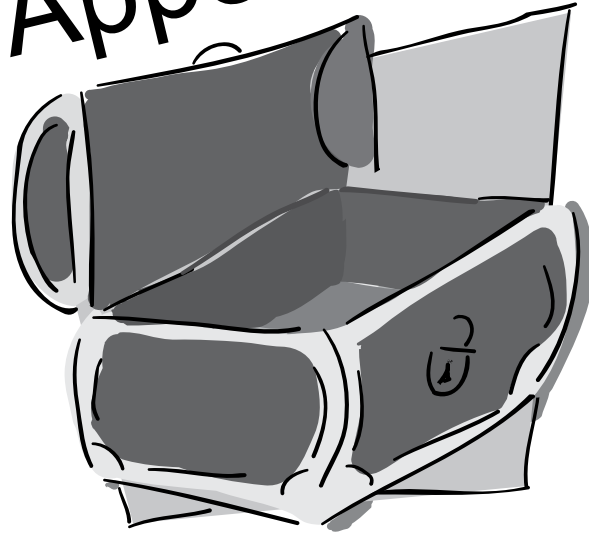


# Appendix



## [Site Definition Sheet](#)

Land Cover

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## Phenology

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[\*Ruby-throated Hummingbird \(RTHU\) Site Definition Sheet\*](#)

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[\*Ruby-throated Hummingbird \(RTHU\) Flower Species Visit Protocol Data Sheet\*](#)

[\*Ruby-throated Hummingbird \(RTHU\) Nesting Report Protocol Data Sheet \(U.S. and Canada\)\*](#)

[\*Arctic Bird Migration Monitoring Site Definition Data Sheet\*](#)

[\*Arctic Bird Migration Monitoring Protocol Data Sheet\*](#)

## [\*Glossary\*](#)

# Site Definition Sheet

**\* Required Field**

School Name: \_\_\_\_\_ Site Name: \_\_\_\_\_

Choose a unique name based on location,  
e.g. "Grassy area - Front of School"

Names of students completing Site Definition Sheet: \_\_\_\_\_

Date: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Check one:  New Site  Metadata Update

**\*Coordinates:** Latitude: \_\_\_\_\_ °  N or  S Longitude: \_\_\_\_\_ °  E or  W  
Elevation: \_\_\_\_\_ meters

**\*Source of Location Data** (check one):  GPS  Other \_\_\_\_\_

Comments: \_\_\_\_\_

**Site Type** (select all that apply based on intended measurements, then complete the necessary fields below):  Atmosphere  Surface Temperature  Hydrosphere  
 Biosphere Land Cover  Biosphere Greening  Biosphere Phenological Gardens  
 Biosphere Lilacs  Soil (Pedosphere) Characteristics  
 Soil (Pedosphere) Moisture and Temperature  Soil (Pedosphere) Frost Tube

**Cover type** (Select one):  Short grass (< 0.5m)  Tall grass (> 0.5m)  Barren land  
 Sand  Closed Forest (Trees interlocking)  Woodland (Trees not interlocking)  
 Shrubs  Dwarf Shrubs  Flowering Plants  Wetland  Cultivated Agricultural  
 Cultivated Recreational  Open Water  Bare Rock  Urban Residential  
 Urban Commercial  Asphalt  Concrete  Other  Land Cover site

**If you selected Closed Forest or Woodland, indicate the ground cover** (Select one):  
 Leaf Litter  Moss  Peat

---

## Atmosphere

**List any obstacles** (Check one):  No obstacles  Obstacles (describe below)  
(Obstacles are trees, buildings, etc. that appear above 14° elevation when viewed from the site)

Description: \_\_\_\_\_

Buildings within 10 meters of instrument shelter (Check one):

No buildings  Buildings (describe below)

Description: \_\_\_\_\_

---

## Other Site Data:

Steepest Slope: \_\_\_\_\_ Compass Angle (facing up slope): \_\_\_\_\_

Rain Gauge Height  cm      Ozone Clip Height  cm      Thermometer Height  cm

**\*Thermometer Type** (Check one):

- Other, Soil or Air
- Liquid-filled, Current Temperature Only
- Digital Single-Day Min/Max
- Digital Multi-Day Min/Max
- Reset Digital Multi-Day Min/Max Thermometer

**Note:** reset is required before data collection and entry, when batteries are changed or every 6 months

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_ Date: \_\_\_\_\_

Date: Year \_\_\_\_ Month \_\_\_\_ Day \_\_\_\_ Universal Time (hour:min): \_\_\_\_\_

Was this reset due to a battery change?  Yes  No

- Earth Networks Station (Automated Station ID \_\_\_\_\_)
- Davis Instrument (Davis Thermometer Type \_\_\_\_\_)
- Data Logger (HOBO)
- Rainwise
- WeatherHawk
- No Thermometer

**Surface Cover Description** under instrument shelter (Check one):  Pavement

- Bare ground
- Short grass (< 10 cm)
- Long grass (> 10 cm)
- Sand
- Roof (describe below)
- Other (describe below)

Description: \_\_\_\_\_

Overall comments on the site (metadata): \_\_\_\_\_

### Surface Temperature

**Homogeneous site size** (Select one):  90m x 90m  30m x 30m

Smaller than 30 x 30m (specify size: \_\_ m x \_\_ m)

Type of IRT Instrument:  Raytech ST20  Other (specify instrument manufacturer and model) \_\_\_\_\_

Overall comments on the site (metadata): \_\_\_\_\_

### Hydrosphere

**\*Name of Body of Water:** \_\_\_\_\_ (the name commonly used on maps; if the body of water does not have a common name, provide a description of the water body it comes from or flows into or both.)

**\*Water Body Type** (Select one):  Unknown  Saltwater  Freshwater  Brackish

**Water Body Source** (Select one):

- Pond (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Lake (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Reservoir (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Bay (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Ditch (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Ocean
- Estuary (Area of standing water \_\_\_\_ km<sup>2</sup>; Average Depth of Standing Water \_\_\_\_ m)
- Stream (Width of Moving water \_\_\_\_ m)
- River (Width of Moving water \_\_\_\_ m)
- Marsh/Swamp
- Agriculture

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_ Date: \_\_\_\_\_

Puddles, animal and vehicle tracks

Other (Width of Moving water \_\_\_ m; Area of standing water \_\_\_ km<sup>2</sup>;  
Average Depth of Standing Water \_\_\_ m)

