

An experimental system for computer aided bird call recognition

VOLUME 3 Appendices C-F

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Appendix C

Compiling and running the BCR software

Appendix C Table of Contents

C1 Compiling and running the BCR software	1
C1.1 Contents of the diskettes	2
C1.1.1 BCR CODE diskette	2
C1.1.2 BCR DATA diskette	3
C1.2 Compiling	3
C1.3 Running	4
C1.3.1 Preparations for examples	4
C1.3.2 SAMPLE	5
C1.3.3 SPECTRA	7
C1.3.4 SONAGRAM	11
C1.3.5 BACKGND	12
C1.3.6 PEAKPICK	13
C1.3.7 CLASSIFY	14
C1.3.8 ELEMENT	15
C1.3.9 SYNTAX	15
C1.3.10 OTHER PROGRAMS	19

C1 Compiling and running the BCR software

The practical issues of compiling and running the BCR software are covered here. This document is accompanied by a number of diskettes, containing source code, executable code and data files, allowing the results presented in the body to be repeated. The following sections detail the contents of the diskettes, compiling the executables from the source code, and finally a step-by-step example execution of the various programs.

C1.1 Contents of the diskettes

The BCR software source, executables and data are contained on two DOS formatted, 1.2 Mb floppy diskettes, labelled "BCR CODE" and "BCR DATA".

C1.1.1 BCR CODE diskette

The BCR CODE diskette contains both source code and compiled code, in directories \SOURCE and \EXECS respectively. The \SOURCE directory contains Turbo Pascal 6.0 source (.PAS) files for units and programs, an include file (.INC), several Turbo Assembler source (.ASM) files and their corresponding .OBJ files, two BCR system specific .MAP files and a .XPL file. It also contains a make file (MAKEFILE) which can be used to compile the BCR system code (see section C1.2 which follows), and a README file. The results of compiling using MAKEFILE are the .EXE (programs) and .TPU (units) which are to be found in the \EXECS directory of the BCR CODE diskette.

The following is a summary of the different files found in the \SOURCE directory. The README file in the root directory of the BCR CODE diskette has a detailed breakdown and any last-minute updates.

.PAS files

The units (which compile to .TPU files) include all the pipeline processes and the library modules. The programs (which compile to .EXE files) include the BCR system utilities and support programs, and a small example "shell" program for each processes which is not a program in itself. Thus SAMP.PAS is a "shell" program (compiles to SAMP.EXE) which runs the SAMPLE process whose source is in SAMPLE.PAS (compiles to SAMPLE.TPU). The example "shell" programs do not have listings in Appendix B or explanations in Appendix A, being all extremely simple and similar in content. Examine them to see how to use the units and run them to follow the examples on running the software given in section C1.3 in this appendix.

.INC file

The file FFTB2.INC is included by SPECTRA.PAS - it contains the Borland Turbo Numerical Methods FFT algorithm.

.ASM files

Assembly language was used to implement certain procedures in three BCR system modules. PRTEGA uses GETCBYTE.OBJ (assembled from GETCBYTE.ASM). MOUSE uses GETREGS.OBJ (GETREGS.ASM) and TEXTWIN uses SAVERECT.OBJ and RESTRECT.OBJ (SAVERECT.ASM and RESTRECT.ASM).

.MAP files

BCDACCESS.MAP is the file which controls which processes have access to Bird Call Descriptor fields. It is thus strictly a data file read by BCDMANIP, but it is "permanent" data, controlling the behaviour of the system and is not expected to change until parts of the system are modified.

BCRUPDAT.MAP is similarly a controlling data file - it contains BCR-system-specific instructions for the UPDATE utility. The latter will not need to be used until changes in the format of BCR system files are implemented, at which time BCDUPDAT.MAP would need to be extended.

.XPL file

This is a file of help information used by the UPDATE utility.

C1.1.2 BCR DATA diskette

The BCR DATA diskette has the data for the twelve birds used in the BCR system trials (see Chapter 6). The data for each bird are contained in a separate directory, named after the base bird name. Thus the directory \CROW1 contains the files CROW1.ADS, a sampled portion of the call of the Pied Crow, and BCD.DAT, the Bird Call Descriptor for a set of data files generated for that bird. Those two files are all that are needed to regenerate all the data for the Pied Crow experiments, by running the various pipeline processes as explained in section C1.3. The directories also contain sample syntax specification (.S) files for the respective birds. These are the syntax specs used in trials of Chapter 6. They are do not pertaining strictly to a particular sample bird call, but to all calls of a species. They are stored in the data directories for simplicity. However, they are in fact closely related to the particular data files with which they are stored, having been largely inspired by them rather than by any other samples of the species' calls.

The root directory of the BCR DATA diskette contains a README file with some explanatory and last minute information.

C1.2 Compiling

If you are familiar with the Turbo Pascal 6.0 integrated environment, you may load any .PAS file and Make it. For simplicity, ensure that the current directory contains all the files found in the BCR CODE \SOURCE directory, although the .ASM, .MAP and .XPL files are not required. By default the results of the compilation, the .EXE and .TPU files, will be placed in the current directory, but this may be changed through the Options/Directories menu. If the .TPUs are placed elsewhere, ensure that they can be seen by the compiler (again via the Options/Directories menu) when compiling modules that use them. Also note that some programs need the Turbo Pascal GRAPH.TPU file, so ensure that that too is locateable by the compiler.

As to what files to compile - all .PAS files starting with the keyword "PROGRAM" may be compiled into executables or run from the environment. .TPUs will be compiled transparently if you are using the Make option. Compiling by hand from the Turbo environment has the advantage that only those files which you need will be compiled, and you will be able to easily control the destinations and sources of all files. You will also be able to alter compiler options (such as Range Checking) resulting in smaller or faster code, as required.

If you are not familiar with the Turbo Pascal environment you may compile all the executables with a single command issued at the DOS prompt. Simply read the instructions contained in the file MAKEFILE in the BCR CODE \SOURCE directory. You may want to edit the parts of MAKEFILE indicated, or you may use the default configuration. The latter requires that all the files in the BCR CODE \SOURCE directory be present in the current DOS directory on the current drive. The .EXE and .TPU files will also end up in this directory after compilation has completed. You will need to have the Turbo Pascal command line compiler, TPC.EXE, and the Turbo Pascal Make utility, MAKE.EXE, residing somewhere in the file system. After making, if the source code is changed, the MAKE command may be reissued to rebuild any files affected.

Compiling may not be necessary, however, if you do not need to alter the source code, or the compiler options found in MAKEFILE. In that case, BCR system executables and .TPUs can be found ready-made in the BCR CODE \EXECS directory.

Assembling the .ASM files is not necessary since the .OBJ files have been provided. If however, the .ASM files are changed, note that they are designed specifically for use with Borland's Turbo Assembler.

C1.3 Running

This section takes you through a step-by-step example execution of all the BCR system executables, with diversions to introduce file formats and interpret results.

C1.3.1 Preparations for examples

Before working through the examples given here, make the following preparations to your system.

- Ensure that you can access all the BCR system executables. For example, place the BCR CODE diskette in drive A: and whenever asked to run a program, say SPEC.EXE, type A:\EXECS\SPEC at the DOS prompt.

Alternatively add the A:\EXECS directory, or another directory into which you have copied all the .EXE files from BCR CODE\EXECS, to the DOS search path, for example by typing the following (user types what is shown below after the DOS prompt, computer prints other text in response).

```
C:\>path
PATH=C:\;C:\UTILS
C:\>set path=C:\;C\UTILS;C:\BCREXECES
C:\>
```

Once the executables directory is in the search path, it will be possible to simply type SPEC when asked to run SPEC.EXE.

