

Welcome to the Paleoecology Module!

Overview

This module has two activities centered on data from a core sediment sample taken from Sutherland Pond in Black Rock Forest.

In the Pollen Identification Activity, students learn how to identify pollen grains and other plant macrofossils from a pond core sample.

In the Core Sediment Sampling Activity, students learn strategies for efficient sampling of a pond core to ensure the capture of the relevant changes in the pollen record over time.

This module is currently being developed by the Center for New Media Teaching and Learning in collaboration with Dr. Terryanne Maenza-Gmelch of the Department of Environmental Science at Barnard College.

This Module Contains Two Activities:

[Start Pollen Identification Activity >>](#)

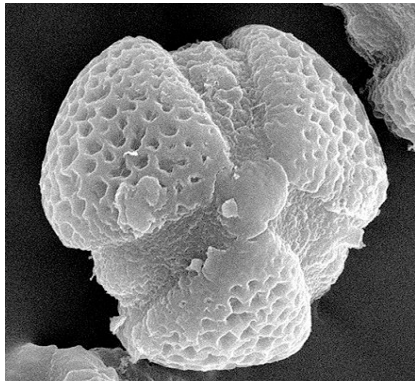
[Start Core Sediment Sampling Activity >>](#)

1. Identify Specimens

2. Review Correct Identifications

Instructions: Use the appropriate interactive key to identify each of the pictured specimens. You may change your answer any time by clicking on a specimen you have already identified.

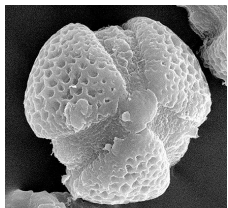
▼ Identify this Specimen



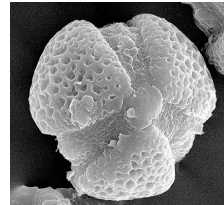
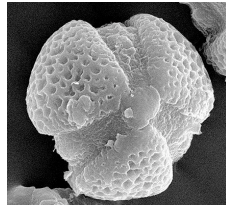
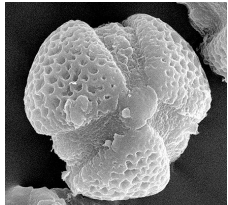
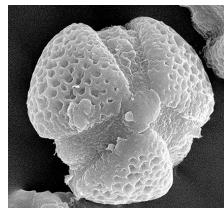
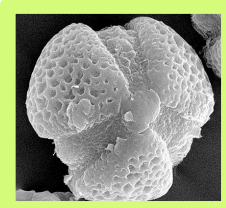
Write Species Name:

Next Species>>

Species to Identify



Aspen Pollen



Pollen Key

Needle Key

Seed Key

1.a. The penguin has a blue gray back
Go to #2.

Yes

No

1.b. The penguin has a black back
Go to #3.

2.a. The flipper is bordered with white
on both edges

white-flipped penguin
Eudyptula albosignata

2.b. The flipper is bordered with white
only on the back edge

little blue penguin
Eudyptula minor albosignata

3.a. Stands under 31/2 feet tall
Go to #4.

3.b. Stands over 31/2 feet tall

Emperor Penguin
Aptenodytes forsteri

4.a. Yellow/orange markings on head
Go to #5.

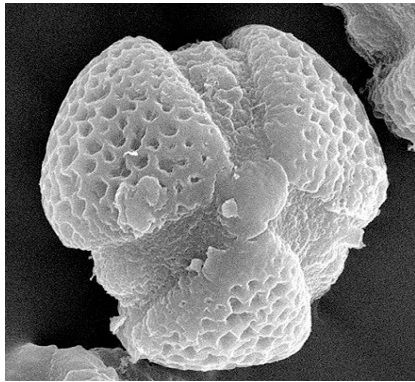
4.b. No yellow/orange markings on
head
Go to #12

1. Identify Specimens

2. Review Correct Identifications

Instructions: Use the appropriate interactive key to identify each of the pictured specimens. You may change your answer any time by clicking on a specimen you have already identified.

