

Puketi Forest Trust

Kokako Sound Recorder Survey 2019

24 AR4 sound recorders were lent to Puketi Forest Trust by DOC in spring 2019 for a survey of kokako in Puketi Forest. The recorders were set out in the forest for periods of 7 to 13 days from August to October, as detailed in Table 1. The recorders were set to record for 2.5 hours, starting 10 to 30 minutes before sunrise, in the 'low' mode (0 – 4kHz). Recorder locations are shown in Figure 1.

Table 1: Deployment of recorders

Dates (2019)	Location	Number of recorders	Time of sunrise	Recording period	Dates Analysed
30 Aug – 11 Sept	South half of plateau	11	0646 – 0629	0630 - 0900	30 Aug – 02 Sept
31 Aug – 11 Sept	North half of plateau	12	0646 – 0629	0630 - 0900	31 Aug – 02 Sept
17 – 23 Sept	NE of plateau, to Bramley's/Totara Ridge	24	0620 - 0611	0600 - 0830	17, 20, 22, 23 Sept
02 – 08 Oct	Mangahorehore Ridge	7	0658 – 0650 (daylight saving)	0630 - 0900	05 – 08 Oct

Recorders were put out firstly in late August to cover the plateau where the kokako were released and where they have been encountered since, and ridges to the west. They were then set out in September on high ground to the northeast of the plateau, in locations where kokako historically held territories and where kokako released in 2012 spent brief periods before they settled on the plateau. Most of the recorders had to be returned to DOC at the end of September, but 7 were kept longer and were set out in October on Mangahorehore Ridge, which historically had resident kokako and recently had unconfirmed reports of possible kokako song.

After retrieval of the recorders, a preliminary review of the recordings was made to select the four most suitable days for detailed examination. During most of the first period, 31 August to 11 September, the weather was wet and windy. Only 30 August to 2 September were useable and even then, the morning of 31 August had continuous light rain. The selected recordings were placed in Dropbox and trust volunteers went through them one by one.

The open source sound editing program Audacity <https://www.audacityteam.org/> was used for analysis. Detailed instructions for using Audacity to analyse the recordings were also placed on Dropbox. The sound files, recorder location maps and instructions can be found at:

<https://www.dropbox.com/sh/o9vw6n06447h9by/AAAONwj9QQQ9i1BqnAft-infa?dl=0>

The AR4 recorders store recordings in 15 minute .wav files. Volunteers went through each file and recorded on a spreadsheet the times of kokako calls and their loudness on a subjective scale of faint – medium – loud. Audacity displays a spectrogram of the sound recording and with practice the graphical shape of a kokako call can be recognised, so that about 10 hours of recording can be processed per hour of review.

Several spectrograms can be viewed together on Audacity. Selected sound files in which kokako calls had been identified by the volunteers, from the same time but different recorders, were compared in this manner to determine whether the calls on different recorders were from the same or different birds. This procedure was repeated for different combinations of recorders to establish the rough locations where calls originated.

Results

Kokako calls were only found in recordings from the plateau, during the period 30 August – 2 September. These locations are coloured blue in Figure 1 and shown on a larger scale map in Figure 2. A condensed list of the calls that were recorded is given in Table 2.

Comparison of calls from different recorders showed that the recorders can pick up kokako calls from at least a kilometre away on a calm morning with a clear line of sight. An example of spectrograms illustrating this for NNI 29, NNI 16, NNI 25 and NNI 27 is shown in Figure 4. The times of calls on the four recorders are displaced by a few seconds due to differences in the setting of the recorder timers and the sound travel time (300 m/sec).

There is no high ground between NNI 29 (close to the source) and the other recorders in this group. By contrast, there is little cross-recording between NNI 29 and NNI 11, which are only 450m apart but separated by a slight rise and dense forest over most of this distance.

Comparison of spectrograms also allowed some very faint calls to be identified in outlying recorders that had not been found in the initial review.

Interpretation suggests that the recorded calls originated from 6 locations, shown on Figure 3. These locations are consistent with kokako residence locations identified in previous surveys.