- Create a working directory (call it BIRDDATA for the sake of this example) and copy into it the required files from one of the directories on the BCR DATA diskette - in this case we will work with the Pied Crow data, in \CROW1. Copy CROW1.ADS, the sample file, and BCD.DAT, the Bird Call Descriptor that contains parameters for a complete BCR pipeline run for this bird.
- Copy the BCDACCES.MAP file from the BCR CODE\SOURCE directory into BIRDDATA
- Copy the Borland Graphics Interface (.BGI) file required by your graphics adaptor into BIRD-DATA. If you have monochrome adaptor, use HERC.BGI, for EGA or VGA colour adaptors use EGAVGA.BGI. These driver files are supplied with the Turbo Pascal distribution. A colour display, or a dual frequency monochrome display attached to an EGA adaptor, is highly recommended.
- Ensure that there is at least 600K free disk space, and that BIRDDATA is the current directory.

You will need a file viewer (DOS command TYPE will do) and/or editor in order to manipulate the contents of BCD.DAT. If you want to use a mouse in the graphics programs (DRAWER and LINKPEAK), make sure a mouse driver is loaded on your system.

Now we are ready to run the BCR pipeline.

C1.3.2 SAMPLE

The first pipeline process is SAMPLE. View BCD.DAT and note the following lines:

```
CROW1.ADS Pied Crow 548 (522)
Sampling_frequency: 2.0000000000E+01 kHz
```

CROW1A.ADS is the name of, and the beginning marker for, the outermost block in the file. At the end of the file is an END keyword that terminates the block. By convention (although not required), the name of the block is placed after END keyword, so that the last line of the file is END CROW1A.ADS.

Everything contained within the CROW1.ADS block pertains to the CROW1.ADS data file, or files that were derived from the CROW1.ADS data. Currently, all the information inside the CROW1.ADS block is in the form of other blocks, representing other files in a set of data derived from CROW1.ADS, except for the "Sampling_frequency:" line. That is the sole parameter for this file. It is the frequency with which the call is sampled (by the SAMPLE process) in order to produce the Analogue-to-Digital samples file CROW1.ADS.

The words "Pied Crow 548 (522)" are commentary text, ignored by the BCR system but useful to people reading the file. They name the species belonging to the call in CROW1.ADS, the Pied Crow, whose South African Bird Number is 548, the old Roberts' Number (by which some tape recordings are indexed) being 522.

Now that we have seen the appropriate entry for the sample data in BCD.DAT, we could run the SAMPLE process - this would read the BCD to find the sampling frequency as entered by the experimenter, then perform the sampling, producing the CROW1.ADS file. Since we already have the file, this step is not required.

In fact, the current version of the SAMPLE process merely converts an old file format to the ADS format, entering the "Sampling_frequency:" value it obtains from the original file's header into the BCD. That is why the value has so many digits - this is usually a sign that it was placed there by a process rather than entered by the operator. Viewing the BCDACCES.MAP file shows the following lines:

```
Sampling_frequency: REAL
  writers: SAMPLE
    readers: SPECTRA SONAGRAM PEAKPICK DRAWER SONAPS SOUNDGEN
ELEMENT
```

They confirm that the process responsible for determining the value of the "Sampling_frequency:" field (its 'writer') is SAMPLE, while many other processes need to read the value of this field.

Note that in making any modifications to the system, if a new field should be added to the Bird Call Descriptor, or a new process require access to an existing field, any attempt to access the field will result in an error until the correct permissions have been added to BCDACCES.MAP, thereby forcing the operator to keep this file up-to-date in the information it contains.

The word "kHz" placed after the value is a comment - it is not needed by the system, but whatever comment is placed next to a field will be preserved when and if that field's value is written by a process.

C1.3.3 SPECTRA

The next pipeline process is SPECTRA, responsible for producing Spectral Frames (.SF) files. SPECTRA is a process with many user-entered parameters and so will serve as a good example of how the BCD is used in setting up experiments.

Look at the BCD block for the only .SF file currently derivable from CROW1.ADS, named CROW1A.SF. Its parameters all have values. We can therefore generate the CROW1A.SF file immediately, by simply running the SPECTRA process, available through the example executable SPEC.EXE (see preparation discussion above on accessing executables). From the DOS prompt type:

```
spec crow1 a
```

The message: "FFTING 402 frames" appears on the following line, and the number of the frame being processed appears at the top right corner. When it reaches 402, the process will be finished. For now, press Ctrl-Break to abort the process. A directory listing of BIRDDATA should show that the file CROW1A.SF has been created, but its size will be much smaller than it would be if the process had run to completion. You should also see the new file CRP.DAT, which is used by the BCR system to register the name of the current process - it may be deleted without ill effect in between process executions, although there is no point in doing so.

The above exercise shows how a previously generated .SF file may be regenerated given a complete BCD.DAT. Now let us generate a completely new .SF file, called CROW1B.SF. It will also derive from CROW1.ADS.

Edit the BCD.DAT file. Start by creating a new block called CROW1B.SF directly beneath the CROW1A.SF block. That is, find the END CROW1A.SF line and insert the block beginning and end markers, so that the BCD.DAT looks as follows:

```
CROW1.ADS Pied Crow etc...
```

```
CROW1A.SF
...lots
...of
...fields
...and
...blocks
END CROW1A.SF
```

```
CROW1B.SF
END CROW1B.SF
```

```
END CROW1.ADS
```

Copy the fields (but not the other blocks) contained in the CROW1A.SF block, to the CROW1B.SF block. Delete the values of the fields, leaving only the field names and the commentary text giving the units, if any. Commentary text in brackets should be deleted. The CROW1B.SF block should now appear as follows:

```
CROW1B.SF
Window_duration: ms
Frequency_resolution: kHz
FFT_Length: points
Window_length: samples
Window_type:
Start_time: ms
Finish_time:
Number_of_frames:
Max_magnitude:
Background_mag:
END CROW1B.SF
```

We now have the skeleton for producing a new .SF file, whose characteristics we will determine by entering values into the fields.

The first four fields in the .SF block are interconnected. If we fix "Window_duration:" then "Window_length:" is automatically determined, and vice versa. Likewise "Frequency_resolution:" and "FFT_length:" are reflections of the same quantity. Moreover, only certain combinations of Window and Frequency parameters are possible. SPECTRA will automatically ensure that a correct combination occurs by altering one of the values.

Let us enter a value of 50 for "Window_length". Place a value of 0 in "Window_duration:" to show that it is to be calculated automatically, and place the comment "(filled in by SPECTRA)" next to the 0 to remind the reader that this value was not fixed by the operator. Now let us choose a fairly short "FFT_length:" of 64 points, placing a 0 in the "Frequency_resolution:" field to indicate that the frequency value is not determined by this field but by "FFT_length:", and again add the comment "(filled in by SPECTRA)".

The block should now appear follows:

```
CROW1B.SF
  Window_duration: 0 ms (filled in by SPECTRA)
  Frequency_resolution: 0 kHz (filled in by SPECTRA)
  FFT_Length: 64 points
  Window_length: 50 samples
  Window_type:
  Start_time: ms
  Finish_time:
  Number_of_frames:
  Max_magnitude:
  Background_mag:
END CROW1B.SF
```

The value of 64 was chosen for the length of the spectral frame because the FFT requires a number of points equal to a power of 2, and it must larger than the window length, (50), so that all the points in the window can be contained in the Spectral Frame. If we had chosen an unacceptable length, SPECTRA would simply increase it until it reached the nearest power of 2 that is greater than 50. It would write the new value back to the "FFT_length:" field to ensure that BCD.DAT reflects the correct information.

If we had used the "Window_duration:" or "Frequency_resolution:" fields to specify the window and spectral frame lengths, the validity of the combination would not be immediately apparent because we would not know the "XXX_length:" values until after we execute the process. We might therefore enter incompatible values. In that case SPECTRA would print an error message, and we would edit the values in BCD.DAT and try executing SPECTRA again. Once SPECTRA executes successfully, the values in BCD.DAT will all be compatible and correct.

The rest of the fields are straightforward to fill in. "Window_type:" can be one of "Hamming", "Triangular" or "Rectangular" - we will use "Hamming". "Start_time:" is the point (specified in ms) in the call where processing is to begin - we will use 300 because the first 400 or so milliseconds of the call happen to be silent and we choose to skip them. "End_time:" is the point at which to

stop processing - we will use the special value of -1 to indicate that processing should continue until the end of the file. Place a comment "(to end of data)" beside the -1 value in order to remind the reader of its meaning.

