VI. FOREST MONITORING STUDY SHEET

The forest ecosystem involves interactions between many different components. Different parts of the ecosystem, and interactions between them, can be used as indicators of ecosystem health.

When forest scientists and managers check on forest health over a period of time they find out if the forest is improving, is stable or is declining in overall health.

This is called **forest monitoring**.

People involved in forest monitoring are careful with the checks they do so that the information is accurate enough to be used to make good management decisions. For example, monitoring will be carried out on trees that are known to be favourite foods of possums, before and after a possum control programme is implemented. Results will tell if the programme was successful or not and when and what type of control, if any, will be best in the future. This enables cost effective management practises to be put in place.

For the purposes of this exercise several monitoring techniques can be tried. The methods given are not as precise as those used by scientists, however they provide good practice models.

The Foliar Browse Index Sheet, examples of insect and possum damaged leaves and the Foliar Cover Scale are given on pages 39 to 41.

For back at school ***for*** and ***about*** the environment activities, refer to the front section (pages 7 and 8).

Foliar Browse Index Sheet

Foliage Cover
From the **Foliage Cover Scale** (page 41) select the square which most closely resembles the foliage cover of the canopy.

Dieback
The conspicuous presence of dead branches or branchlets over the whole of the canopy.
Record dieback as:

0	No dieback	affecting <5% of the canopy
1	Light	affecting 5-25% of the canopy
2	Moderate	affecting 26-50% of the canopy
3	Heavy	affecting 51-75% of the canopy
4	Severe	affecting >75% of the canopy

Browse
The proportion of possum-browsed leaves (**or** in the case of small-leaved species such as totara, the severity of possum-related **hedging***) averaged over the whole canopy.

0	Nil	no browsed leaves **or** no possum-related hedging
1	Light	5-25% browsed **or** lightly hedged
2	Moderate	26-50% leaves browsed **or** moderately hedged
3	Heavy	51-75% browsed **or** heavily hedged
4	Severe	76-100% browsed **or** severely hedged

* Trees showing signs of possum-induced hedging will have little of the current season's growth remaining.

Use
Recent possum use of the lower 2m of the trunk or stem. Record as:

0	Nil	no scratching or bite marks on the trunk
1	Light	occasional scratch and bite marks
2	Moderate	numerous clearly defined scratch and bite marks
3	Heavy	bark worn smooth, evidence of a well developed possum "run"

Flowering and Fruiting
Look for the presence of flowers and fruit.