▼ Identify this Specimen

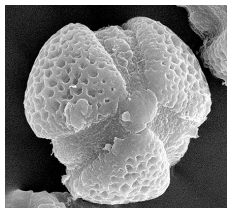


Write Species Name:

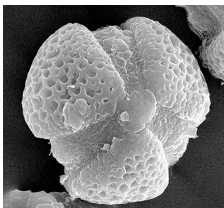
grass seed

Check Answers>>

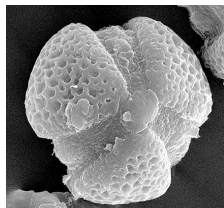
Species to Identify



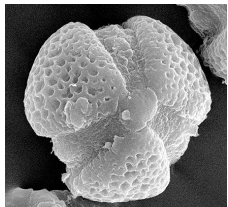
Aspen Pollen



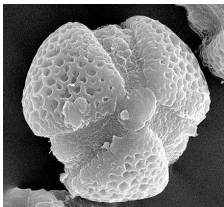
Oak Pollen



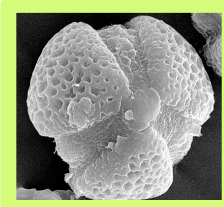
Pine Needle



Oak Seed



Sesame Seed



Pollen Key

Needle Key

Seed Key

1.a. The penguin has a blue gray back
Go to #2.

1.b. The penguin has a black back
Go to #3.

2.a. The flipper is bordered with white
on both edges

white-flipped penguin
Eudyptula albosignata

2.b. The flipper is bordered with white
only on the back edge

little blue penguin
Eudyptula minor albosignata

3.a. Stands under 31/2 feet tall
Go to #4.

3.b. Stands over 31/2 feet tall

Emperor Penguin
Aptenodytes forsteri

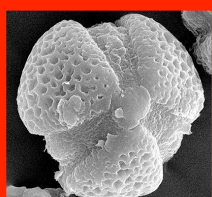
4.a. Yellow/orange markings on head
Go to #5.