The last three fields in the block should be left empty, they will be filled in automatically. The block now appears as follows:

```
CROW1B.SF
  Window_duration: 0 ms (filled in by SPECTRA)
  Frequency_resolution: 0 kHz (filled in by SPECTRA)
  FFT_Length: 64 points
  Window_length: 50 samples
  Window_type: Hamming
  Start_time: 300 ms
  Finish_time: -1 (to end of data)
  Number_of_frames:
  Max_magnitude:
  Background_mag:
END CROW1B.SF
```

Now we are ready to run the process. Because we now have two .SF blocks in the Bird Call Descriptor, we must be sure to specify which one is to be used. That is the purpose of the second parameter to the SPECTRA process, which in this case should be "b" to indicate that the CROW1B.SF file is desired. Run

```
spec crow1 b
```

The message "FFTing 804 frames" is given and the processing begins. This shows up a "bug" in the SPECTRA process - the number 804 actually reflects the total number of frames in the call, even though we are processing the call starting at 300 ms ($= 300/2.5 = 120$ frames) from the beginning of the call. Recall that on the previous run, when we began regenerating CROW1A.SF, the number of frames was 402, but that run started from the beginning of the call. So now, with half the frame length and 120-frame offset, we should have $2 \times 402 - 120 = 684$ frames. Stop the processing using Ctrl-Break, and re-edit the BCD.DAT. Change the "Start_time:" to 0 ms, so that the entire call is processed and the number of frames is consistent. Avoid using non-zero offsets until the bug is fixed.

Once more, run

```
spec crow1 b
```

and this time allow the processing to complete. SPECTRA will detect that CROW1B.SF already exists from the previous abortive run, and ask if you wish to overwrite it. Press Y to answer "yes".

Note that SPECTRA is the process that takes up the majority of pipeline processing time. On a 16Mhz 386SX computer without a 80387 math co-processor, CROW1B.SF takes approximately 8 minutes. On a 33 MHz 486 computer the time is about 50 seconds.

A directory listing should show CROW1B.SF to be 154368 bytes in size. The file CROW1B.SC should also have been created. This is used transparently by the PEAKPICK process.

Now that we have seen how to create a .SF file from scratch, we will return and use the existing parameters for the rest of the files in this example. In BCD.DAT, delete the current fields of CROW1A.SF and copy the fields of the CROW1B.SF block into their place. Delete the CROW1B.SF block. In DOS, delete CROW1A.SF and rename the CROW1B.SF file to CROW1A.SF, and CROW1B.SC to CROW1A.SC. We have now eliminated all traces of CROW1B files, but our CROW1A.SF file is different to the original CROW1A specification. In a real experiment, we would leave CROW1A.SF and its derivatives as is, and continue with the CROW1B.SF block, so that BCD.DAT would contain specifications for at least two "runs" of the pipeline. We work with only one run here for simplicity.

C1.3.4 SONAGRAM

The next process we run is SONAGRAM, in order to generate the Sonagram Storage (.SS) file. This file is used later on by DRAWER to display the call.

The BCD.DAT block for the .SS file is as follows:

```
CROW1A.SS
  Frequency_scale: 8 kHz full scale screen width
  Time_scale: 500 ms full scale screen length
  Min_factor: 0.0 of max magnitude
  Max_factor: 0.5 of max magnitude
  PixelsPerkHz: 7.500000000000000E+0001
  LinesPerMsec: 4.000000000000091E-0001
END CROW1A.SS
```

"Frequency_scale:" and "Time_scale:" are "zooming" parameters for the frequency and time axes - smaller values result in greater zooms (greater stretching of the axes). "Min_factor:" and "Max_factor:" are cutoff magnitudes controlling the range and detail in which magnitude variation is discernible in the sonagram. "PixelsPerkHz:" and "LinesPerMsec:" are values filled in by SONAGRAM and used by DRAWER. They are hardware specific in the sense that they depend on screen dimensions encoded into SONAGRAM. See Appendix A, SONAGRAM for more details.

To execute the SONAGRAM process and generate the CROW1A.SS file, run

```
sona crowl a a
```

This means: Using CROW1A.SF, create CROW1A.SS. In principle, there is enough information in the BCD.DAT so that only the .SS suffix need be supplied, assuming .SS filenames are unique (i.e. assuming there is not a CROW1A.SS in more than one .SF block). However the system as it stands is not able to extract this information, and a more detailed "path" to the files is always required. Thus we specify the first "a" to say that CROW1A.SS is to be found within the CROW1A.SF block, and the second "a" identifies which .SS block is desired.

The message "Calcplotting 804 frames" appears and the frames are counted at the top right of the screen. SONAGRAM is also a fairly lengthy process, compared with the pipeline processes. It greatly reduces the time needed by DRAWER to display the sonagram, however.

Now that we have a .SS file it is possible to run DRAWER to see the sonagram. Run the command:

```
disp crowl a a
```

and then press any key when the initial message appears. Part of the sonagram appears on the screen, with a menu. See Appendix A, DRAWER, for details on operating this program. Since we have not yet generated the other files viewable in DRAWER, The Peaks, Classes or Elements options will give a "file not found" message.

C1.3.5 BACKGND

While inside drawer, we need to run the BACKGND process, in order to fill in the "Background_mag:" field of CROW1A.SF whose value is still missing. This field is an average background noise magnitude estimate, and is needed for the PEAKPICK process to operate correctly.

To run the BACKGND process, select **Functions** from the main DRAWER menu. The mouse, or the arrow keys, or the numeric keypad keys (try using Numlock or shift to speed up the motion), can be used to move the arrow cursor, and the ENTER key and ESC key have the usual meanings. The left mouse button is like the ENTER key and the right mouse button is like the ESC key

Select **Interval** from the **Functions** submenu. Now select **Beginning** from the **Interval** submenu. The **Interval** submenu disappears and the arrow cursor appears at the top left corner of the screen. In general you can now move the cursor to point to the beginning of the interval over which you want the background average calculated. Only the vertical (time axis) position is important. We will start from the beginning of the call, so no need to move the cursor, just press the ENTER key or the left mouse button.

The sonagram is redisplayed in reverse video, indicating that the entire call is selected as the interval for the background calculation. The **Interval** submenu reappears. Select **End**, and it disappears once more, with the arrow appearing at the bottom left of the screen. Move the arrow to the point in the sonagram where the first loud element begins. If you are not clear where this is, look in Appendix F for the CROW1A.SS sonagram, and note the position 0.3 seconds from the start of the graph. Find the corresponding position on the screen, and press ENTER to specify the end point of the background interval. The sonagram is redisplayed so that only the first part of the call, containing background sounds but no significant elements, is highlighted.

Select **Find Backgnd** from the **Interval** menu. The **Interval** menu disappears while the program calculates the average magnitude over the selected interval and stores the result in BCD.DAT. Then the **Functions** menu appears. Escape (ESC or right mouse button) to main menu. Pressing ESC once more gives the "Exit or resume" message. Press E to quit the DRAWER program.

Examine BCD.DAT. The "Background_mag:" field of CROW1A.SF should contain a value similar to the following:

```
Background_mag: 1.31310292102396E+0002
```

or about 130. If it does not, or if you have had trouble following the procedure above, fill in the value of 130 manually.

C1.3.6 PEAKPICK

We can now generate the Linked Peak Frames (.LPF file). The BCD.DAT block for this file is:

```
CROW1A.LPF Linked peak frame file
  Snr: 20

CROW1A.CF
  High_pass_freq: 0.5 kHz (lower cutoff)
  Distance_thresh: 0.3 kHz between adjacent peaks
  Class_mag_thresh: 10 times background

CROW1A.E
  Dominance_ratio: 0.9
END CROW1A.E
END CROW1A.CF
END CROW1A.LPF
```

It shows that the "Snr:" parameter (a threshold determining which magnitudes are significant in the spectral frames by comparing them to the background magnitude) is set to 20. This is a value set by the operator. Also shown is the block for the Classified Frames file CROW1A.CF, which is to be derived from CROW1A.LPF later on.