Insect vs Possum Damaged Leaves

Northern Rata

Insect damage

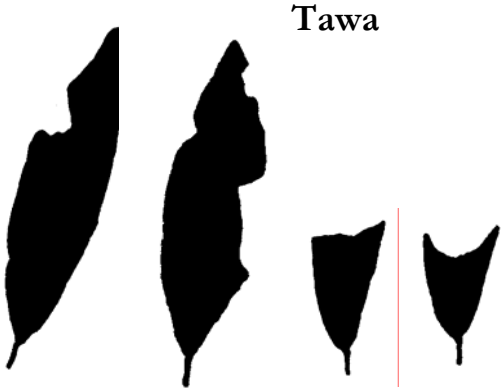
Possum damage

Kamahi

Insect damage

Possum damage

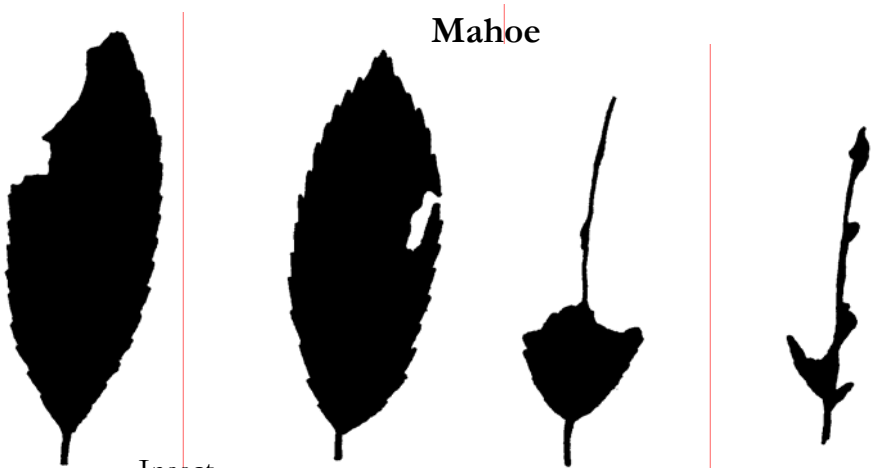
Tawa



Insect damage

Possum damage

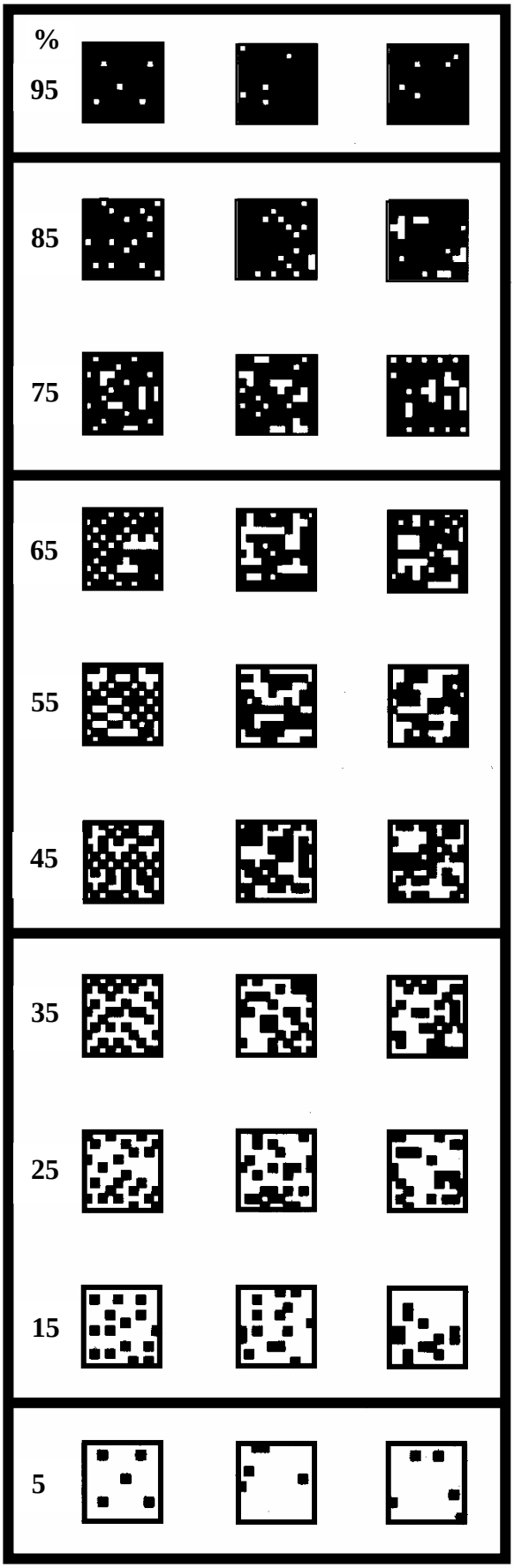
Mahoe



Insect damage

Possum damage

Foliage Cover Scale



FOREST MONITORING RECORDING SHEET

Attach to Clipboard

Name: _____ Date: _____

Location: _____

Which trees are you studying? _____

Foliar Browse Index:

	Tree 1	Tree 2	Tree 3
• Dieback	_____	_____	_____
• Browse	_____	_____	_____
• Stem Use	_____	_____	_____

Foliage Cover Scale
Write down the percentage cover for your study trees.

Tree 1 _____ Tree 2 _____ Tree 3 _____

What birds have you seen during the fieldwork? Species most likely to be seen are: fantail, grey warbler, tui, kereru (pigeon), wax-eye, magpie, rosella, blackbird, shining cuckoo.

_____

_____

_____

_____

VII. TEACHER STUDY SHEET – BAT MONITORING

Long-tailed bats are found in the Waitomo district. They are not common but are not yet endangered as are the short-tailed bat.

long-tailed bat

short-tailed bat

More information is needed about where long-tailed baits live in Waitomo, how common they are, when they hibernate and what time of day they emerge to feed. The information your survey gathers will help answer some of these questions.