**Water Sample Location:**  Outlet  Bank  Bridge  Boat  Inlet  Pier

**Can you see the bottom?**  Yes  No

**Channel/Bank Material:**  Soil  Rock  Concrete  Vegetated Bank

**Bedrock:**  Granite  Limestone  Volcanics  Mixed Sediments  Unknown

**Freshwater Habitats Present:**  Rocky Substrate  Vegetated Banks  Mud Substrate

Sand Substrate  Submersed Vegetation  Logs

**Saltwater Habitats Present:**  Rocky Shore  Sandy Shore  Mud Flats/Estuary

Overall comments on the site (metadata): \_\_\_\_\_

## Biosphere

### Land Cover

**MUC Description:** Level 1: \_\_\_\_\_ Level 2: \_\_\_\_\_

Level 3: \_\_\_\_\_ Level 4: \_\_\_\_\_

\***MUC Code:** \_\_\_\_\_ **Note:** Use the MUC Guide to determine the greatest level possible within the MUC system

Overall comments on the site (metadata): \_\_\_\_\_

## Greening

Are there multiple dominant species?  Yes  No

### Primary Plant

Is this plant in the understory?  Yes  No

**Vegetation Type** (Select one):  Grass Genus: \_\_\_\_\_

Tree Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Shrub Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Label: \_\_\_\_\_

### Secondary Plant

Is this plant in the understory?  Yes  No

**Vegetation Type** (Select one):  Grass Genus: \_\_\_\_\_

Tree Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Shrub Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Label: \_\_\_\_\_

### Tertiary Plant

Is this plant in the understory?  Yes  No

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_ Date: \_\_\_\_\_

**Vegetation Type** (Select one):  Grass Genus: \_\_\_\_\_  
 Tree Genus: \_\_\_\_\_ Species: \_\_\_\_\_  
 Shrub Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Label: \_\_\_\_\_

If additional plants will be monitored record the information on another sheet or in your Science Log.

Overall comments on the site (metadata): \_\_\_\_\_

**Phenological Gardens**

**Soil Texture** (Select one):  Unknown  Sandy Clay  Sandy Clay Loam  
 Sandy Loam  Silty Clay  Silty Clay Loam  Silt Loam  Loamy Sand  Sand  
 Silt  Clay  Clay Loam  Loam  Organic

**Soil pH:** \_\_\_\_\_; **pH Method:**  pH Maper  pH Meter

Shrub Name	Date Planted
Witch Hazel 'Jelena'	
Witch Hazel 'Genuine'	
Lilac	
Mock-Orange	

Shrub Name	Date Planted
Forsythia	
Heather 'Allegro'	
Heather 'Long White'	
Snowdrops	

**Cloned and Common Lilac**

Lilac Shrub Name	Cloned or Common	Date Planted/Died	Height (cm)

**Soil (Pedosphere)**

**Soil Characteristics**

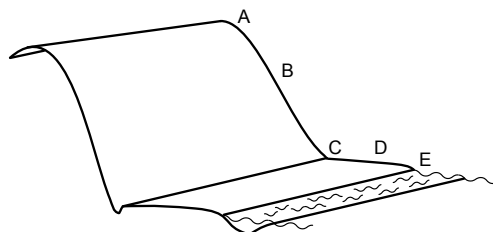
**Slope angle** (North, Northeast, etc.): \_\_\_\_\_

**Method** (select one):  Soil Pit  Auger Hole  Near Surface  Excavation  
 Road Cut  Erosion Cut

**Land Use** (Select one):  Urban  Agricultural  Recreation  Wilderness  
 Other \_\_\_\_\_

**Landscape Position** (Select one):

- A. Summit
- B. Slope
- C. Depression
- D. Large Flat Area
- E. Stream Bank









# Land Cover

## Land Cover Sample Site Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

City/State/Country: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

Complete the table below using a GPS receiver once a minute for five minutes to better identify the coordinates of the site:

Observation	Latitude Decimal Degrees (N/S)	Longitude Decimal Degrees (E/W)	Elevation Meters
1			
2			
3			
4			
5			
<b>Average</b>			

\*Coordinates: Latitude: \_\_\_\_\_ °  N or  S Longitude: \_\_\_\_\_ °  E or  W Elevation: \_\_\_ m

\*Source of Location Data (check one):  GPS  Other \_\_\_\_\_

### MUC Land Cover Description (to most details level):

Level 1: \_\_\_\_\_

Level 2: \_\_\_\_\_

Level 3: \_\_\_\_\_

Level 4: \_\_\_\_\_

MUC Code: \_\_\_\_\_

### Site Photos

(record the appropriate photo number for easy identification during data entry)

North	South	East	West
Photo number _____	Photo number _____	Photo number _____	Photo number _____

Comments (metadata): \_\_\_\_\_

# Land Cover

## Tree and/or Shrub Canopy and Ground Cover Data Sheet\*

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

No.	Use this column to determine Shrub Canopy	Use this column to determine Dominant and Co-Dominant Canopy Species	Use this column to derive MUC for Shrubland	Use this column to determine Overall Ground Cover	Use this column to determine Dominant and Co-Dominant Ground Vegetation Type	Use this column to determine Total Shrubs
	1. Canopy Observations T = Tree Canopy SB = Shrub - = Sky	2. Canopy Species or Common Name	3. Canopy Type E = Evergreen D = Deciduous - = Sky	4. Ground Observations G = Green Cover B = Brown Cover - = No Cover	5. Ground Vegetation Type GD = Graminoid FB = Forb OG = Other Green Veg. SB = Shrub DS = Dwarf-Shrub	6. Put "+" in this column if there is a "SB" in Column 1 or Column 5; put a "-" if no shrubs present
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

No.	Use this column to determine Shrub Canopy	Use this column to determine Dominant and Co-Dominant Canopy Species	Use this column to derive MUC for Shrubland	Use this column to determine Overall Ground Cover	Use this column to determine Dominant and Co-Dominant Ground Vegetation Type	Use this column to determine Total Shrubs
	1. Canopy Observations T = Tree Canopy SB = Shrub - = Sky	2. Canopy Species or Common Name	3. Canopy Type E = Evergreen D = Deciduous - = Sky	4. Ground Observations G = Green Cover B = Brown Cover - = No Cover	5. Ground Vegetation Type GD = Graminoid FB = Forb OG = Other Green Veg. SB = Shrub DS = Dwarf-Shrub	6. Put "+" in this column if there is a "SB" in Column 1 or Column 5; put a "-" if no shrubs present
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

Summary of Tree Canopy Observations	
Total "T"	
Total "SB"	
Total "-"	
Total Canopy Observations	
% Tree Canopy	
% Shrub Canopy	

Summary of Canopy Type	
Total "E"	
Total "D"	
Total Canopy Type Observations	
% Evergreen (E)	
% Deciduous (D)	

Summary of Ground Observations	
Total "G"	
Total "B"	
Total "-"	
Total Ground Observations	
% Ground	

Summary of Ground Vegetation Type	
Total "GD"	
Total "FB"	
Total "OG"	
Total "SB"	
Total "DS"	
Total Ground Type Observations	
% Graminoid (GD)	
% Forb (FB)	
% Other Green (OG)	
% Shrub (SB)	
% Dwarf Shrub (DS)	

**\*Note:** Always measure the highest level of canopy.  
 In a forest or woodland, canopy cover refers to the tree canopy.  
 In a shrubland, canopy cover refers to the shrub canopy.