To generate the .LPF file, we run PEAKPICK, as follows:

```
pick crowl a a
```

This means generate CROW1A.LPF from CROW1A.SF. Press a key to begin the process. The message "Picking peaks from 804 frames" appears and the frames are counted at the top right. Very soon the process ends, and the file CROW1A.LPF should exist with a size of 52260 bytes.

Run DRAWER again:

```
disp crowl a a a
```

and select **Peaks** from the main menu to see the result of the PEAKPICK process. Compare the peaks with the sonagram. Note how no peaks are found over the interval we selected as being representative of background noise. Note also how the peaks are regularly spaced horizontally. This is surprising because the pattern is not apparent in the sonagram. We will see what it means later on.

C1.3.7 CLASSIFY

To generate the Classified Frames file, CROW1A.CF whose parameters "High_pass_freq:", "Distance_thresh:" and "Class_mag_thresh:" are explained in the CLASSIFY section of Appendix A, and in Chapter 5 of the document body, run

```
class crowl a a a
```

Which means generate CROW1A.CF, from CROW1A.LPF, which in turn comes from CROW1A.SF. The message "Classifying 804 frames" appears and the process ends after a few seconds. CROW1A.CF should have a size of 10452 bytes.

To see the CROW1A.CF contents, run DRAWER:

```
disp crowl a a a a
```

and select **Classes**. Select **Reconstruct** from the submenu. Consult Appendix A and the document for explanations of the various submenu options. Note how CLASSIFY has placed most frames in the "single" class and the remaining majority in the "harmonic" class. If you are using a colour monitor, the class key (available from the **Functions** menu) is useful here. The results once again

indicate that all is perhaps not what it should be, because the **Peaks** as viewed previously did not seem composed of many frames containing single peaks. Most frames seemed to have at least two peaks, usually more.

C1.3.8 ELEMENT

Generate the Elements file CROW1A.E by running

```
elem crow1 a a a
```

which means create CROW1A.E from CROW1A.CF which in turn comes originally from CROW1A.SF.

The "Dominance_ratio" parameter determines what percentage of the frames in an element need to be of one class before the element is classified as being of that overall class. The overall class is not particularly important in the current BCR system, however.

To see the elements file, run DRAWER:

```
disp crow1 a a a a a
```

and select **Elements**. Plot the class key from the **Functions** menu to interpret the class composition of each element (colour monitor is necessary). See Appendix A, **ELEMENT**, for more details. Compare the elements to the sonagram or other views by turning **Overplot ON** from the main menu, then selecting Sonagram (or **Peaks** or **Classes**) and then **Element**. The element plot will be overlayed on the selected view. Select **Overplot** once more to turn it off.

Note that in the elements view it is very clear that the majority of frames are 'single'.

C1.3.9 SYNTAX

Now that we have an elements file, we can attempt to recognize it using the syntax specifications of some of the other birds. Let us say we do not know the identity of the call and wish to compare it with four candidate species: The Redbilled Hornbill, the Pied Crow, the Grey Lourie and the Mourning Dove.

Example syntax specifications for these four birds are available in the BCR DATA diskette subdirectories \REDB1, \CROW1, \GREY1 and \MOUR1 respectively. Copy the .S files found there, REDB.S, CROW.S, GREY.S and MOUR.S, into the current working directory (BIRD-DATA).

Now create a Candidates file, lets call it CANDS, and edit this file to contain the following text:

REDB
CROW
GREY
MOUR

which are the syntax spec file names (without .S extension) of the candidates to be used in this run of SYNTAX.

Now we can run SYNTAX:

```
synt crow1a.e candS
```

which means compare the element file CROW1A.E to the candidates in CANDS, with output appearing on screen.

The result is the following table:

Recognition scores for call CROW1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	---	-----	-----	-----
Redbilled Hornbill	N	2.83		
Pied Crow	N	2.67		
Grey Lourie	N	1.75		
Mourning Dove	Y	1.57	24	55

Which means that only the Mourning Dove spec found at least one of the elements it considers "essential" in the CROW1A.E file. The Mourning Dove scores a preliminary score of 1.57 (out of 4), had 24 failures in the parse, and the total score of all matches comes to 55. By this table we would conclude that CROW1A.E contains a Mourning Dove call.

This result gives us an opportunity to look at how an experimenter might work with the BCR system and interpret its results.

Even if we didn't know the true identity of the call we might be alerted to the fact that something is amiss because the Mourning Dove scores such a low preliminary score. That indicates that while it found an element that could match it's Essential criterion, the matches were on the whole not good. If only the essential element were found in, say the Pied Crow and the Redbilled Hornbill, those might perform adequately on the failures and match score, and they already have better preliminary scores.

Since we do know that Pied Crow should have scored better, we can hypothesize as to why it did not. Starting from the end of the pipeline, we can ask whether the syntax specification is adequate. The answer is: No. CROW1.S was compiled from ONE particular run of the pipeline, the one

embodied by the set of parameters present at the start of the exercise, for CROW1A.SF, which we overwrote. Although some generalization took place in creating CROW.S, the only way to produce an effective syntax specification is to observe the variations due to different processing parameters and different samples of the species' call.

Given that we can blame CROW.S, we nevertheless know that it did manage to recognize a differently processed Pied Crow call (see Chapter 6 of the document body for the SYNTAX trials, and Appendix F for detailed scores). What did we change that could have caused the new behaviour? We changed three parameters: The window length, the FFT length and the background magnitude. The latter is different due to slight differences in the chosen interval, but is sufficiently close to the old value (190) to have little effect

The FFT length was shortened drastically from 512 points to 64. The effect of this is to make the twin-peak error explained in Chapter 4 a likelihood. Thinking back now to the strange patterns in the Peaks view of CROW1A.LPF, it is clear that this is indeed what has happened.

Why would this have the effect observed? To answer this we must examine CROW.S and CROW1A.E to see why the essential element specified by the former was not found in the latter. To look at CROW1A.E, run

```
readelem crowla
```

and examine the resulting file, CROW1A.ETX. In it are lines of text and numbers detailing the element contents. Note the following lines:

```
DURN 415.00 FREQ 1.49  
CLASS MIXED SINGLE: 0.754 HARMONIC: 0.182 MULTIPLE: 0.064 NOISE: 0.000
```

This is an element of duration 415 ms, average frequency 1.49 kHz, and containing 75.4% single frames, 18.2% harmonic frames, 6.4% multiple frames and no noisy frames.

Now look in CROW.S, at the element specification of the Essential "Caw" element (ignore the numbers in parentheses, they are comments):

```
Caw: Essential  
frequency 1.1 to 1.2 kHz (1.16, 1.18)  
duration 440 to 455 ms (445, 450)  
single 80 harmonic 15 multiple 5 noise 0 %  
occurrence_distance 15 %
```

We see that element mentioned above just misses a match in duration (415 ms instead of minimum 440) and that the frequency is 0.39 kHz higher than the maximum. The class content of the element is compatible with the spec.

The change in duration is probably due to the different background magnitude level, meaning that a certain peak fell below the SNR threshold and made a "hole" in the element, leaving it broken into two parts. This type of occurrence is fairly common and syntax specs have to take it into account somehow. The characteristic frequency values, however, are expected to remain fairly constant no matter what parameters are involved in the processing. The change here is due to the extra peaks introduced by the twin peak error, shifting the average frequency of the frames upwards.

In order see whether we are right, we would follow the prescription for getting rid of twin peak error - increase the frequency resolution. Lets us choose an "FFT_length:" of 256, and run SPECTRA, PEAKPICK, CLASSIFY and ELEMENT once again. Alternatively one could leave the current files as is and add a new .SF block with the new FFT length, copying the rest of the contents from the CROW1A.SF block.