Discussion

AR4 recorders are sensitive detectors of kokako calls, but manual processing of sound files is time consuming. Development of software to automate analysis of the recordings could make this a useful tool to assist kokako management.

Acknowledgements

The recorders used for this survey were lent to Puketi Forest Trust by Tertia Thurley (DOC Whangarei) and Cinzia Vestena (DOC Bay of Islands).

Procedures used in the survey were based on advice from Eric Wilson of the Ark in the Park project, Waitakere.

Recorders were set out in the forest and retrieved by Grant Adams and Kenny Whittaker.

Recordings were reviewed by Jill Mortensen, Grant Adams, Ian Wilson and John Dawn.

Report by John Dawn, February 2020.

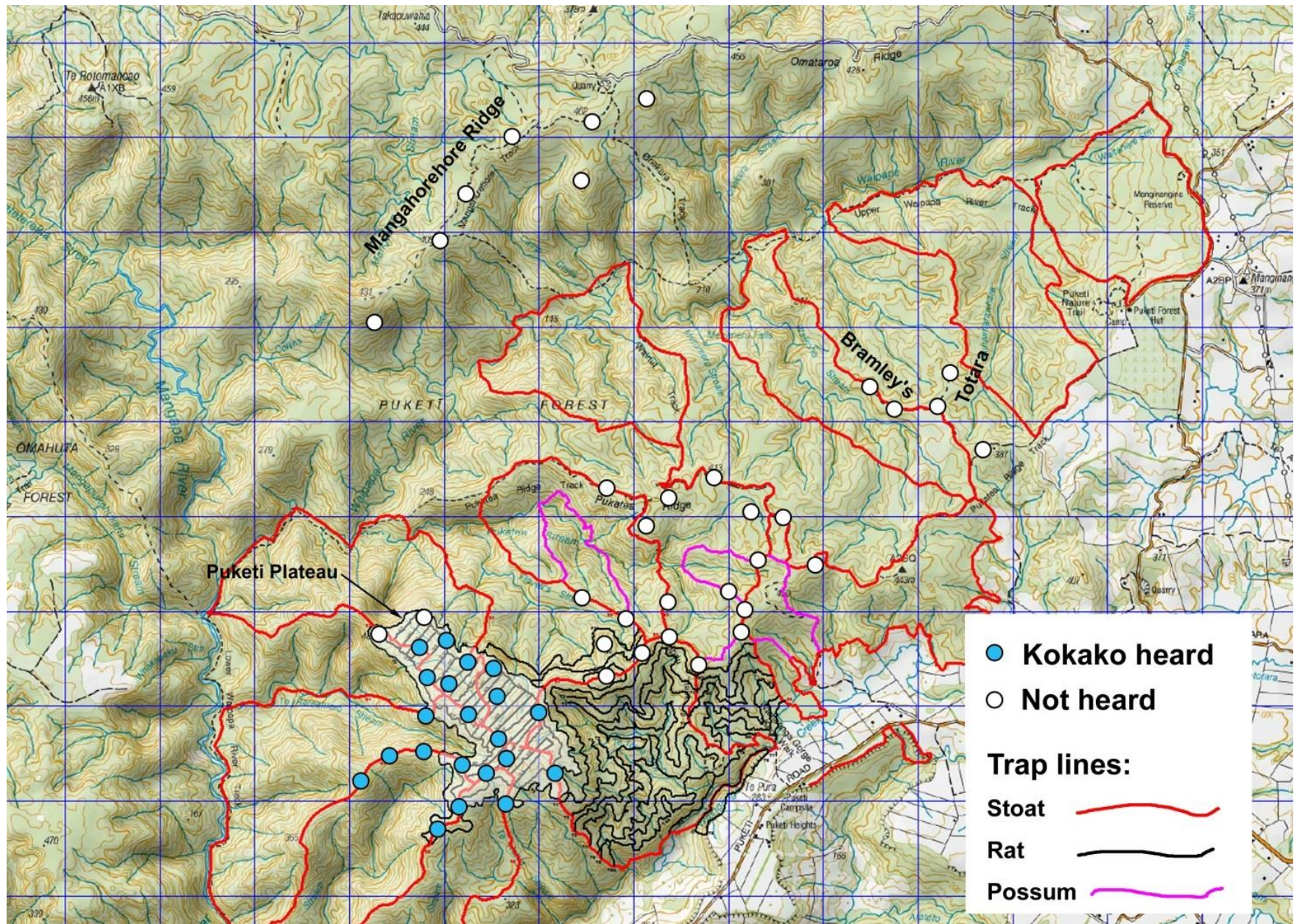


Figure 1: Locations of sound recorders in Puketi Forest, August – October 2019

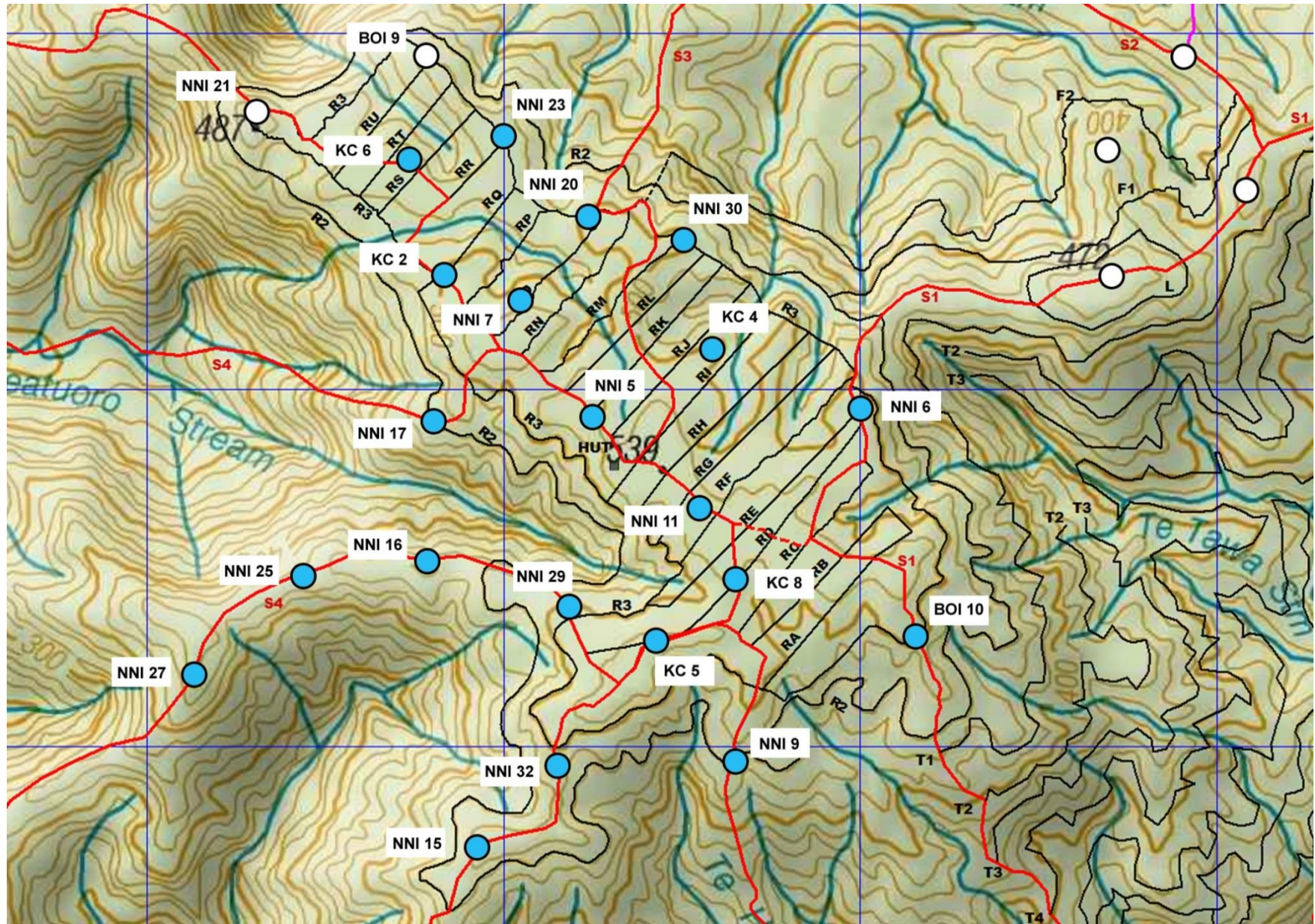


Figure 2: Locations of recorders on the Puketi plateau.

Labelled recorders were in place 30 August – 11 September 2019. Blue dots indicate that kokako calls were recorded at those locations.