# Land Cover

## Measure Tree Height on Level Ground Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

Clinometer Data								
Tree No.	Latin/Common Name	Clinometer Reading (°)	TAN of Clinometer Reading	Distance from Tree (m)	Eye Height (m)	Tree Height (m)	Dominant or Co-Dominant	Average Lat. and Long. of Each Tree (GPS protocol)
1								Lat.:
								Long.:
2								Lat.:
								Long.:
3								Lat.:
								Long.:
4								Lat.:
								Long.:
5								Lat.:
								Long.:
6								Lat.:
								Long.:
7								Lat.:
								Long.:
8								Lat.:
								Long.:
9								Lat.:
								Long.:
10								Lat.:
								Long.:

**Tree Height = [TAN of Clinoter Reading] x [Distance from Tree (m)] + [Eye Height (m)]**

# Land Cover

## Measure Tree Height on Level Ground: Simplified Clinometer Technique Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

### Clinometer Data

Tree Species 1 Name <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	Clinometer Reading (°)	Tree Height (m) = Distance from Base of the Tree (m) plus height of Eyes (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
Specimen 1	45°			Lat.:
	45°			Long.:
	45°			
Specimen 2	45°			Lat.:
	45°			Long.:
	45°			
Specimen 3	45°			Lat.:
	45°			Long.:
	45°			
Specimen 4	45°			Lat.:
	45°			Long.:
	45°			
Specimen 5	45°			Lat.:
	45°			Long.:
	45°			

Tree Species 1 Name <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	Clinometer Reading (°)	Tree Height (m) = Distance from Base of the Tree (m) plus height of Eyes (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
Specimen 1	45°			Lat.:
	45°			Long.:
	45°			
Specimen 2	45°			Lat.:
	45°			Long.:
	45°			
Specimen 3	45°			Lat.:
	45°			Long.:
	45°			
Specimen 4	45°			Lat.:
	45°			Long.:
	45°			
Specimen 5	45°			Lat.:
	45°			Long.:
	45°			

**Note:** Measure each tree three times and average the three height values. If all three values are within 1 meter of the average, report the values. If not, repeat the measurements until they are within 1 meter of their average, and then report these values.

# Land Cover

## Measure Tree Height on a Slope: Stand by Tree Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_ Month \_\_\_\_ Day \_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

<b>Clinometer Data</b>							
Tree Species 1 Name <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	Clinometer Reading (°)	TAN of Clinometer Reading	Height to 0° on Tree (m)	Distance to Tree (m)	Tree Height* (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
Specimen 1							Lat.:
							Long.:
Specimen 2							Lat.:
							Long.:
Specimen 3							Lat.:
							Long.:
Specimen 4							Lat.:
							Long.:
Specimen 5							Lat.:
							Long.:

\*Tree Height = [(TAN of Clinometer Reading) x (Distance to Tree)] + (Height to 0° on Tree)

Tree Species 1 Name <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	Clinometer Reading (°)	TAN of Clinometer Reading	Height to 0° on Tree (m)	Distance to Tree (m)	Tree Height* (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
Specimen 1							Lat.:
							Long.:
Specimen 2							Lat.:
							Long.:
Specimen 3							Lat.:
							Long.:
Specimen 4							Lat.:
							Long.:
Specimen 5							Lat.:
							Long.:

**Note:** Measure each tree three times and average the three height values. If all three values are within 1 meter of the average, report the values. If not, repeat the measurements until they are within 1 meter of their average, and then report these values.

# Land Cover

Measure Tree Height on a Slope: Two-Triangle with Eyes Higher or Lower than Tree Base Technique  
Data Sheet (Page 1 of 2)

School Name: \_\_\_\_\_ Site: \_\_\_\_\_  
 Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_  
 Recorded By: \_\_\_\_\_

Clinometer Data										
Tree Species 1 Name _____ <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	1 <sup>st</sup> Clinometer Reading (°)	TAN of 1 <sup>st</sup> Clinometer Reading	2 <sup>nd</sup> Clinometer Reading (°)	TAN of 2 <sup>nd</sup> Clinometer Reading	COS of 2 <sup>nd</sup> Clinometer Reading	Distance to Tree (m)	Baseline Calculation (m)	Tree Height (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
<b>Specimen 1</b>										Lat.:
										Long.:
<b>Specimen 2</b>										Lat.:
										Long.:
<b>Specimen 3</b>										Lat.:
										Long.:
<b>Specimen 4</b>										Lat.:
										Long.:
<b>Specimen 5</b>										Lat.:
										Long.:

$$\text{Baseline} = (\text{Distance to the Tree}) \times (\text{COS of } 2^{\text{nd}} \text{ Clinometer Reading})$$

**Tree Height (Eyes Higher than Tree Base)** = [(TAN of 1<sup>st</sup> Clinometer Reading) x (Baseline)] + [(TAN of 2<sup>nd</sup> Clinometer Reading) x (Baseline)]

**Tree Height (Eyes Lower than Tree Base)** = [(TAN of 1<sup>st</sup> Clinometer Reading) x (Baseline)] - [(TAN of 2<sup>nd</sup> Clinometer Reading) x (Baseline)]

**Note:** Measure each tree three times and average the three height values. If all three values are within 1 meter of the average, report the values. If not, repeat the measurements until they are within 1 meter of their average, and then report these values.

# Land Cover

Measure Tree Height on a Slope: Two-Triangle with Eyes Higher or Lower than Tree Base Technique  
Data Sheet (Page 2 of 2)

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

Clinometer Data										
Tree Species 2 Name <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	1 <sup>st</sup> Clinometer Reading (°)	TAN of 1 <sup>st</sup> Clinometer Reading	2 <sup>nd</sup> Clinometer Reading (°)	TAN of 2 <sup>nd</sup> Clinometer Reading	COS of 2 <sup>nd</sup> Clinometer Reading	Distance to Tree (m)	Baseline Calculation (m)	Tree Height (m)	Average Tree Height (m)	Average Lat. and Long. of Each Tree (GPS protocol)
<b>Specimen 1</b>										Lat.: Long.:
<b>Specimen 2</b>										Lat.: Long.:
<b>Specimen 3</b>										Lat.: Long.:
<b>Specimen 4</b>										Lat.: Long.:
<b>Specimen 5</b>										Lat.: Long.:

$$\text{Baseline} = (\text{Distance to the Tree}) \times (\text{COS of 2}^{\text{nd}} \text{ Clinometer Reading})$$

$$\text{Tree Height (Eyes Higher than Tree Base)} = [(\text{TAN of 1}^{\text{st}} \text{ Clinometer Reading}) \times (\text{Baseline})] + [(\text{TAN of 2}^{\text{nd}} \text{ Clinometer Reading}) \times (\text{Baseline})]$$

$$\text{Tree Height (Eyes Lower than Tree Base)} = [(\text{TAN of 1}^{\text{st}} \text{ Clinometer Reading}) \times (\text{Baseline})] - [(\text{TAN of 2}^{\text{nd}} \text{ Clinometer Reading}) \times (\text{Baseline})]$$

**Note:** Measure each tree three times and average the three height values. If all three values are within 1 meter of the average, report the values. If not, repeat the measurements until they are within 1 meter of their average, and then report these values.