Running the pipeline again (note that SPECTRA will now take much longer because it has the same number of frames to process at a higher FFT length), and executing SYNTAX results in the following table:

Recognition scores for call CROW1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	N	2.83		
Pied Crow	Y	2.67	26	56
Grey Lourie	N	1.75		
Mourning Dove	Y	1.57	24	55

Now we find the results in agreement with the Chapter 6 trials: The Mourning Dove matches the call marginally better than the Pied Crow, based on failure and match scores, but much worse based on preliminary score. The other birds all fail to find their essential requirements.

Based on this table we would choose the identity of the call as the Pied Crow, although the Mourning Dove remains a possibility.

Examining the Peaks with DRAWER shows that the regular stripes have disappeared, being replaced with a more natural looking "cloud" of peaks. The Classes and Elements have, however, not changed much, and this is an indication of a certain robustness of the system. The erroneous extra peaks shifted the characteristic frequency of the elements, but were too low in magnitude to influence the classification of the frames much.

We can still ask, why does the Mourning Dove spec match a Crow call better than the Crow spec? Here the blame is squarely on the specs. The Crow spec is a very simplistic one, containing only one large non-silent element spec. The crow call is however noisy, and being so, prone to break

up and display many random variations. The higher background magnitude and the smaller window length give many opportunities for strings of smaller elements to replace the large monolithic one. The Mourning Dove spec is designed to recognize such strings because its call is naturally composed of a string of short elements (see Appendix F).

Clearly, much work needs to be done to derive specs and processing parameters that work well with likely candidate lists. The above is an example of how a researcher might go about experimenting to improve the spec and show up problems.

One thing that may be useful in such problem tracing exercises is to run SYNTAX in Trace mode. This can be done by running

```
trace crowla.e cands > results
```

and pressing a key repeatedly to see the effect of each step.

TRACE.EXE runs SYNTAX with the Trace compiler directive turned on, which gives a step-by-step screen display of its activity. See the section on Trace in Appendix A for details on understanding the display. We redirect the output (the score table) to the RESULTS file here so that they don't interfere with the screen display.

Finally, you can run SYNTAX and obtain a detailed track of the parses rather than a results table (see section on Track in Appendix A) with the following command:

```
track crowla.e cands > trackres
```

which sends the track to the file TRACKRES.

C1.3.10 OTHER PROGRAMS

The following commands run the other processes and utilities in BCR system, see the appropriate sections in Appendix A for more details:

To edit the CROW1A.LPF file (add links for sound generation purposes):

```
linkpeak crowla
```

To generate a sound waveform sample file CROW1A.DAS from CROW1A.LPF, which can then be treated like a .ADS file, i.e. played back or reprocessed by the BCR pipeline:

```
sound crowl a a a
```

To create a PostScript sonagram plot from CROW1A.SS, from a point 300 ms from the start of the call until 400 ms from the start, with the PostScript code (which can then be sent to a PostScript printer) being stored in a file called CROW1A.PS:

```
sonaps crowl a a 300 400
```

To generate simple computer readable text files of the contents of CROW1A.SF and CROW1A.LPF, from frames 10 to 20, with output going to file OUTFILE:

```
readsf crowl a 10 20 > outfile
```

and

```
readlpf crowl a 10 20 > outfile
```

To ensure all your data files are up-to-date (not old formats) - although they definitely are in this case, find the location of BCRUPDAT.MAP (originally in the \SOURCE directory of the BCD CODE diskette) and run:

```
update CROW*.* <bcrupdat directory>\BCRUPDAT.MAP
```

Note that SONAPS.EXE, READSF.EXE, READLPF.EXE and UPDATE.EXE can be run without parameters to give a brief description of their function and usage.

Appendix D

Hamming window spectral analysis

Appendix D Table of Contents

D1 Hamming window spectral analysis	1
---	---

D1 Hamming window spectral analysis

This appendix is a Mathematica notebook showing how a figure was derived for the point at which the magnitude spectrum of a Hamming window falls to half its maximum value. The result is used in an analysis of the peak extraction algorithm's usefulness, in Chapter 4.

Hamming Window Spectral Analysis

This notebook derives the frequency at which the main lobe of a Hamming window's Fourier transform has a magnitude equal to half that of its maximum magnitude.

■ Fourier transform of Hamming window

■ Clear undefined variables

First, we clear all variable names not defined here. T is the window length (on the time axis), w is the radian frequency variable, t is the time variable.

```
Clear[T, w, t]
```

■ Definition of Hamming window function $f(t)$ in time domain

```
f = 0.54 - 0.46 Cos[(2 Pi t)/T]
```

$$0.54 - 0.46 \cos\left[\frac{2 \pi t}{T}\right]$$

between $t=0$ and $t=T$, and 0 elsewhere.

■ Fourier transform $F(w)$ of $f(t)$:

```
F = Integrate[Expand[f Exp[-I w t]], {t, 0, T}]
```

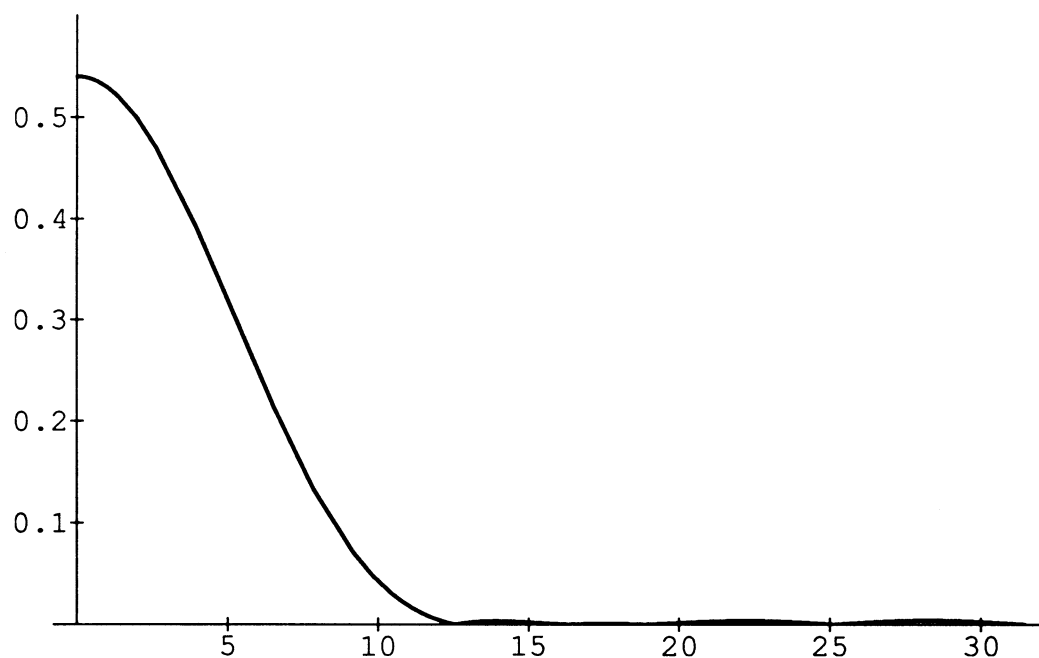
$$\frac{-0.54 I}{w} + \frac{0.54 I e^{-I T w}}{w} + \frac{-0.46 I w}{4 \pi^2 T} + \frac{0.46 I e^{-I T w}}{4 \pi^2 T}$$

■ Plot the magnitude of the spectrum, $|F(w)|$, versus w , with $T = 1$.

```

T = 1
Plot [Abs[F], {w, 0.00000001, 10 Pi},
      PlotRange -> { Automatic, {0, 0.6}}]

```



-Graphics-

■ Finding the point at which the magnitude falls to half the maximum

As the plot shows, the magnitude is greatest at $w=0$. The factorization shows that at this point the function evaluates to $0/0$, so we take the limit, obtaining the result in terms of T :

```

Clear [T,w]
Fmax = Limit [F, w -> 0]

```

0.54 T

We now wish to solve the equation $|F(w)| = F_{\max}/2$ for w , but this is not handled adequately by the Solve function, so we need to iterate and substitute manually. The following value of w is the solution found by such an iteration. Naturally the plot helps to make good estimates.

```
Clear [T, w]
```

```
w = 5.7027/T
```

```
Abs[N[F]]
```

```
Print["|F(w)| = ", N[Abs[F]]],
```

```
Abs[(-0.258707 - 0.0772698 I) T]
```

To evaluate the coefficient of T above, we simply divide by T:

```
Abs[N[F]/T]
```

```
0.27
```

Appendix E

Sonagrams

Appendix E Table of Contents

E1 Sonagrams	1
--------------------	---

E1 Sonagrams

Sound spectrograms, or sonagrams, are widely used, both in the study of speech and of bird calls. To quote Jellis [10]:

Sonagrams have become the international written language for bird sounds.