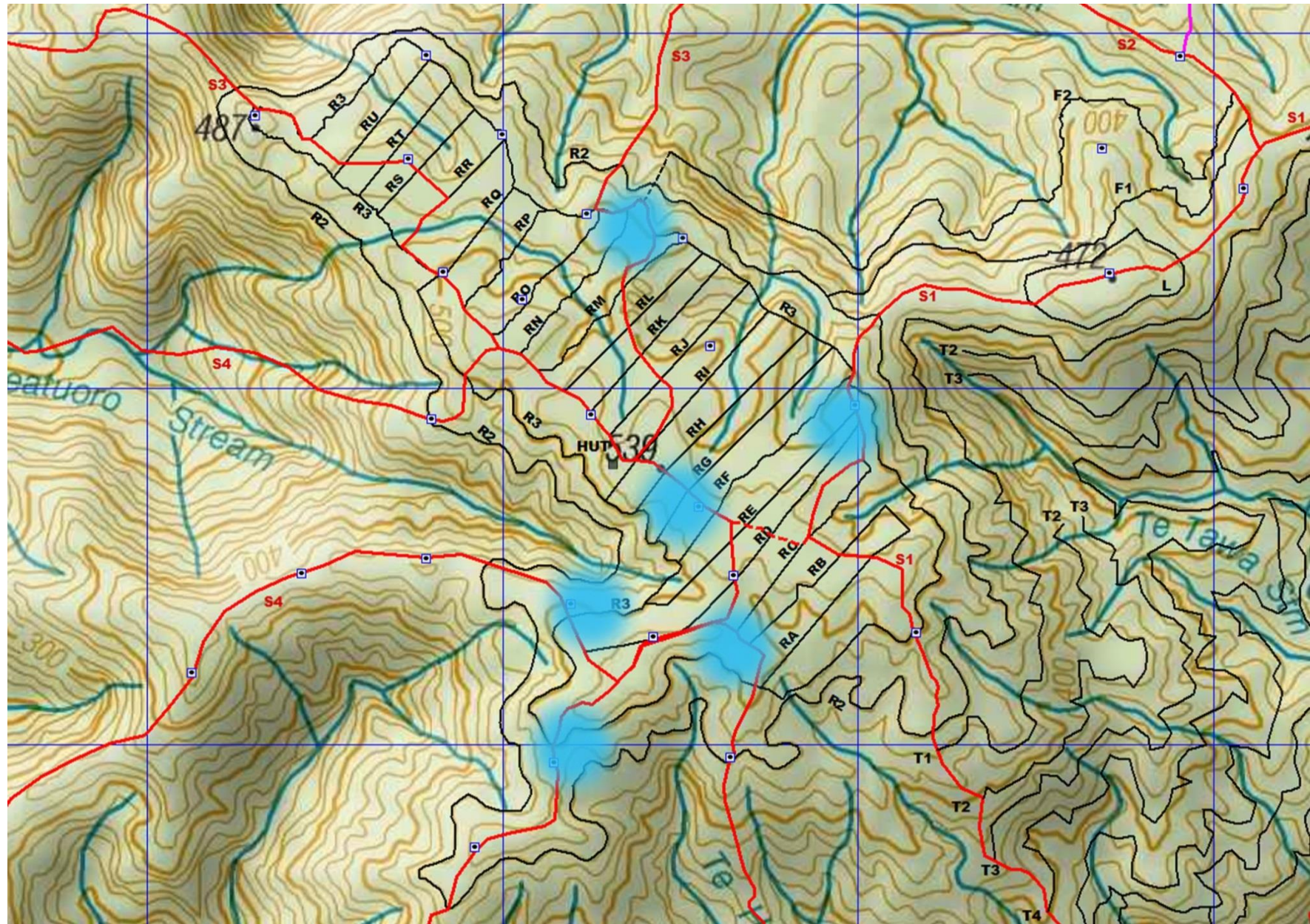


Figure 3: Interpreted locations of kokako call origins recorded 30 August – 2 September 2019.