# Land Cover

## Tree Circumference Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

<b><i>Tree Circumference Measurements</i></b>	
<b>Tree Species 1</b>	<b>Tree Circumference (cm)</b>
Name _____ <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	
<b>Specimen 1</b>	
<b>Specimen 2</b>	
<b>Specimen 3</b>	
<b>Specimen 4</b>	
<b>Specimen 5</b>	

<b>Tree Species 2</b>	<b>Tree Circumference (cm)</b>
Name _____ <input type="checkbox"/> Dominant <input type="checkbox"/> Co-Dominant	
<b>Specimen 1</b>	
<b>Specimen 2</b>	
<b>Specimen 3</b>	
<b>Specimen 4</b>	
<b>Specimen 5</b>	

# Land Cover

## Graminoid Biomass Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

### *Graminoid Biomass Measurements*

<b>Sample Number</b>	<b>Color</b> (Green or Brown)	<b>Mass of Sample and Bag (g)</b>	<b>Mass of Empty Bag (g)</b>	<b>Graminoid Biomass (g)</b>
1				
2				
3				

**Graminoid Biomass = (Mass of Sample and Bag) – (Mass of Empty Bag)**

# Land Cover

## Land Cover Summary Data Sheet

Use this data sheet to collect data for GLOBE Data Entry

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Time: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Hour (UT) \_\_\_\_\_

Recorded By: \_\_\_\_\_

Canopy Observations		Canopy Type		Ground Observations		Ground Vegetation Type	
Total "T"		Total "E"		Total "G"		Total "GD"	
Total "SB"		Total "D"		Total "B"		Total "FB"	
Total "-"				Total "-"		Total "OG"	

Shrub Cover		Dwarf Shrub Cover	
SB from Canopy		Total "DS"	
SB from Ground		Total observations (Total DS + Total "-")	
Total SB			
Total observations (Total Canopy + Total Ground)			

Tree No.	Latin/Common Name	Tree/Shrub Height 1 (m)	Tree/Shrub Height 2 (m)	Tree/Shrub Height 3 (m)	Tree Circumference (cm)	Dominant or Co-Dominant
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Graminoid Biomass Measurements				
Sample Number	Color (Green or Brown)	Mass of Sample and Bag (g)	Mass of Empty Bag (g)	Graminoid Biomass (g)
1				
2				
3				

# Fire Fuel Protocol

## Center Plot Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Date: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_

Recorded By: \_\_\_\_\_

**Aspect:** \_\_\_\_\_ degrees True North (enter 0 for sites with no slope)

**Overall slope of stand:** looking up slope \_\_\_\_\_ degrees looking down slope \_\_\_\_\_ degrees

Heights of trees or shrubs in dominant stratum	
Tree or Shrub	Height (m)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

**Average height of dominant stratum =**  $\frac{\text{(sum of all heights)}}{\text{(total number of trees and shrubs)}}$

Average height: \_\_\_\_\_ m

Heights of the base of crowns in lowest stratum	
Tree or Shrub	Height (m)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

**Average height of base of crowns =**  $\frac{\text{(sum of heights)}}{\text{(total number of trees and shrubs)}}$

Average height: \_\_\_\_\_

Comments: \_\_\_\_\_

# Fire Fuel Protocol:

## Transect Measurements Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Measurement Date: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_

Recorded By: \_\_\_\_\_

Number of Transects: \_\_\_\_\_

### Woody Fuel Counts

	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7
Direction of transect (True North)	90°	330°	270°	210°	150°	90°	30°
Slope of transect (degrees)							
0-1 cm diameters (5-7 m mark)							
1-3 cm diameters (5-10 m mark)							
3-8 cm diameters (5-25 m mark)							