The sonagram is a method of graphically representing a signal, in this case acoustic, which may be changing both in frequency content and time, and as such is an invaluable tool in the study of such sounds. Indeed it was the invention of the sonagram which provided the stimulus for the rapid advancement of research in the field of speech and animal sound.

Technically, sonagrams are frequency versus time plots, with magnitude represented by the plot density. As such they are the result of ongoing frequency decomposition of a signal. For more specific details on the generation and interpretation of sonagram data, refer to Chapter 3. This appendix is a brief, casual introduction to the sonagram notation and its use in representing bird calls.

A sonagram is somewhat analogous to musical notation. The vertical height of a point represents pitch, so the higher a point, the higher the note. Also similarly to music, horizontal distance represents time, so points further to the right mean notes that occur later in time. Figure E1.1a below therefore shows two low, short notes followed by a high, long one, and Figure E1.1b shows an analogous musical sequence.

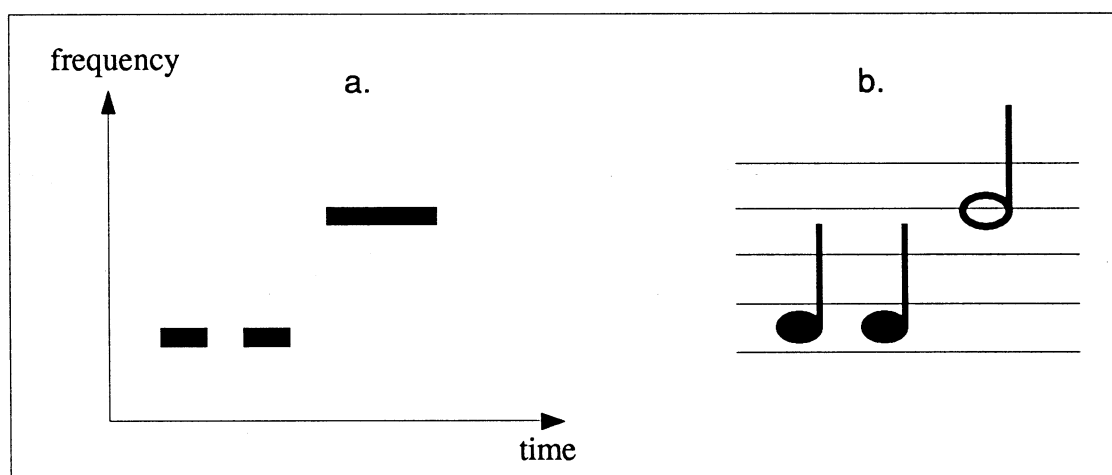


Figure E1.1 Schematic of a simple sonagram and the equivalent musical notation.

The sonagram is a more general notation than music, however, so any frequency (not just the notes in the musical scale) and any duration (not just multiples of beats) can be represented.

When more than one frequency is present at each instant, the effect is similar to that of a musical chord - notes (or traces on the sonagram) are stacked vertically. Figure E1.2a illustrates a sound containing three different simultaneous tones, and Figure E1.2b an analogous musical form. Figure E1.2a also demonstrates how shading can be used to denote magnitude (loudness) of the frequency components. The loudest (darkest) of the components is the lowest in pitch, with the higher ones becoming progressively softer (lighter).

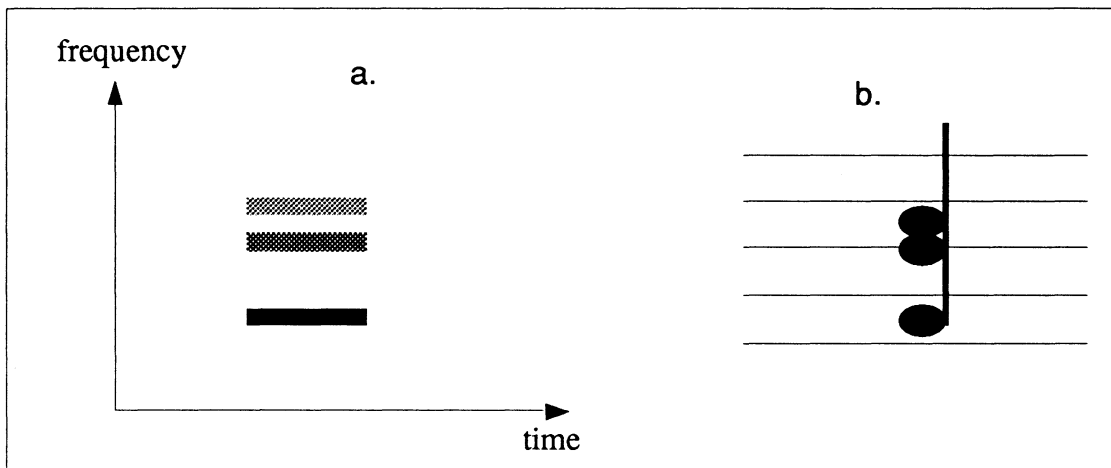


Figure E1.2 Schematic sonagram of a multifrequency sound and a similar musical notation.

In a multi-frequency sound, the relationship between the components determines the nature of the sound. In bird calls, this varies from a pure whistle-like chirp, to a vocal honking or croaking, to a noisy hissing, clicking or buzzing. Figure E1.3 illustrates.