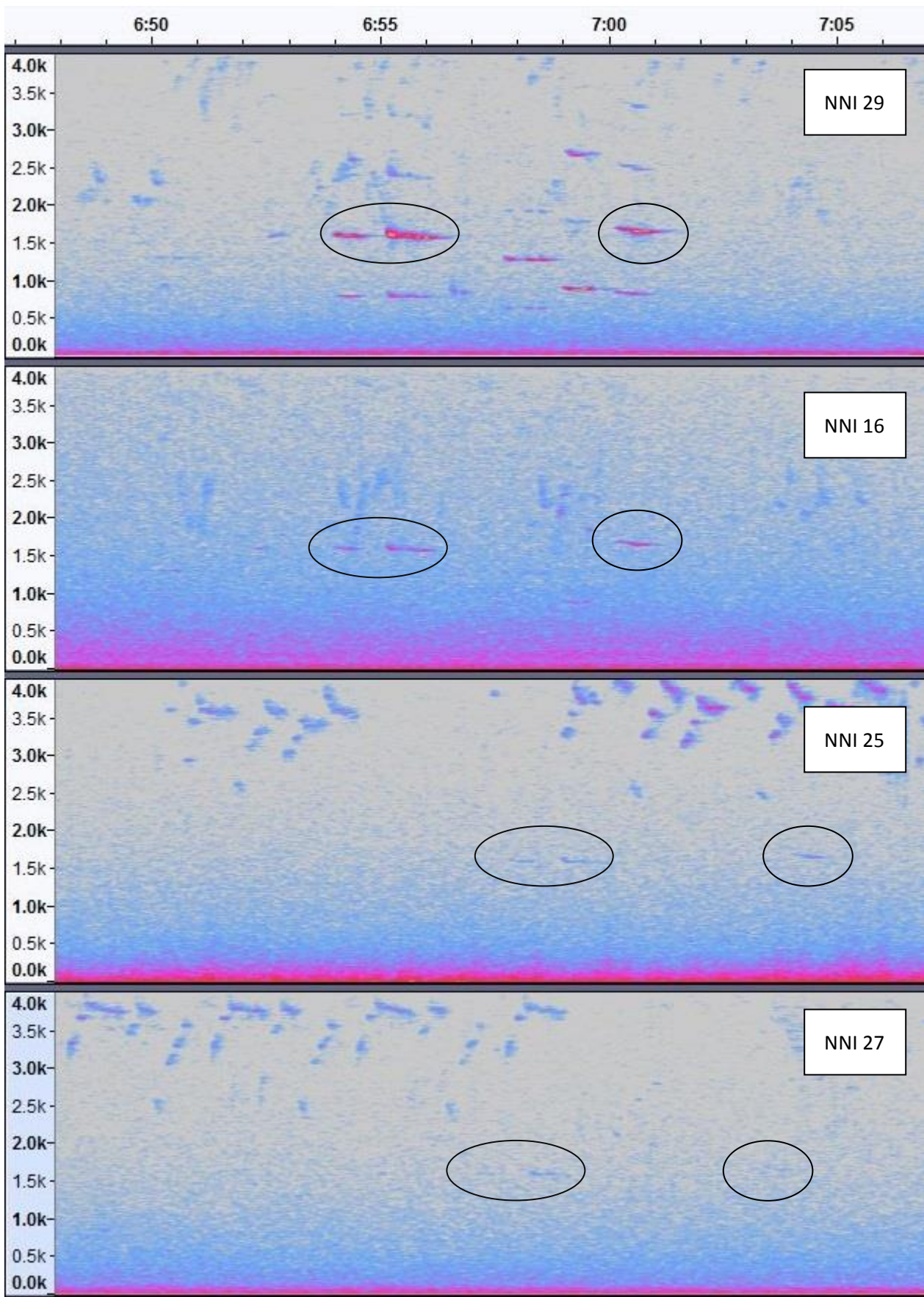


Figure 4: Comparison of spectrograms from 4 recorders at 0645 on 2 September 2019.

The circled calls are loud (close) at NNI 29 and medium, faint and very faint at NNI 16, NNI 25 and NNI 27 respectively. The 3 latter recorders are 0.42, 0.75 and 1.07 km respectively from NNI 29.

X axis: time (minutes:seconds) from start of recording. Y axis: sound frequency (Hz).

Table 2: Recordings in which kokako calls were found.

File name is the date and time at the start of recording in the format yyyyymmdd_hhmmss, with extension .wav (not shown). Start and end times are in minutes and seconds (mmss) from the start of the recording.

Recorder Name	File Name	Start time	End time	Notes
BOI 10	20190830_063004	0022	1404	faint
	20190830_064505	0059	0707	faint
	20190830_070005	1222	1227	faint
	20190830_074505	0331	0957	faint - medium
	20190831_063003	0026	0645	faint
	20190831_064504	0106	1014	faint
	20190902_064504	0210	0631	faint - medium
KC 2	20190901_063003	1434		very faint, same call as NNI 20/NNI 30
KC 4	20190901_063003	1434		very faint, same call as NNI 20/NNI 30
KC5	20190830_063003	0002	1457	medium
	20190830_064504	0009	1421	faint - medium
	20190830_070004	0017	1226	faint - medium
	20190830_071504	0208	0259	very faint
	20190830_074504	0843	0955	faint
	20190830_081504	0633	0753	faint. occasional short calls
	20190830_083004	0733	0844	faint - medium
	20190831_063003	0009	1500	medium - loud
	20190831_064504	0041	1416	medium
	20190901_063003	0134	1500	medium - loud
	20190901_064504	0033	0849	faint - loud
	20190901_070004	0226	1447	faint - loud
	20190901_071504	0021	1447	medium - loud
	20190901_073004	0001	1452	medium - loud
	20190901_081504	0242	1455	faint - medium
	20190901_083004	0007	0512	faint - medium
	20190902_063003	1019	1457	faint - loud
	20190902_064504	0006	1445	faint - loud
	20190902_070004	0027	1500	medium - loud
	20190902_071504	0032	0454	faint - loud
20190902_083004	1223	1454	faint - medium	
20190902_084504	0003	0803	faint - medium	

Table 2 (continued): Recordings in which kokako calls were found.