# Clinometer Sheet

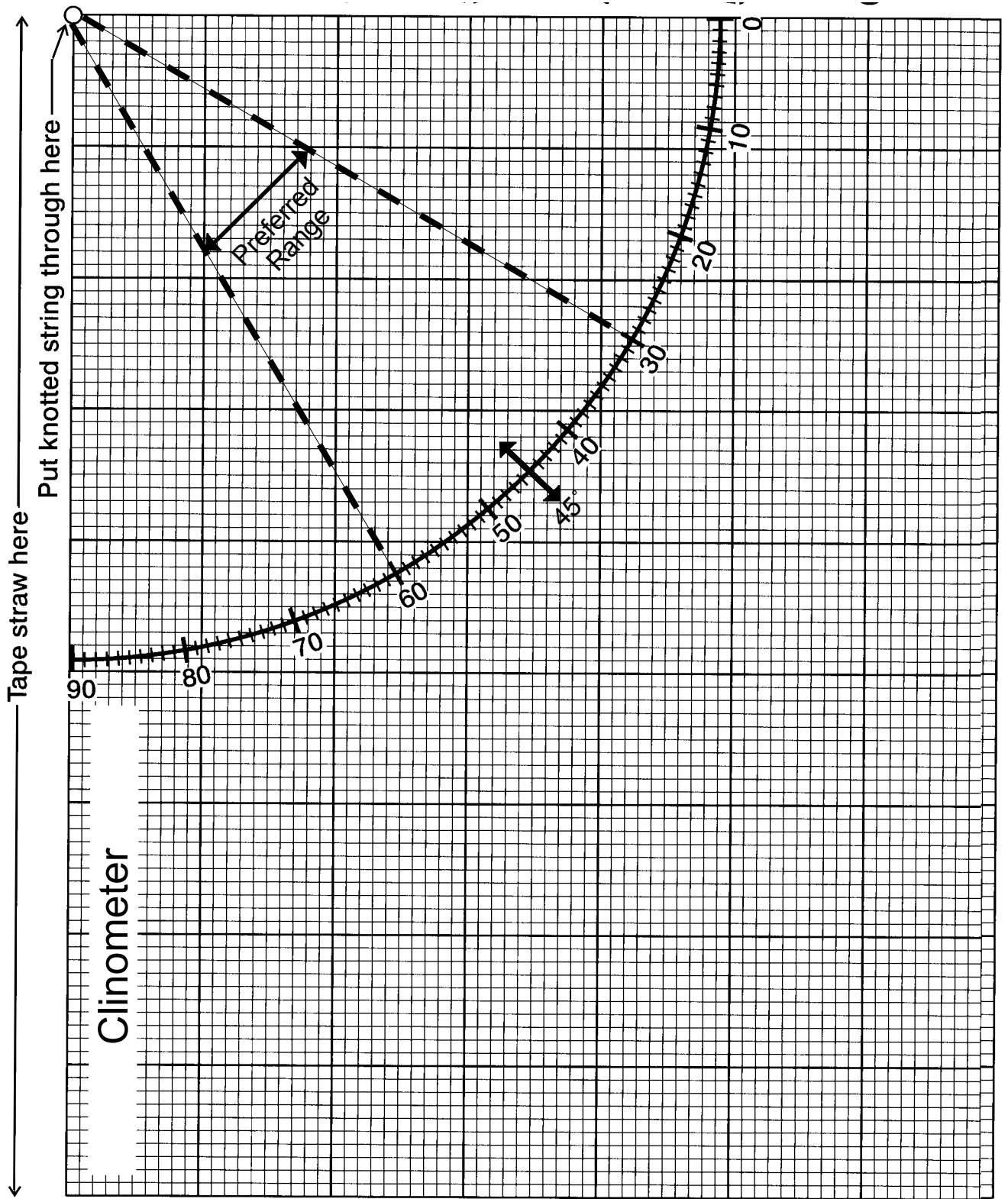


Table BIO-AP-1: Table of Tangents

Angle (°)	Tan.	Angle (°)	Tan.	Angle (°)	Tan.	Angle (°)	Tan.	Angle (°)	Tan.	Angle (°)	Tan.
1	.02	17	.31	33	.65	49	1.15	65	2.14		
2	.03	18	.32	34	.67	50	1.19	66	2.25		
3	.05	19	.34	35	.70	51	1.23	67	2.36		
4	.07	20	.36	36	.73	52	1.28	68	2.48		
5	.09	21	.38	37	.75	53	1.33	69	2.61		
6	.11	22	.40	38	.78	54	1.38	70	2.75		
7	.12	23	.42	39	.81	55	1.43	71	2.90		
8	.14	24	.45	40	.84	56	1.48	72	3.08		
9	.16	25	.47	41	.87	57	1.54	73	3.27		
10	.18	26	.49	42	.90	58	1.60	74	3.49		
11	.19	27	.51	43	.93	59	1.66	75	3.73		
12	.21	28	.53	44	.97	60	1.73	76	4.01		
13	.23	29	.55	45	1.00	61	1.80	77	4.33		
14	.25	30	.58	46	1.04	62	1.88	78	4.70		
15	.27	31	.60	47	1.07	63	1.96	79	5.14		
16	.29	32	.62	48	1.11	64	2.05	80	5.67		

Example: Assume you have established a baseline distance of 60.0 meters. Assume that you have measured the tree top to an angle of 34°. From the Table, you will see that the tangent of 34° is 0.67. Therefore, the tree height above your eye height is 60.0 m x .67 = 40.2 meters. By adding your eye height above the ground (1.5 m), the total tree height is 41.7 meters.

Table BIO-AP-2: Table of Cosines

Not Part of Clinometer\*

Angle (°)	COS	Angle (°)	COS	Angle (°)	COS	Angle (°)	COS	Angle (°)	COS	Angle (°)	COS
1	1.00	17	0.96	33	0.84	49	0.66	65	0.42		
2	1.00	18	0.95	34	0.83	50	0.64	66	0.41		
3	1.00	19	0.95	35	0.82	51	0.63	67	0.39		
4	1.00	20	0.94	36	0.81	52	0.62	68	0.37		
5	1.00	21	0.93	37	0.80	53	0.60	69	0.36		
6	0.99	22	0.93	38	0.79	54	0.59	70	0.34		
7	0.99	23	0.92	39	0.78	55	0.57	71	0.33		
8	0.99	24	0.91	40	0.77	56	0.56	72	0.31		
9	0.99	25	0.91	41	0.75	57	0.54	73	0.29		
10	0.98	26	0.90	42	0.74	58	0.53	74	0.28		
11	0.98	27	0.89	43	0.73	59	0.52	75	0.26		
12	0.98	28	0.88	44	0.72	60	0.50	76	0.24		
13	0.97	29	0.87	45	0.71	61	0.48	77	0.22		
14	0.97	30	0.87	46	0.69	62	0.47	78	0.21		
15	0.97	31	0.86	47	0.68	63	0.45	79	0.19		
16	0.96	32	0.85	48	0.67	64	0.44	80	0.17		

\* For use with Two-Triangle Alternative Technique to Measure Tree Height Field Guides









# Common and Cloned Lilac

## Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

Lilac shrub label	Cloned or common	Date of first leaf observed (YYYY/MM/DD)	Date of last observation immediately before first leaf (YYYY/MM/DD)	Date of full or 95% leafed (YYYY/MM/DD)	Date of last observation immediately before full leaf (YYYY/MM/DD)

Lilac shrub label	Cloned or common	Date of first bloom observed (YYYY/MM/DD)	Date of last observation immediately before first bloom (YYYY/MM/DD)	Date of full bloom (YYYY/MM/DD)	Date of last observation immediately before full bloom (YYYY/MM/DD)

Lilac shrub label	Cloned or common	Date of end of bloom (YYYY/MM/DD)	Date of last observation immediately before end of bloom (YYYY/MM/DD)	Height Measured once only in autumn (cm)

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Phenological Gardens

## Data Sheet

School Name: \_\_\_\_\_ Site name: \_\_\_\_\_

Recorded By: \_\_\_\_\_

For witch hazel, mock-orange, heather and snowdrops, record the dates for the following flowering stages:

Shrub	Flowering Stage		
	BF	GF	EF
Witch Hazel 'Jelena'			
Snowdrops			
Mock-Orange			
Heather 'Allegro'			
Heather 'Long White'			
Witch Hazel 'Genuine'			

**BF = Beginning of flowering**

**GF = General flowering**

**EF = End of Flowering**

For lilac and forsythia, record the dates for the following flowering and leaf growth stages:

Shrub	Flowering Stage			Leaf Stage	
	BF	GF	EF	LU	FL
Lilac					
Forsythia					

**BF = Beginning of flowering**

**GF = General flowering**

**EF = End of Flowering**

**LU = Beginning of leaf unfolding**

**FL = Full leaves**

Height and health of each plant. Measure in the Autumn.