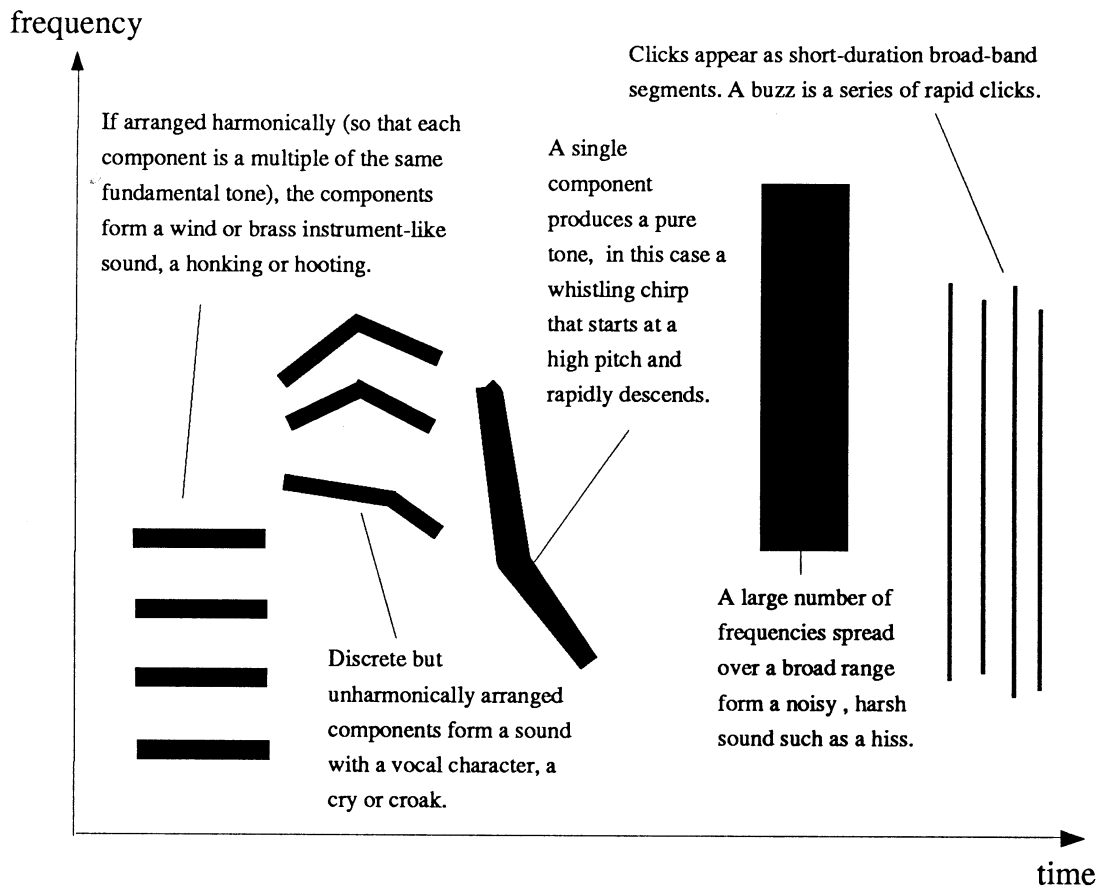


Figure E1.3 Schematic sonagram of different bird calls.

Appendix F

Bird data reference

Appendix F Table of Contents

F1 Bird data reference	1
F1.1 REDB Redbilled Hornbill <i>Tockus erythrorhynchus</i> 458 (425)	2
F1.1.1 REDB Bird Call Descriptor	3
F1.1.2 REDB Plots	4
F1.1.3 REDB Elements	5
F1.1.4 REDB Syntax Specification	6
F1.1.5 REDB Track	8
F1.1.6 REDB Trial results	13
F1.2 SOUT Southern Boubou <i>Lanius ferrugineus</i> 736 (709)	14
F1.2.1 SOUT Bird Call Descriptor	15
F1.2.2 SOUT Plots	16
F1.2.3 SOUT Elements	17
F1.2.4 SOUT Syntax Specification	18
F1.2.5 SOUT Track	21
F1.2.6 SOUT Trial results	25
F1.3 GREY Grey Lourie <i>Corythaixoides concolor</i> 373 (339)	26
F1.3.1 GREY Bird Call Descriptor	27
F1.3.2 GREY Plots	28
F1.3.3 GREY Elements	29
F1.3.4 GREY Syntax Specification	32
F1.3.5 GREY Track	34
F1.3.6 GREY Trial results	44
F1.4 FISC Fiscal Shrike <i>Lanius collaris</i> 732 (707)	45
F1.4.1 FISC Bird Call Descriptor	46
F1.4.2 FISC Plots	47
F1.4.3 FISC Elements	48
F1.4.4 FISC Syntax Specification	49
F1.4.5 FISC Track	50
F1.4.6 FISC Trial results	54
F1.5 HOOP Hoopoe <i>Upupa epops</i> 451 (418)	55
F1.5.1 HOOP Bird Call Descriptor	56
F1.5.2 HOOP Plots	57
F1.5.3 HOOP Elements	58
F1.5.4 HOOP Syntax Specification	59
F1.5.5 HOOP Track	60
F1.5.6 HOOP Trial results	63
F1.6 MOUR Mourning Dove <i>Streptopelia decipiens</i> 353 (315)	64
F1.6.1 MOUR Bird Call Descriptor	65
F1.6.2 MOUR Plots	66
F1.6.3 MOUR Elements	67
F1.6.4 MOUR Syntax Specification	70
F1.6.5 MOUR Track	73
F1.6.6 MOUR Trial results	82
F1.7 OLIV Olivtree Warbler <i>Hippolais olivetorum</i> 626 (597)	83
F1.7.1 OLIV Bird Call Descriptor	84
F1.7.2 OLIV Plots	85
F1.7.3 OLIV Elements	86
F1.7.4 OLIV Syntax Specification	88
F1.7.5 OLIV Track	92
F1.7.6 OLIV Trial results	99
F1.8 JACO Jacobin Cuckoo <i>Clamator jacobinus</i> 382 (348)	100
F1.8.1 JACO Bird Call Descriptor	101
F1.8.2 JACO Plots	102
F1.8.3 JACO Elements	103

F1.8.4 JACO Syntax Specification	104
F1.8.5 JACO Track	106
F1.8.6 JACO Trial results	110
F1.9 CROW Pied Crow <i>Corvus Albus</i> 548 (522)	111
F1.9.1 CROW Bird Call Descriptor	112
F1.9.2 CROW Plots	113
F1.9.3 CROW Elements	114
F1.9.4 CROW Syntax Specification	115
F1.9.5 CROW Track	116
F1.9.6 CROW Trial results	120
F1.10 SWAI Swainson's Francolin <i>Francolinus swainsonii</i> 199 (185)	121
F1.10.1 SWAI Bird Call Descriptor	122
F1.10.2 SWAI Plots	123
F1.10.3 SWAI Elements	124
F1.10.4 SWAI Syntax Specification	125
F1.10.5 SWAI Track	127
F1.10.6 SWAI Trial results	132
F1.11 WILL Willow Warbler <i>Phylloscopus trochilus</i> 643 (599)	133
F1.11.1 WILL Bird Call Descriptor	134
F1.11.2 WILL Plots	135
F1.11.3 WILL Elements	136
F1.11.4 WILL Syntax Specification	138
F1.11.5 WILL Track	141
F1.11.6 WILL Trial results	148
F1.12 MONO Monotonous Lark <i>Mirafra passerina</i> 493 (457)	149
F1.12.1 MONO Bird Call Descriptor	150
F1.12.2 MONO Plots	151
F1.12.3 MONO Elements	152
F1.12.4 MONO Syntax Specification	154
F1.12.5 MONO Track	156
F1.12.6 MONO Trial results	161

F1 Bird data reference

This appendix presents the data used in the BCR system trials of Chapter 6, both input and results. It is organised as twelve sections, each containing all the data for a single bird. Each bird has a four-letter code, which is used as reference by the tables in Chapter 6, and as a base name for the files whose contents are printed here and which are specified in the Bird Call Descriptor for each bird. The codes are as follows:

REDB - Redbilled Hornbill
SOUT - Southern Boubou
GREY - Grey Lourie
FISC - Fiscal Shrike
HOOP - Hoopoe
MOUR - Mourning Dove
OLIV - Olivetree Warbler
JACO - Jacobin Cuckoo
CROW - Pied Crow
SWAI - Swainson's Francolin
MONO - Monotonous Lark

Each section is headed by the code and the bird's common (normal typeface) and scientific (italicised) names, the SA bird numbers and the old Roberts' numbers (parenthesised).

The plots contained within this appendix correspond to disk files found on the accompanying diskettes or reproducible using the BCR software (See Appendix C). The file names are formed by appending "1A" to the base name. For example, the Redbilled Hornbill's **Sonagram** is a plot of the file REDB1A.SS, its **Peaks** plot comes from REDB1A.LPF, **Classes** from REDB1A.CF and **Elements** from REDB1A.E. The time-domain samples from which all data are derived are found in REDB1.ADS.

The syntax specifications supplied in the **Syntax Specification** sections were derived by generalizing the elements file (sections titled **Elements** which are the output of the READELEM utility) of the corresponding bird. They syntax specs may be found in the files <bird code>.S on the accompanying diskettes (See Appendix C).

The trials consisted of using the BCR system to compare the elements file of each bird to the syntax spec of all the birds. The result tables for each element string are found in the corresponding bird's section under the **Trial results** sections. The **Track** sections are the detailed tracks of the parse (SYNTAX process with TrackResult option).