4.b. No yellow/orange markings on
head
Go to #12

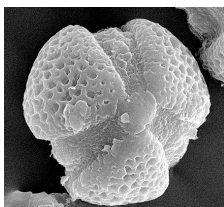
1. Identify Specimens

2. Review Correct Identifications

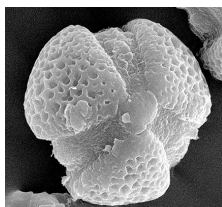
Answers



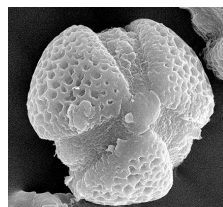
Tulip Pollen
Aspen Pollen



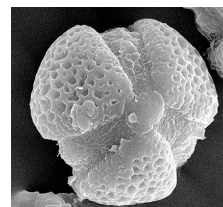
Oak Pollen



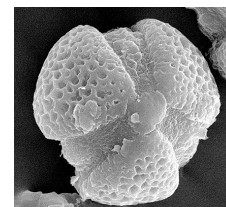
Pine Needle



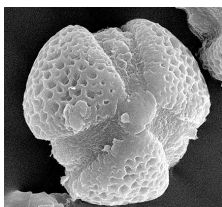
Birch Pollen



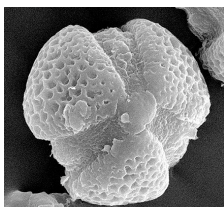
Poplar Pollen



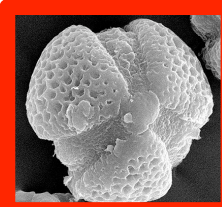
Spruce Needle



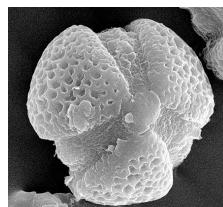
Oak Seed



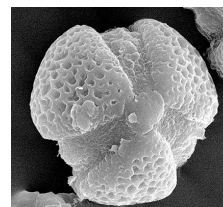
Sesame Seed



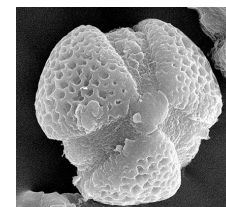
Grass Pollen
Ragweed Pollen



Petunia Pollen



Poppy Pollen

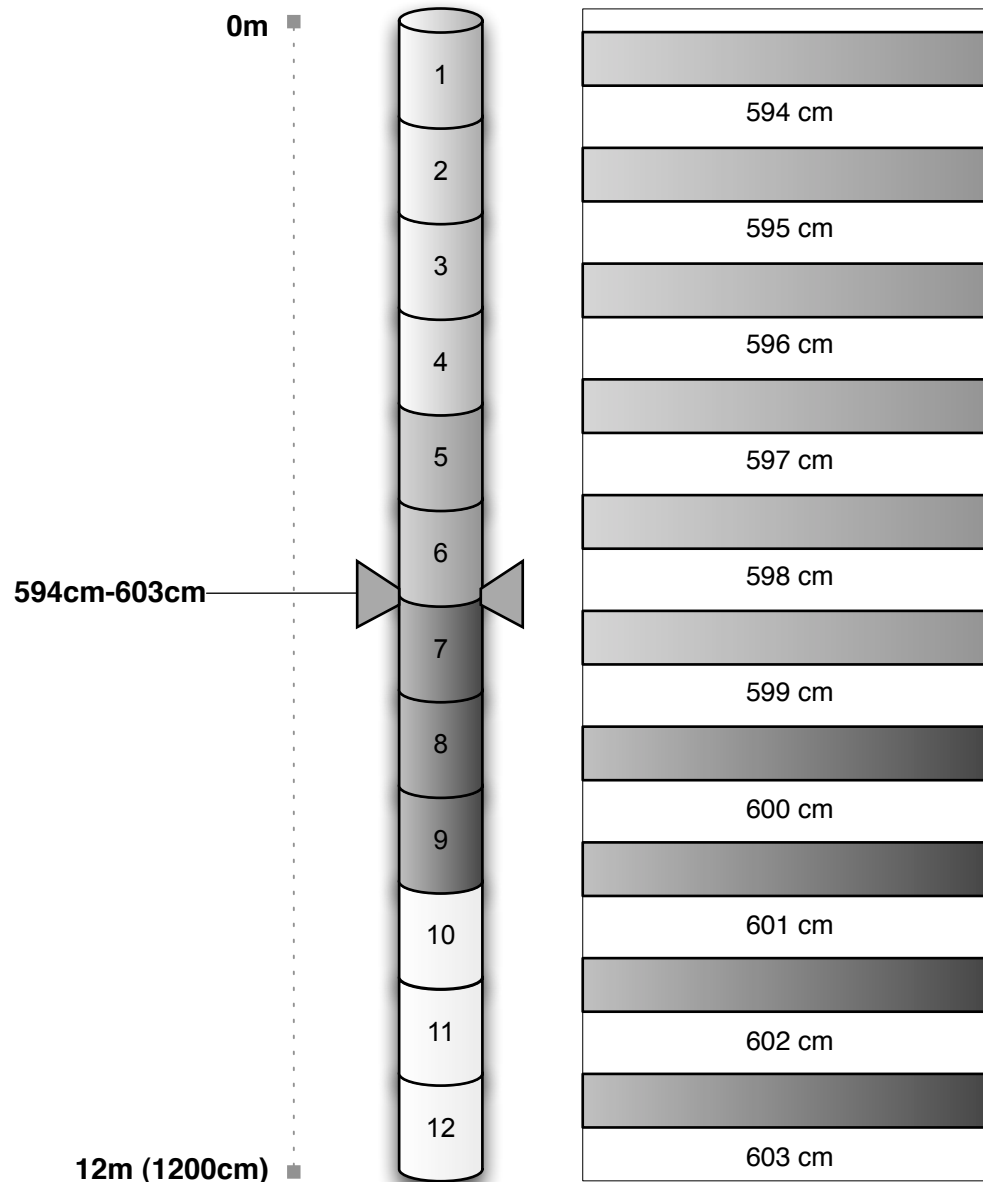


Ivy Seed

1. Explore Sediment Core

2. Select Sampling Intervals

3. Choose and justify an ideal interval



Step 1:

Explore the sediment core at left to find a sampling interval which will enable you to capture all relevant changes in the pollen record over time. You will be asked to justify your interval choice, as well as describe the history of the pond, at the end of this activity.