Bats navigate when flying in the dark by echolocation. They use their voice to emit sounds that bounce off solid objects and reflect back to the bats ears. This enables the bat to build up a near instantaneous picture of the environment along and around its flight path. The sounds are too high in pitch for humans to hear.

People locate bats by changing the bats voice into sounds we can hear using "bat detectors".

Remember to *book* the pack with the Waitomo Caves Museum.
Tel: 07-878-7640 or fax: 07-878-6184.

- Collect bat packs from the Waitomo Caves Museum. The pack contains 5 detectors (keep one as a reserve). Photocopy the map/recording sheet from this kit for each of the four groups.
- Before using, check that the bat detectors are working. Hold your hand out in front of the detectors and slap your thumb and forefinger together. The sound you make will be heard on the detector. Bats make a similar sound.
- Begin the survey from the top car park 30 minutes before sunset. Sunset can be found in the current daily newspaper, included with weather details.
- Use rubber bands to attach red cellophane to all torches (red light does not scare animals). Not all group members need a torch, one between two will be sufficient.

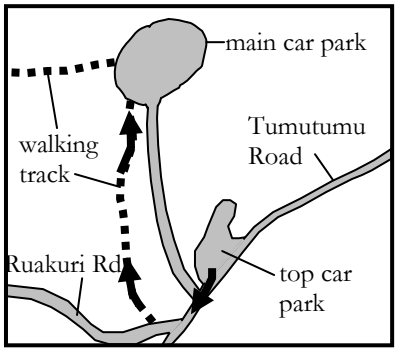
Use these references to research N.Z. bats:
"The Natural World of N.Z." Gerard Hutching
www.learnz.org.nz
www.batcon.org/batsmag/v2n3

Park at the top car park (Tumutumu Road) 50 minutes before sunset, so that groups are ready to begin their recording 30 minutes before sunset.

The survey will take about 2 hours so the group should be back at the car park about 15 minutes after it is completely dark.

- Divide the class into four groups with an accompanying adult in charge. Each group will have a map/recording sheet, a watch and a bat detector. There will be a spare bat detector in case of malfunctions.

- Set the frequency dial on bat monitor to 40 kHz.



- Groups leave at two-minute intervals. Walk from the top car park to Ruakuri Road. Approximately 100 metres along Ruakuri Road turn right down the forest path to the kiosk picnic area. Groups one and three do the walk taking left hand turns at each track junction. Groups **two** and **four** take **right** turns at each junction.

- Groups one and **two** go first, groups three and **four** wait fifteen minutes doing surveys around the lower car park and picnic area, then they move off.

- Each group will stop at the sites marked on the map for ten minutes, switch detectors on and record any sounds made by bats. This means each group will have four stops of ten minutes each and will cover all the sites. Switch detectors off between sites. If groups meet at a site, combine.

- Groups one and **two** will arrive back first and they will survey the lower car park and picnic area while waiting for groups three and **four**.

- Walk back up the bush track past the toilets to Ruakuri Road and the cars.

The bat monitoring sites marked on the map on the following page are:

1. Natural bridge tunnel exit.
2. Natural bridge tunnel entrance.
3. Side tunnel entrance (on the bend by the viewing platform entrance).
4. The track between the tunnel exit and the swing bridge.