Recorder Name	File Name	Start time	End time	Notes
KC 6	20190901_063004	1434		very faint, same call as NNI 20/NNI 30
KC8	20190830_063003	0003	1457	faint - medium
	20190830_064504	0015	1107	faint
	20190831_063003	0005	1500	faint - medium
	20190831_064504	0043	1333	faint - medium
	20190901_063003	0032	1500	faint
	20190901_064504	0106	0708	faint
	20190901_070004	0245	1448	faint
	20190901_071504	0058	1448	faint - medium
	20190901_073004	0010	1453	faint - medium
	20190901_074504	0045		faint. single call
	20190901_080004	0248	0301	medium
	20190901_081504	0004	1500	faint - medium
	20190901_083004	0007	0237	faint
	20190902_063003	0556	1457	faint - medium
	20190902_064505	0006	1444	faint - medium
	20190902_070005	0026	0554	faint - medium
20190902_071505	0105	0335	faint - medium	
NNI 5	20190831_063004	1129	1449	very faint
	20190831_064504	0005	1358	faint - medium
	20190831_070004	0031	0410	faint
	20190901_063004	0011	1500	faint
	20190901_064504	0106	0747	faint
	20190901_070004	0610	1447	faint
	20190901_071504	0027	0850	faint
	20190902_063004	0526	1415	faint - medium
	20190902_064504	0007	0840	faint
NNI 6	20190831_063004	0301	1456	faint - medium
	20190831_064504	0002	1400	faint - medium
	20190831_070004	0204	0738	faint - medium
	20190901_063004	0000	0830	faint - medium
	20190901_064504	0210	0635	faint - loud
	20190901_070004	0642	0707	faint

Table 2 (continued): Recordings in which kokako calls were found.

Recorder Name	File Name	Start time	End time	Notes
NNI 7	20190901_063004	0708	1437	very faint, same calls as NNI 20/NNI 30
NNI 9	20190830_063004	0257	1500	faint - loud. possibly 3 birds
	20190830_064504	0006	1500	loud
	20190830_070004	0014	1225	faint - loud
	20190830_071504	0217	0452	loud
	20190830_073004	0525		faint
	20190831_064504	0215	1309	medium - loud
	20190901_063004	0021	1500	faint - loud. 2 birds, one close one distant
	20190901_064504	0040	0841	faint - loud
	20190901_070004	0241	0815	faint - medium. 2 birds
	20190901_071504	0024	1444	faint - medium. 2 birds
	20190901_073004	0006	0344	faint
	20190901_081504	0437	1447	faint. 2 birds
	20190901_083004	0042	0702	faint - medium
	20190902_064504	0003	1241	medium
	20190902_070004	0208	1500	faint - medium. 2 birds
	20190902_071504	0218	0332	faint
NNI 11	20190830_063004	0005	1500	faint - medium
	20190830_064504	0004	1110	faint - medium
	20190831_063004	1019	1451	faint - medium
	20190831_064504	0003	0600	faint
	20190901_063004	0000	1456	faint - loud
	20190901_064504	0001	0840	faint - loud
	20190901_070004	0231	1459	faint - loud
	20190901_071504	0013	1451	faint - loud
	20190901_073004	0149	1455	faint - medium
	20190901_081504	0755	1459	faint - medium
	20190901_083004	0011	0516	faint - medium
	20190902_063004	1011	1420	faint - medium
	20190902_064504	0001	1456	faint - medium
	20190902_070004	0036	1219	faint - medium
	20190902_071504	0110	0340	faint

Table 2 (continued): Recordings in which kokako calls were found.

Recorder Name	File Name	Start time	End time	Notes
NNI 15	20190830_064504	0412	1103	faint
	20190901_063004	0011	1428	faint - medium
	20190901_070004	0534	1415	faint
	20190901_071504	0243	0554	very faint
	20190901_081504	0129		very faint
	20190902_063004	1408	1416	very faint
	20190902_064504	0638	0842	faint
NNI 16	20190830_063004	0011	1453	very faint
	20190830_064504	0421	1105	faint - medium
	20190830_070004	1005		faint
	20190831_063004	1128		medium
	20190831_064504	0238		faint
	20190901_063004	0009	0658	faint - medium
	20190901_064504	0113	0748	medium. 2 birds dueting. Mewing at 0454.
	20190901_070004	0613	1446	faint.
	20190901_071504	0000	1051	medium
	20190901_073004	0424	1342	medium
	20190901_081504	1232	1500	medium
	20190901_083004	0006	0511	medium
	20190902_063004	1235	1414	medium
	20190902_064504	0000	0951	medium. 2 birds, one further away
NNI 17	20190831_063004	1001	1447	medium
	20190831_064504	0051	0240	medium
	20190901_063004	0213	0522	faint - medium
	20190901_064504	0259	0701	medium
	20190901_070004	0705	1449	faint - medium
	20190901_071504	0048	0850	medium
	20190901_073004	0640	1018	medium. some mewing
	20190901_083004	0006	0511	faint - loud. 2 birds. Same as NNI 29.
	20190902_063004	1304	1414	loud. 2 birds? Same as NNI 29.
	20190902_064504	0000	0840	faint - loud. 2 birds, one quite close, one far away. Some mewing.
	20190902_071504	0333		faint (distant)

Table 2 (continued): Recordings in which kokako calls were found.