Shrub	Height (cm)	Health of Shrub Healthy = H Unhealthy = U Dead = D	If shrub died, did you replace it with another shrub? (yes or no)
Witch Hazel 'Jelena'			
Snowdrops	not necessary to measure height		
Mock-Orange			
Heather 'Allegro'			
Heather 'LongWhite'			
Lilac			
Forsythia			

Was fertilizer used on the plants this year? \_\_\_\_ If yes, date of application: \_\_\_\_\_

Type of fertilizer: \_\_\_\_\_

Record dates plant(s) were watered: \_\_\_\_\_

If plants are pruned, record date(s): \_\_\_\_\_

Comments (Metadata): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Seaweed Reproductive Phenology

## Site Definition Data Sheet

School Name: \_\_\_\_\_ Date: Year \_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_

Recorded By: \_\_\_\_\_

Site name (give your site a unique name): \_\_\_\_\_

Complete the table below using a GPS receiver once a minute for five minutes to better identify the coordinates of the site:

Observation	Latitude Decimal Degrees (N/S)	Longitude Decimal Degrees (E/W)	Elevation Meters
1			
2			
3			
4			
5			
<b>Average</b>			

\*Coordinates: Latitude: \_\_\_\_\_ °  N or  S Longitude: \_\_\_\_\_ °  E or  W Elevation: \_\_\_\_ m

\*Source of Location Data (check one):  GPS  Other \_\_\_\_\_

Tidal Range: \_\_\_\_\_ meters

Beach Aspect: \_\_\_\_\_ ° Beach Slope: \_\_\_\_\_ °

Dominant Rock size (check one):  large boulders  medium boulders  
 small boulders  cobbles  pebbles  gravel

**Site Photos** (record the appropriate photo number for easy identification during data entry)

<p>North</p>          <p>Photo number _____</p>	<p>South</p>          <p>Photo number _____</p>	<p>East</p>          <p>Photo number _____</p>	<p>West</p>          <p>Photo number _____</p>
---	---	--	--

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Seaweed Reproduction Phenology Protocol

## Data Sheet

School Name: \_\_\_\_\_ Site name: \_\_\_\_\_

Recorded By: \_\_\_\_\_

Date: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Time: \_\_\_\_\_ (local) \_\_\_\_\_ (UT)

Time of low tide: \_\_\_\_\_ (local) \_\_\_\_\_ (UT)

Species (check one):  *Fucus vesiculosus*                       *Asophyllum nodosum*  
 *Fucus distichus*     *Fucus spiralis*  
 *Fucus serratus*     *Pelvetia canaliculata*

Stage	1	2	3	4	5	Total
Number of receptacles in Stage						
Percentage of receptacles in stage [(number in stage/ total number of receptacles observed)*100]						100

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# Ruby-throated Hummingbird (RTHU)

## Site Definition Data Sheet

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_

Observer Names: \_\_\_\_\_

Date: Year \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_

Complete the table below using a GPS receiver once a minute for five minutes to better identify the coordinates of the site:

Observation	Latitude Decimal Degrees (N/S)	Longitude Decimal Degrees (E/W)	Elevation Meters
1			
2			
3			
4			
5			
<b>Average</b>			

\*Coordinates: Latitude: \_\_\_\_\_°  N or  S Longitude: \_\_\_\_\_°  E or  W Elevation: \_\_\_ m

\*Source of Location Data (check one):  GPS  Other \_\_\_\_\_

Nearest Atmosphere Study Site: \_\_\_\_\_

Distance to Atmosphere Site: \_\_\_\_\_ meters;

Direction to Site:  N  NE  E  SE  S  SW  W  NW

Elevation Difference (Soil Moisture Site – Hummingbird Site): \_\_\_\_\_ meters  
(this value may be positive or negative)

Check If Present At Site:  Hummingbird Feeder  Flowers

If flowers are present, record the following (use additional sheets if needed):

Genus	Species	Common Name

**Photo Number and Orientation**

North	South	East	West
Photo number _____	Photo number _____	Photo number _____	Photo number _____

Comments (Metadata): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Ruby-throated Hummingbird (RTHU)

## Hummingbird Sighting Protocol Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

	Number of Hummingbirds Observed						
<b>Date</b>							
Observation Start Time: (local time)							
Observation End Time: (local time)							
Observation Start Time: (UT)							
Observation End Time: (UT)							
<b>Adult Male</b> <i>full red throat</i> February-October (U.S., Canada) January-September ONLY (Mexico, Central America, Caribbean)							
<b>Adult Male</b> (probable adult, but may be an advanced juvenile) <i>full red throat</i> October-December (Mexico, Central America, Caribbean)							
<b>Adult Female</b> <i>white throat</i> February-April ONLY (U.S., Canada) January-May (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> (could be female or young male) <i>white throat</i> May-October (U.S., Canada) August-December ONLY (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> <i>throat not observed</i> Any time of the year (all locations)							
<b>Young Male</b> <i>throat streaked in green or black and/or one or more red throat feathers</i> May-October (U.S., Canada) August-April (Mexico, Central America, Caribbean)							

If no hummingbirds are seen, record "0" in the data fields above.

For any “unusual” RTHU (i.e., one with “abnormal” plumage or one that is color-marked) record in the Data Entry page’s Comments section the color of the bird’s forehead, crown, throat, breast, belly, flanks, back, tail, bill, and eyes, and the location of other distinct markings. Describe the bird’s activity (including feeding behavior). Take a photo if possible. Also follow this procedure for any “vagrant” hummingbirds other than RTHUs from 15 October through 15 March. Please be sure to report any of these “unusual” and “vagrant” hummingbirds directly to [research@hiltonpond.org](mailto:research@hiltonpond.org) as soon as possible after sighting.

**Comments:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

# Ruby-throated Hummingbird (RTHU)

## Feeder Visit Protocol Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

	Number of Feeder Visits						
Date							
Observation Start Time: (local time)							
Observation End Time: (local time)							
Observation Start Time: (UT)							
Observation End Time: (UT)							
<b>Adult Male</b> <i>full red throat</i> February-October (U.S., Canada) January-September ONLY (Mexico, Central America, Caribbean)							
<b>Adult Male</b> (probable adult, but may be an advanced juvenile) <i>full red throat</i> October-December (Mexico, Central America, Caribbean)							
<b>Adult Female</b> <i>white throat</i> February-April ONLY (U.S., Canada) January-May (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> (could be female or young male) <i>white throat</i> May-October (U.S., Canada) August-December ONLY (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> <i>throat not observed</i> Any time of the year (all locations)							
<b>Young Male</b> <i>throat streaked in green or black                      and/or one or more red throat                      feathers</i> May-October (U.S., Canada) August-April (Mexico, Central America, Caribbean)							

Observations are made in 45-minute time blocks. If no hummingbirds are seen, record "0" on the Data Sheet above and enter "0" on the data entry page on the GLOBE website.

For any “unusual” RTHU (i.e., one with “abnormal” plumage or one that is color-marked) record in the Data Entry page’s Comments section the color of the bird’s forehead, crown, throat, breast, belly, flanks, back, tail, bill, and eyes, and the location of other distinct markings. Describe the bird’s activity (including feeding behavior). Take a photo if possible. Also follow this procedure for any “vagrant” hummingbirds other than RTHUs from 15 October through 15 March. Please be sure to report any of these “unusual” and “vagrant” hummingbirds directly to [research@hiltonpond.org](mailto:research@hiltonpond.org) as soon as possible after sighting.