BAT MONITORING RECORDING SHEET

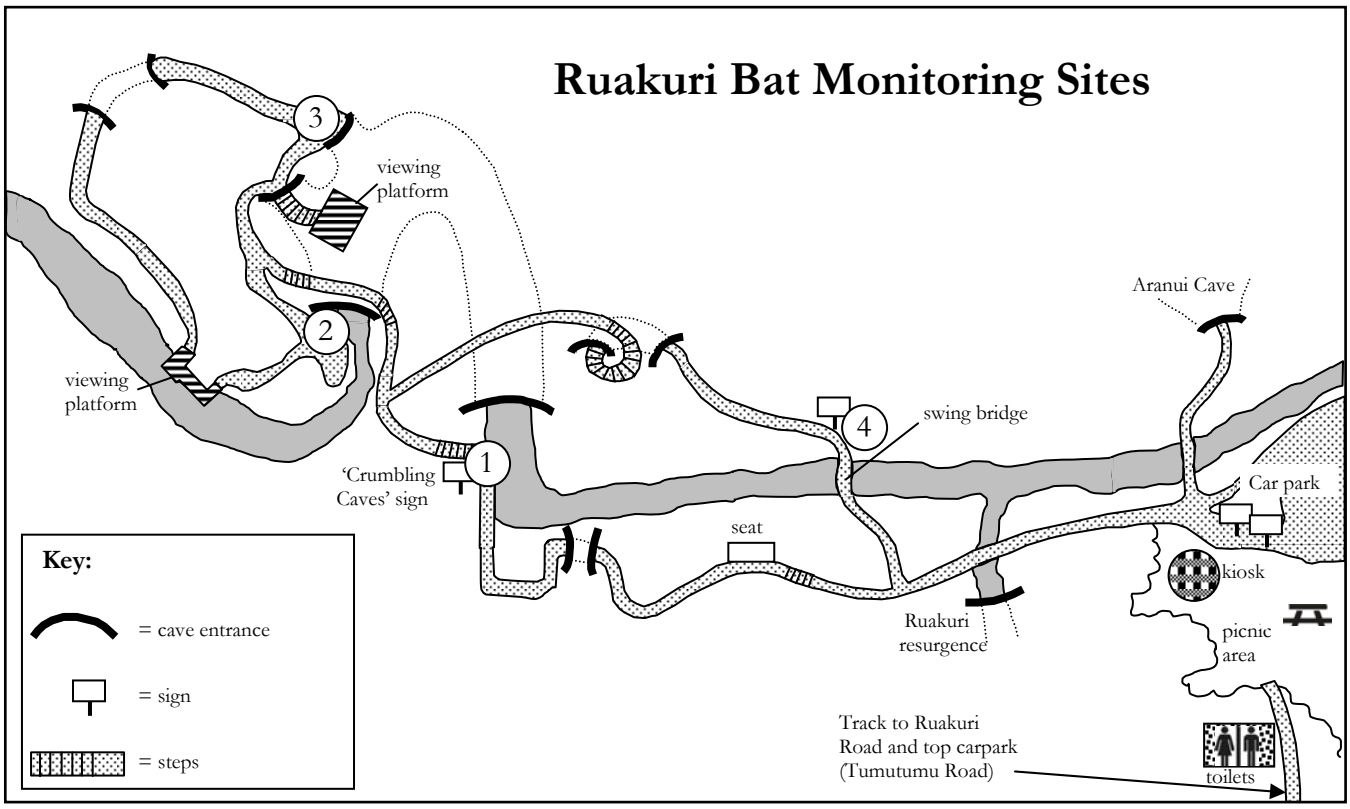
The education office at Waitomo Museum of Caves will photocopy the recording sheets, so they can load the information into a database to be accessed from their webpage. Ensure the Museum gets a copy of the recording sheets, even if no bats were detected - a nil return is important too.

School: _____

Teacher: _____

Date: _____ **Sunset:** _____

Weather: _____ (eg. fine, windy, showers, cloudy)



Bat Monitoring Site (1) **Natural Bridge Tunnel Exit**

Times: _____ to _____ No. of bats heard/seen: _____

Bat Monitoring Site (2) **Natural Bridge Tunnel Entrance**

Times: _____ to _____ No. of bats heard/seen: _____

Bat Monitoring Site (3) **Side Tunnel Entrance**

Times: _____ to _____ No. of bats heard/seen: _____

Bat Monitoring Site (4) **Along Track after swing bridge**

Times: _____ to _____ No. of bats heard/seen: _____

- Remember to keep together and stay as quiet as possible.
- Record for 10 minutes at each site.
- Take care on the track.
- Enjoy the glow-worms.

OTHER REFERENCES AND RESOURCES

Crowe, A. 1997. Life-size Guide to Native Trees. Penguin. New Zealand.

Department of Conservation. Mangakara Nature Walk Guide. Waikato Conservancy. Hamilton.

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Hanford, P. 2000. Native Forest Monitoring: A guide for forest owners and managers. Forme Consulting Group Ltd. Wellington.
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