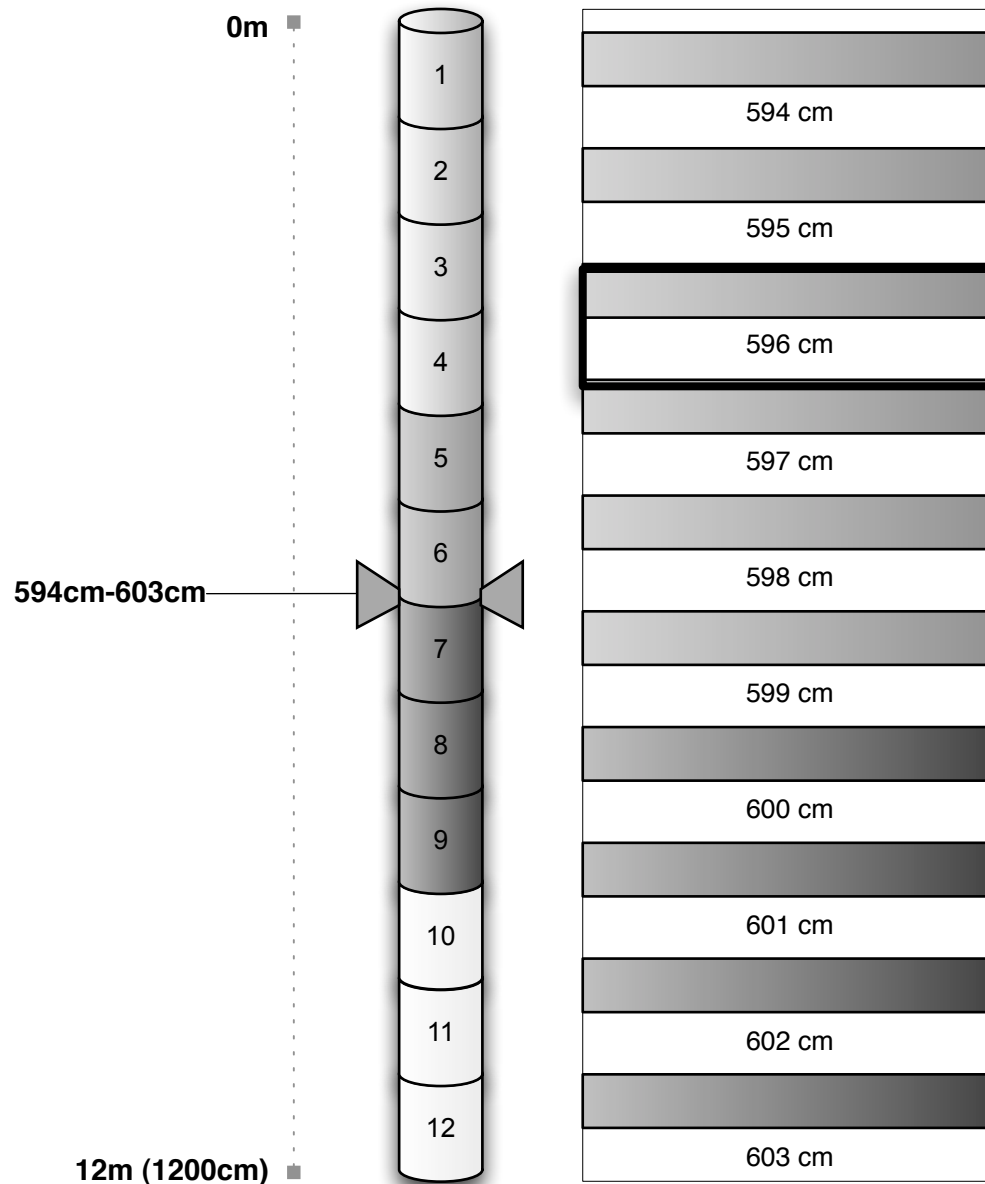
When you are ready to choose samples for "lab" analysis, click "Select Sampling Intervals" button below.

[Select Sampling Intervals >>](#)