**Comments:** \_\_\_\_\_  
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# Ruby-throated Hummingbird (RTHU)

## Flower Visit Protocol Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

Date	Number of Flower Visits						
Observation Start Time: (local time)							
Observation End Time: (local time)							
Observation Start Time: (UT)							
Observation End Time: (UT)							
<b>Adult Male</b> <i>full red throat</i> February-October (U.S., Canada) January-September ONLY (Mexico, Central America, Caribbean)							
<b>Adult Male</b> (probable adult, but may be an advanced juvenile) <i>full red throat</i> October-December (Mexico, Central America, Caribbean)							
<b>Adult Female</b> <i>white throat</i> February-April ONLY (U.S., Canada) January-May (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> (could be female or young male) <i>white throat</i> May-October (U.S., Canada) August-December ONLY (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> <i>throat not observed</i> Any time of the year (all locations)							
<b>Young Male</b> <i>throat streaked in green or black and/or one or more red throat feathers</i> May-October (U.S., Canada) August-April (Mexico, Central America, Caribbean)							

Observations are made in 45-minute time blocks. If no hummingbirds are seen, record "0" on the Data Sheet above and enter "0" on the data entry page on the GLOBE website.

For any “unusual” RTHU (i.e., one with “abnormal” plumage or one that is color-marked) record in the Data Entry page’s Comments section the color of the bird’s forehead, crown, throat, breast, belly, flanks, back, tail, bill, and eyes, and the location of other distinct markings. Describe the bird’s activity (including feeding behavior). Take a photo if possible. Also follow this procedure for any “vagrant” hummingbirds other than RTHUs from 15 October through 15 March. Please be sure to report any of these “unusual” and “vagrant” hummingbirds directly to [research@hiltonpond.org](mailto:research@hiltonpond.org) as soon as possible after sighting.

**Comments:** \_\_\_\_\_  
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# Ruby-throated Hummingbird (RTHU)

## Feeder vs. Flower Visit Protocol Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

Date	Number of Visits							
Observation Start Time: (local time)								
Observation End Time: (local time)								
Observation Start Time: (UT)								
Observation End Time: (UT)								
<b>Adult Male</b> <i>full red throat</i> February-October (U.S., Canada) January-September ONLY (Mexico, Central America, Caribbean)	<b>Feeder</b>							
	<b>Flower</b>							
<b>Adult Male</b> (probable adult, but may be an advanced juvenile) <i>full red throat</i> October-December (Mexico, Central America, Caribbean)	<b>Feeder</b>							
	<b>Flower</b>							
<b>Adult Female</b> <i>white throat</i> February-April ONLY (U.S., Canada) January-May (Mexico, Central America, Caribbean)	<b>Feeder</b>							
	<b>Flower</b>							
<b>Undetermined Sex and Age</b> (could be female or young male) <i>white throat</i> May-October (U.S., Canada) August-December ONLY (Mexico, Central America, Caribbean)	<b>Feeder</b>							
	<b>Flower</b>							
<b>Undetermined Sex and Age</b> <i>throat not observed</i> Any time of the year (all locations)	<b>Feeder</b>							
	<b>Flower</b>							
<b>Young Male</b> <i>throat streaked in green or black and/or one or more red throat feathers</i> May-October (U.S., Canada) August-April (Mexico, Central America, Caribbean)	<b>Feeder</b>							
	<b>Flower</b>							

Observations are made in 45-minute time blocks. If no hummingbirds are seen, record "0" on the Data Sheet above and enter "0" on the data entry page on the GLOBE website.

For any “unusual” RTHU (i.e., one with “abnormal” plumage or one that is color-marked) record in the Data Entry page’s Comments section the color of the bird’s forehead, crown, throat, breast, belly, flanks, back, tail, bill, and eyes, and the location of other distinct markings. Describe the bird’s activity (including feeding behavior). Take a photo if possible. Also follow this procedure for any “vagrant” hummingbirds other than RTHUs from 15 October through 15 March. Please be sure to report any of these “unusual” and “vagrant” hummingbirds directly to [research@hiltonpond.org](mailto:research@hiltonpond.org) as soon as possible after sighting.

**Comments:** \_\_\_\_\_  
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# Ruby-throated Hummingbird (RTHU)

## Flower Species Visit Protocol Data Sheet

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

	Number of Flower Visits, by Species						
<b>Date</b>							
Observation Start Time: (local time)							
Observation End Time: (local time)							
Observation Start Time: (UT)							
Observation End Time: (UT)							
<b>Flower Name</b>							
Genus							
Species							
<b>Adult Male</b> <i>full red throat</i> February-October (U.S., Canada) January-September ONLY (Mexico, Central America, Caribbean)							
<b>Adult Male</b> (probable adult, but may be an advanced juvenile) <i>full red throat</i> October-December (Mexico, Central America, Caribbean)							
<b>Adult Female</b> <i>white throat</i> February-April ONLY (U.S., Canada) January-May (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> (could be female or young male) <i>white throat</i> May-October (U.S., Canada) August-December ONLY (Mexico, Central America, Caribbean)							
<b>Undetermined Sex and Age</b> <i>throat not observed</i> Any time of the year (all locations)							
<b>Young Male</b> <i>throat streaked in green or black and/or one or more red throat feathers</i> May-October (U.S., Canada) August-April (Mexico, Central Ameri- ca, Caribbean)							

Observations are made in 45-minute time blocks. If no hummingbirds are seen, record "0" on the Data Sheet above and enter "0" on the data entry page on the GLOBE Web site.

For any “unusual” RTHU (i.e., one with “abnormal” plumage or one that is color-marked) record in the Data Entry page’s Comments section the color of the bird’s forehead, crown, throat, breast, belly, flanks, back, tail, bill, and eyes, and the location of other distinct markings. Describe the bird’s activity (including feeding behavior). Take a photo if possible. Also follow this procedure for any “vagrant” hummingbirds other than RTHUs from 15 October through 15 March. Please be sure to report any of these “unusual” and “vagrant” hummingbirds directly to [research@hiltonpond.org](mailto:research@hiltonpond.org) as soon as possible after sighting.

**Comments:** \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

# Ruby-throated Hummingbird (RTHU)

## Nesting Report Protocol Data Sheet (U.S. and Canada)

School Name: \_\_\_\_\_ Site: \_\_\_\_\_

Recorded By: \_\_\_\_\_

Date Nest Was Found: Year \_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_

Check One:  1st set of eggs at this nest

2nd set of eggs at this nest

3rd set of eggs at this nest

Record dates for the following observations. It is possible you will not observe all activities listed.

