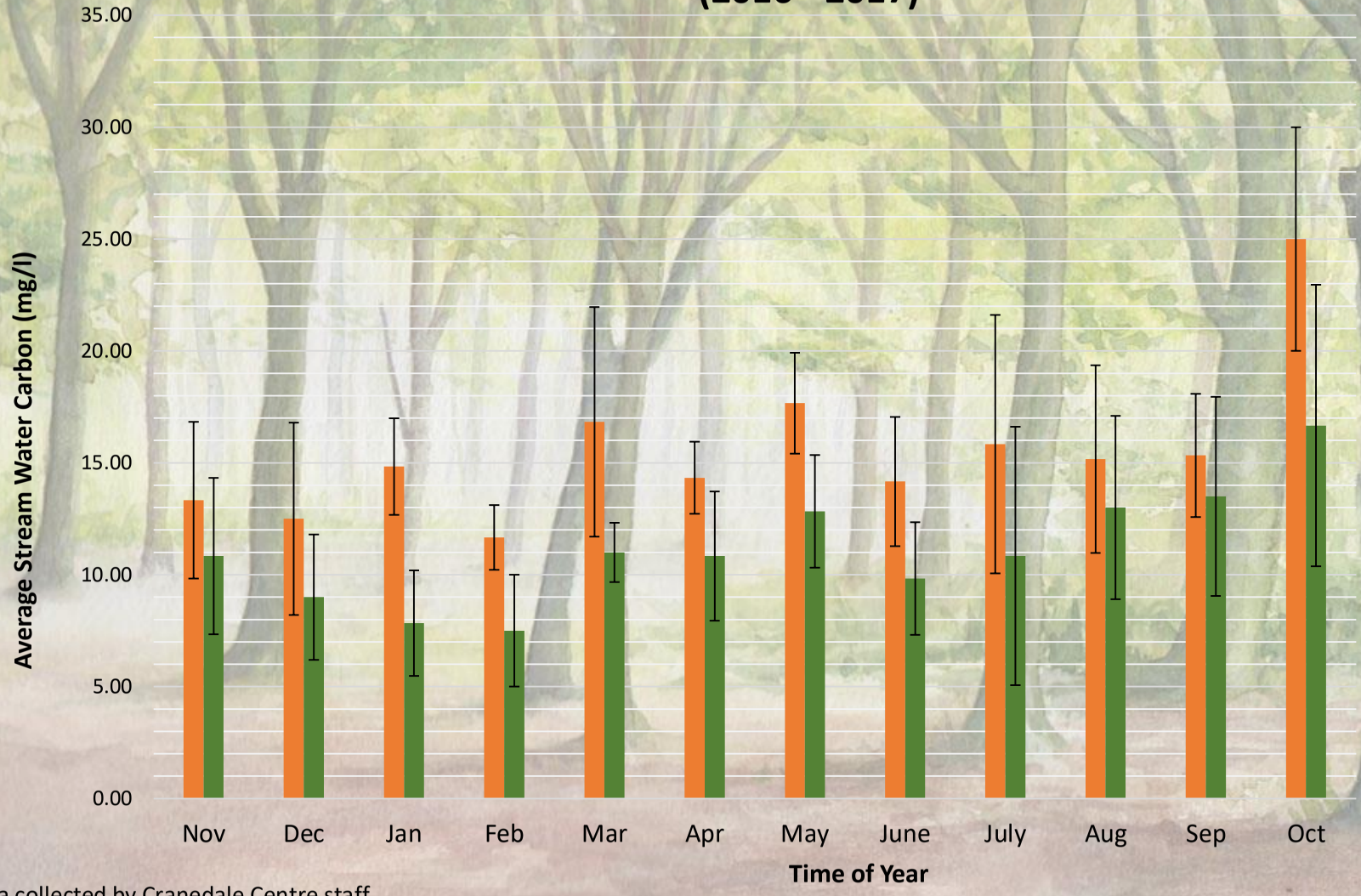


Data collected by Cranedale Centre staff

© Met Office Total Rainfall data for Fylingdales, North Yorkshire

Cranedale Centre

Average Stream Water Carbon (CO_2)of two catchments in Dalby Forest North York Moors National Park (2016 - 2017)



Data collected by Cranedale Centre staff

Cranedale Centre

Water and Carbon Cycles Secondary Data

(Collected 1st June 2016)

	Moorland Catchment	Afforested Catchment
Soil Moisture (%)	9.8	11.9
	12.2	13.9
	10.2	12.3
	8.6	9.1
	9.6	7.9
	8.2	7.5
	7.9	9.0
	10.7	7.2
	13.4	0.0
	12.5	1.0
	10.9	5.4
	12.2	2.7
	8.4	7.3
	9.6	2.4
	0.9	8.6
	11.0	5.0
	7.2	3.5
	7.7	4.6
	17	4.2
	16.6	0.7

Cranedale Centre

Water and Carbon Cycle

(Collected 19/10/16)

	Moorland Catchment	Afforested Catchment
Mean Soil Moisture (%)	14.8	8.9
	19.4	9.2
	12.6	3.4
	14.4	9.2
	11.8	12.8
	10.4	16.8
	7.8	13.5
	13.9	6.8
	11.9	5.2
	17.2	7.4
	15.5	8.3
	15	9.1
	16	8.4
	14.3	6.4
	10.4	
	16	
	18.2	
	13.2	
	16.1	

Low = 0-5%
Medium = 5-10%
High = 10-20%