1. Explore Sediment Core

2. Select Sampling Intervals

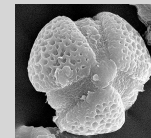
3. Choose and justify an ideal interval



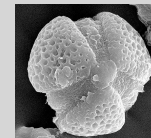
Sample Depth: 596cm

Sample base: mixed sand and clay

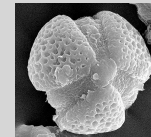
Specimens in this sample



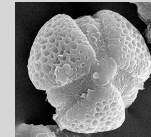
Oak Pollen:
450 grains



Spruce Pollen:
50 grains

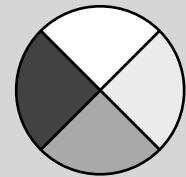


Grass Pollen:
10 grains



Pine Needle:
1 needles

Species breakdown



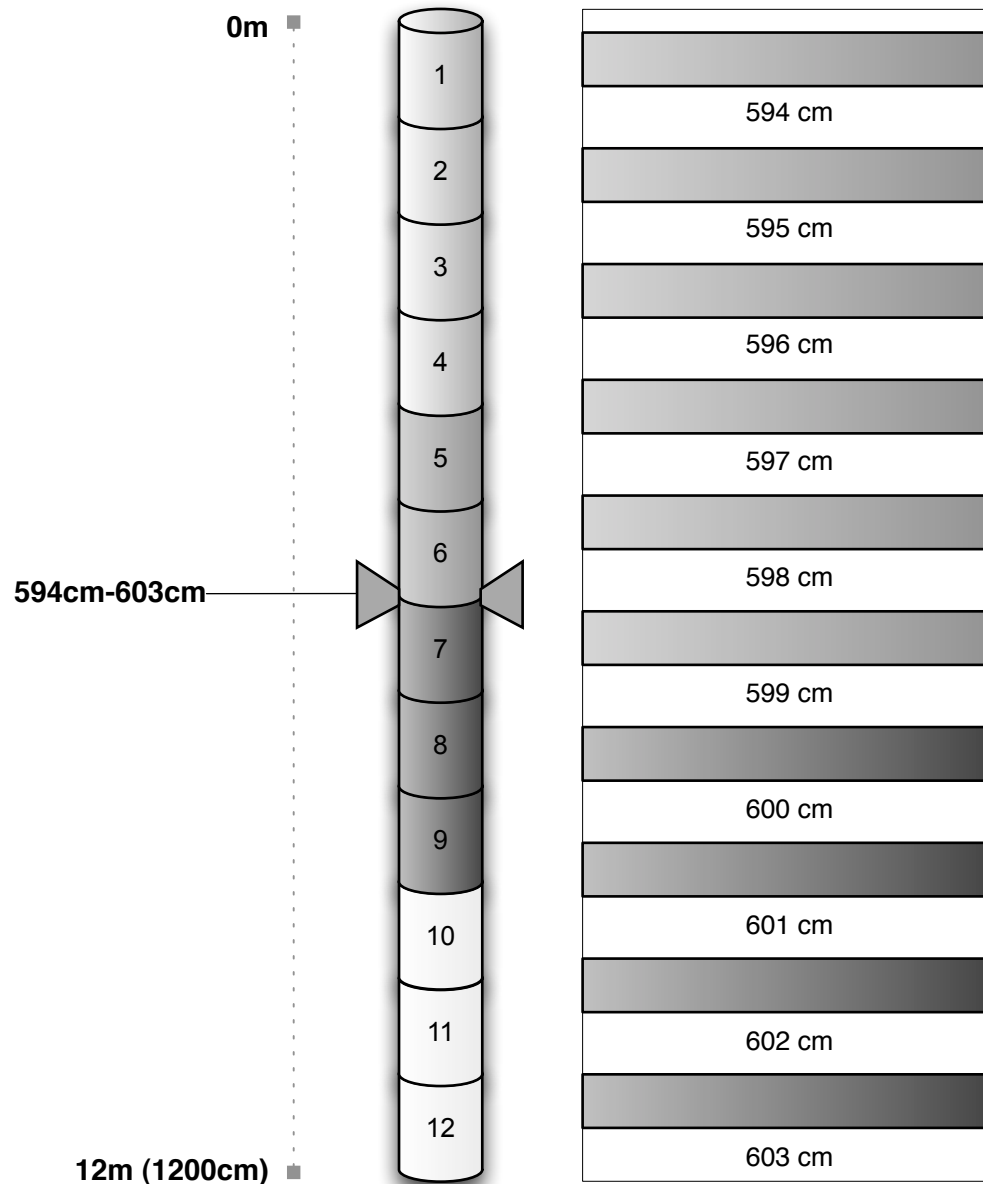
- ☐ **Oak Pollen:** 95%
- ☐ **Spruce Pollen:** 3%
- ☐ **Grass Pollen:** 1%
- ☐ **Other:** 2%

Select Sampling Intervals >>

1. Explore Sediment Core

2. Select Sampling Intervals

3. Choose and justify an ideal interval



Step 2:

Based on your previous exploration, choose intervals to sample. If you do not like your results, you may return to this step later.

When you are ready to submit samples to the "lab" for analysis, click "Run Sample" button below.