Recorder Name	File Name	Start time	End time	Notes
NNI 20	20190831_063004	1417	1423	very faint
	20190831_073004	0600		very faint. possible call
	20190901_063004	0708	1323	faint
	20190901_064504	0143	0149	faint
	20190902_064504	0124		very faint, possible call
NNI 23	20190901_063004	0710	1446	very faint, same call as NNI 20
NNI 25	20190830_063004	0136		faint, possible call
	20190830_064504	0635	1108	faint - medium
	20190830_070004	0505	0713	faint
	20190901_063004	0215	1411	faint - medium
	20190901_064504	0047	0712	medium
	20190901_070004	0837	1247	faint - medium, much closer
	20190901_071504	0115	1231	faint - medium. occasional calls
	20190901_073004	0335	0907	faint
	20190901_081504	1422		medium
	20190901_083004	0010	0016	faint, mewing - and again at 0432
	20190902_064504	0029	0843	faint - medium
NNI 27	20190901_0645	0301	0854	very faint
	20190901_071504	0335	0826	faint
	20190901_073004	0643	0754	very faint
	20190902_063004	1410	1417	faint
	20190902_064504	0547	0842	faint
	20190902_070004	0917	1227	faint
NNI 29	20190830_063004	0001	1500	faint - loud. 1 very close, 1 at distance. Incl tuk-tuk's, mewing
	20190830_064504	0000	1334	faint - loud
	20190830_070004	0236	0646	loud, very close
	20190830_071504	0018	0148	loud. close bird very quiet tuk-tuk's
	20190830_073004	1259		faint - loud
	20190831_063004	0148	1449	loud
	20190831_064504	0021	1338	loud
	20190901_063004	0006	1500	faint - loud. Definitely 3 birds.
	20190901_064504	0000	0806	faint - loud

Table 2 (continued): Recordings in which kokako calls were found.

Recorder Name	File Name	Start time	End time	Notes
NNI 29	20190901_070004	0209	1449	faint - loud
	20190901_071504	0021	1446	faint - loud
	20190901_073004	0004	1453	faint - loud
	20190901_074504	0000	1453	loud
	20190901_080004	0033		faint
	20190901_081504	0256	1455	faint - loud
	20190901_083004	0006	0627	loud
	20190902_063004	0009	1500	loud
	20190902_064504	0000	1500	faint - loud. 2 birds
	20190902_070004	0031	0838	faint - loud. 2 birds
	20190902_071504	0115	0337	faint
NNI 30	20190831_063004	1221	1500	faint
	20190831_064504	0018	0052	very faint
	20190831_070004	0010	0411	very faint
	20190901_063004	0011	1435	very faint
	20190901_064504	0127	0600	faint - medium
	20190901_070004	0620	0638	very faint
NNI 32	20190830_063004	0743	1500	loud
	20190830_064504	0000	1105	faint - loud
	20190830_070004	1224		faint. one short call
	20190830_071504	0220		faint. one short call
	20190831_063004	0704	1258	loud in rain
	20190901_063004	0010	0256	faint - loud
	20190901_064504	0316	1444	faint - medium
	20190901_070004	0244	1432	faint - medium
	20190901_071504	0008	1238	faint - loud
	20190901_073004	0212	0905	very faint
	20190901_081504	1435	1447	very faint
	20190901_083004	0133	0304	very faint
	20190902_063004	0218	0226	medium - loud
	20190902_064504	0155	1254	medium - loud