Observation	Date
Start of Nest Construction	
End of Nest Construction	
First Sighting of Adult Female on Nest	
Laying of First Egg	
Laying of Second Egg	
First Egg Hatched	
Second Egg Hatched	
When First Nestling Leaves the Nest	
When Second Nestling Leaves the Nest	
Last Sighting of Adult Female on Nest	

Number of eggs laid: \_\_\_\_\_

Number of eggs that did not hatch: \_\_\_\_\_

Number of nestlings that survived: \_\_\_\_\_

Record dates and observations of adult male RTHU behavior at the nest: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Arctic Bird Migration Monitoring

## Site Definition Data Sheet

School Name: \_\_\_\_\_ Date: Year \_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_

Recorded By: \_\_\_\_\_

Site name (give your site a unique name): \_\_\_\_\_

Complete the table below using a GPS receiver once a minute for five minutes to better identify the coordinates of the site:

Observation	Latitude Decimal Degrees (N/S)	Longitude Decimal Degrees (E/W)	Elevation Meters
1			
2			
3			
4			
5			
<b>Average</b>			

\*Coordinates: Latitude: \_\_\_\_\_°  N or  S Longitude: \_\_\_\_\_°  E or  W Elevation: \_\_\_ m

\*Source of Location Data (check one):  GPS  Other \_\_\_\_\_

Nearest Atmosphere Study Site: \_\_\_\_\_

Distance to Atmosphere Site: \_\_\_\_\_ meters

Direction to Site:  N  NE  E  SE  S  SW  W  NW

**Site Photos** (record the appropriate photo number for easy identification during data entry)

<p>North</p>          <p>Photo number _____</p>	<p>South</p>          <p>Photo number _____</p>	<p>East</p>          <p>Photo number _____</p>	<p>West</p>          <p>Photo number _____</p>
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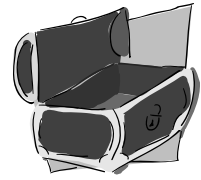
Type of Site (select one):  Field  Estuary/shore  Lake or Pond  Ocean/shore  
 Forest or Woodland  Other

If other, describe: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# Glossary



## Accuracy

How close a measurement is to a standard value of that measurement

## Assessment

Evaluation of the value of an object

## Biogeochemical

Refers to the chemical interactions between the living (“bio”) and physical (“geo”) components of the Earth system, as in biogeochemical cycles of carbon, nitrogen, etc.

## Biomass

The dry weight of vegetation above a unit area of ground, often reported as grams (dry weight) per square meter

## Biome

A major ecological community type (as grassland or desert)

## Biometry

The process of making biological measurements

## Biosphere

The living component of the Earth system, along with the gaseous (atmosphere), liquid (hydrosphere), and solid (geosphere) components

## Canopy Cover

The amount of canopy foliage above a given portion of ground is the canopy cover. This will determine the amount of sunlight that reaches that portion of ground.

## Catastrophic

Used to describe a sudden, violent event

## Characteristic

A distinguishing feature

## Classification

Sorting a group of items into well-defined and distinct subsets according to specific criteria

## Clinometer

A clinometer is an instrument for measuring the angle of a change in height or elevation.

## Criteria

Decision rules that are used to determine into which subset an item is placed during a classification

## Deciduous

Refers to trees or shrubs that lose their leaves every year

## Default

A preset value that a computer uses or an action that it takes unless it is told otherwise

## Densiometer

A device for determining the percentage of canopy closure in a wooded environment

## Dichotomous

This is a branching decision tree (decoder) characterized by successive forking into two approximately equal and contradictory divisions, which ultimately leads to only one correct outcome.

## Difference/Error Matrix

A graphic method of comparing two data sets for validation

## Dominant

A plant or animal that, due to its large numbers or size, influences the conditions of an area and determines what other plants or animals can live there

## Ecosystem

System formed by the interactions of a community of living things with its environment

## Equatorial

Near the equator

## Evapotranspiration

The return of water to the atmosphere by evaporation (from solar energy) and transpiration (plant activity.)

## Glossary

List of terms in a special subject with their definitions

## Genus (pl. Genera)

This is an inclusive category whose species have more characteristics in common with each other than with species of other genera. Genera, therefore, are collections of closely related species.

## Geosphere

The solid component of the Earth system; e.g. rocks, soil, etc.





**Gradient**

The rate of change in a measured quantity over space or time

**Graminoid**

Grass-like vegetation

**Ground Cover**

The amount of ground-level vegetation covering a given area. (For the GLOBE program, “ground level” is defined as “below the observer’s knees.” Ground cover is expressed as a percentage. E.g. 30% ground cover means that, viewed from above, 30% of the ground surface is obscured by ground-level vegetation.

**Herbaceous**

A plant or plant part that is not woody

**Hierarchical**

Having the characteristics of a system of objects ranked one above the other

**Homogeneous**

Composed of parts that are all the same kind, in this case, the same land cover type

**Hydrosphere**

The liquid component of the Earth system; e.g. oceans, lakes, rivers, etc.

**Iterative**

To do something over again or repeatedly

**Magnetic North**

The direction the compass needle points, rather than true north which is a geographic place

**Metadata**

Any additional information that cannot be expressed in the measurement data such as historical information, weather conditions, weather effects, and other observations

**Methodology**

A set of procedures or a planned way of doing this investigation

**Multitemporal**

Viewed from more than one point in time

**NOAA**

The National Oceanic and Atmospheric Administration.

**Perennating Organs**

Parts of plants that live over from one season to another (tubers, rhizomes)

**Perturbations**

A disturbance in the normal functioning of a system

**Phenology**

The study of changes over time in an environmental setting

**Photointerpretation**

The production of a land cover map or identification of specific features by visual inspection of an aerial photo or satellite image

**Photosynthetic Potential**

The maximum amount of biomass that can be produced in an area

**Physiological**

Characteristic of, or appropriate to, an organism’s healthy or normal functioning

**Pixels**

The smallest element of an image

**Precise**

Exact in measuring

**Primary Productivity**

The rate at which organic material is produced by photosynthesis at a given location. Often represented as grams (dry weight) of Carbon per m<sup>2</sup> per year.

**Protocol**

A plan for carrying out a scientific study

**Sediment**

Matter that settles to the bottom eventually but can be carried along in a water body or the air until then

**Senescence**

The plant growth phase from full maturity to death that is characterized by a loss in dry weight

**Spatial**

Having to do with space

**Species**

This is a group of individual plants/animals that is fundamentally alike.

**TM**

Thematic Mapper. Carried aboard the Landsat 4 and 5 satellites, this instrument is designed to study surface features in 7 bands covering the visible through thermal infrared regions with a pixel resolution of 30 m in 6 bands and 120 m in the thermal infrared band.

**Topographic Map**

Map showing detailed features and contour lines of an area

**Urban**

Areas developed for residential (ex. houses, apartments), commercial (ex. stores), industrial (ex. factories) or transportation (ex. roads) uses

**Validation Data**

Data necessary to assess the accuracy of a land cover map produced by manual or electronic means.

**Variation**

A different form of something