- Section 1:** Sample every cm
- Section 2:** Sample every cm
- Section 3:** Sample every cm
- Section 4:** Sample every cm
- Section 5:** Sample every cm
- Section 6:** Sample every cm
- Section 7:** Sample every cm
- Section 8:** Sample every cm
- Section 9:** Sample every cm
- Section 10:** Sample every cm
- Section 11:** Sample every cm
- Section 12:** Sample every cm

Reset

Run Sample>>

SAMPLING INTERVALS

- Section 1: Sample every 20 cm
- Section 2: Sample every 20 cm
- Section 3: Sample every 300 cm
- Section 4: Sample every 300 cm
- Section 5: Sample every 500 cm
- Section 6: Sample every 500 cm
- Section 7: Sample every 500 cm
- Section 8: Sample every 500 cm
- Section 9: Sample every 500 cm
- Section 10: Sample every 500 cm
- Section 11: Sample every 500 cm
- Section 12: Sample every 500 cm

SAMPLING SUMMARY

TOTAL # SAMPLES ANALYZED	23
SPECIES IDENTIFIED	5
TOTAL # SPECIMENS	215
RADIOCARBON AGE SPAN	200 YEARS

Reset

Export to CSV

Write Justification >>

SAMPLING DETAILS

SAMPLE #	SAMPLE DEPTH	RADIOCARBON AGE	OAK POLLEN	SPRUCE POLLEN	GRASS POLLEN	PINE NEEDLES	OTHER	TOTAL SPECIMENS
1	500cm (.5m)	8	22.3	xxx	xxx	xxx	xxx	xxx
2	1000cm (1m)	22	12	xxx	xxx	xxx	xxx	xxx
3	2200cm (2.2m)	3	4.7	xxx	xxx	xxx	xxx	xxx

4	2400cm (2.4m)	11	5	xxx	xxx	xxx	xxx	xxx
5	2600cm (2.6m)	12	45	xxx	xxx	xxx	xxx	xxx
6	2800cm (2.8m)	14	26.8	xxx	xxx	xxx	xxx	xxx
7	5000cm (5m)	2	132	xxx	xxx	xxx	xxx	xxx
8	10000cm (10m)	0	0	xxx	xxx	xxx	xxx	xxx
9	12000cm (12m)	5	12.5	xxx	xxx	xxx	xxx	xxx
23	1250cm (12.05m)	1	67	xxx	xxx	xxx	xxx	xxx
TOTAL: 10	TOTAL: 10	78	54.4	xxx	xxx	xxx	xxx	xxx



FOR DISCUSSION:

Referencing the data from your sediment sampling, describe the history of this pond as indicated by relevant pollen changes over time. Describe your thought process for choosing and settling on the intervals you selected for sampling. How did your choices affect...

[Complete Module](#)

SAMPLING INTERVALS

- Section 1:** Sample every cm
- Section 2:** Sample every cm
- Section 3:** Sample every cm
- Section 4:** Sample every cm
- Section 5:** Sample every cm
- Section 6:** Sample every cm
- Section 7:** Sample every cm
- Section 8:** Sample every cm
- Section 9:** Sample every cm
- Section 10:** Sample every cm
- Section 11:** Sample every cm
- Section 12:** Sample every cm

SAMPLING SUMMARY

TOTAL # SAMPLES ANALYZED	23
SPECIES IDENTIFIED	5
TOTAL # SPECIMENS	215
RADIOCARBON AGE SPAN	200 YEARS

[Reset](#)[Export to CSV](#)[Write Justification >>](#)

SAMPLING DETAILS

SAMPLE #	SAMPLE DEPTH	RADIOCARBON AGE	OAK POLLEN	SPRUCE POLLEN	GRASS POLLEN	PINE NEEDLES	OTHER	TOTAL SPECIMENS
1	500cm (.5m)	8	22.3	xxx	xxx	xxx	xxx	xxx
2	1000cm (1m)	22	12	xxx	xxx	xxx	xxx	xxx
3	2200cm (2.2m)	3	4.7	xxx	xxx	xxx	xxx	xxx
4	2400cm (2.4m)	11	5	xxx	xxx	xxx	xxx	xxx
5	2600cm (2.6m)	12	45	xxx	xxx	xxx	xxx	xxx
6	2800cm (2.8m)	14	26.8	xxx	xxx	xxx	xxx	xxx
7	5000cm (5m)	2	132	xxx	xxx	xxx	xxx	xxx
8	10000cm (10m)	0	0	xxx	xxx	xxx	xxx	xxx
9	12000cm (12m)	5	12.5	xxx	xxx	xxx	xxx	xxx
23	1250cm (12.05m)	1	67	xxx	xxx	xxx	xxx	xxx
TOTAL: 10	TOTAL: 10	78	54.4	xxx	xxx	xxx	xxx	xxx