F1.1 REDB
Redbilled Hornbill
Tockus erythrorhynchus
458 (425)

F1.1.1 REDB Bird Call Descriptor

```
REDB1.ADS (Red billed Hornbill 458 (425)).
Sampling_frequency: 2.6667000000E+01

REDB1A.SF
Window_duration: 4.98743765702966E+0000 ms
Frequency_resolution: 5.20839843749741E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 133 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 241
Max_magnitude: 3.87325814431310E+0004
Background_mag: 1.7637454886E+02

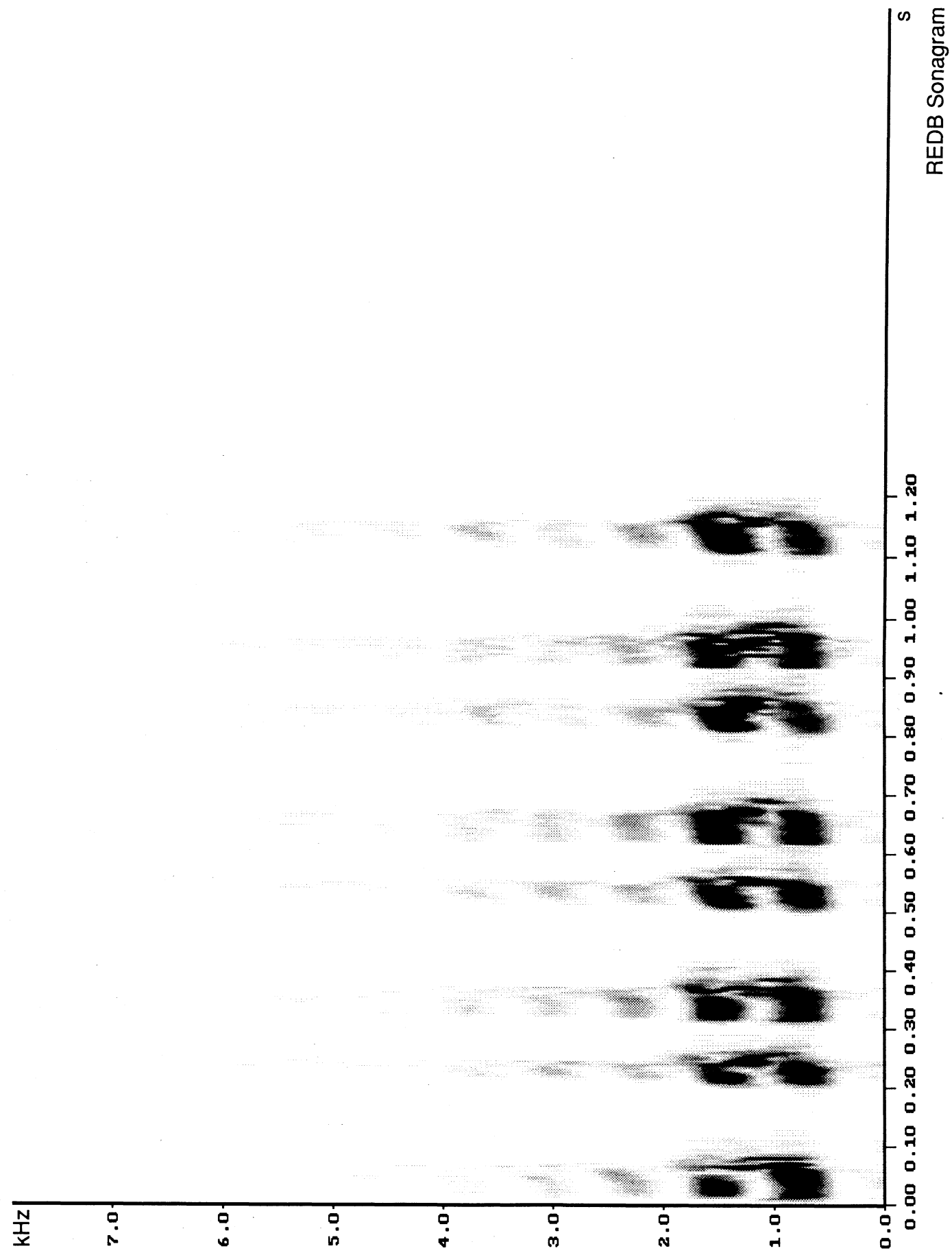
REDB1A.SS
Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerKHz: 7.50000000000000E+0001
LinesPerMsec: 4.00000000000091E-0001
END REDB1A.SS

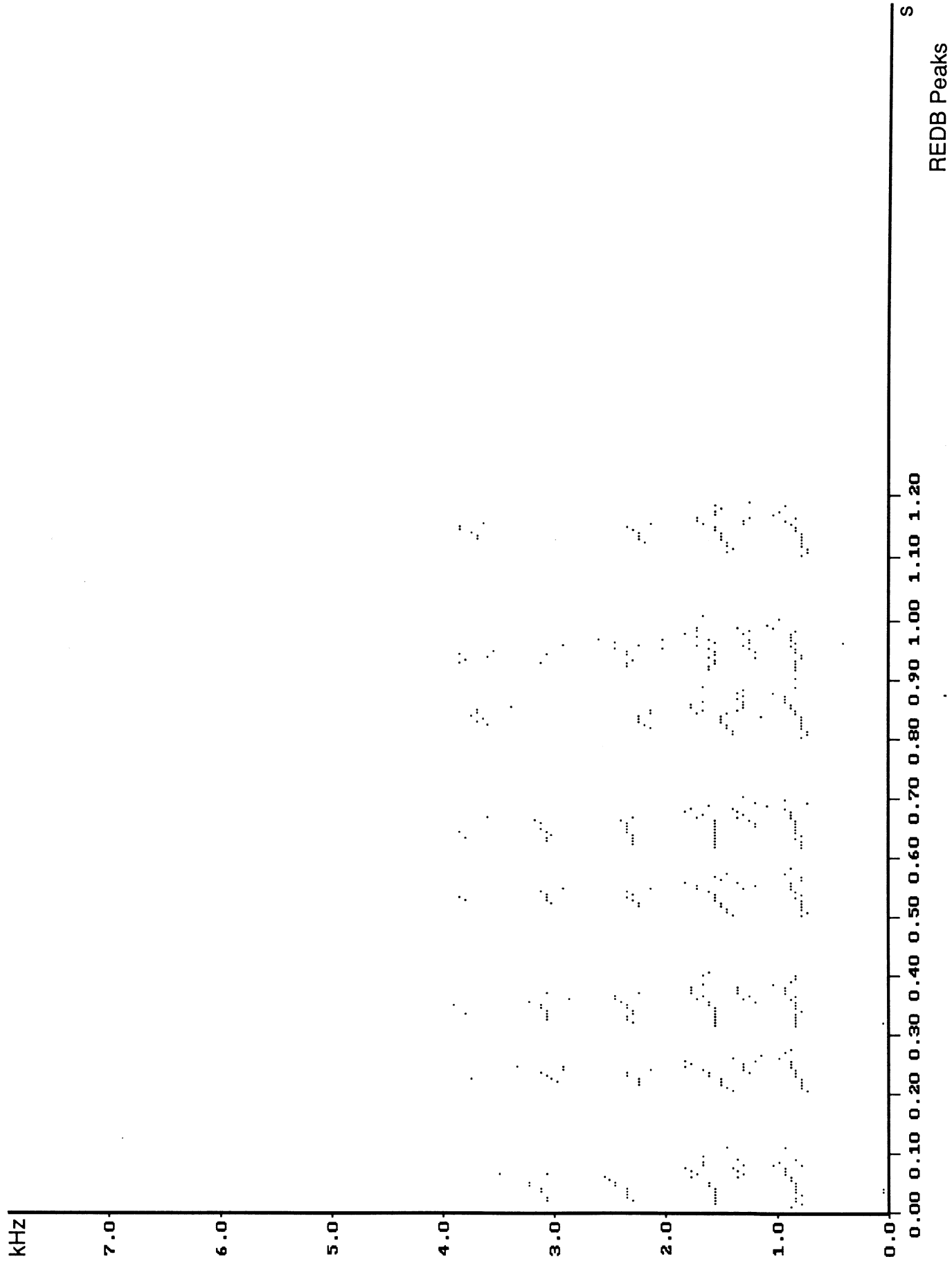
REDB1A.LPF
snr: 20

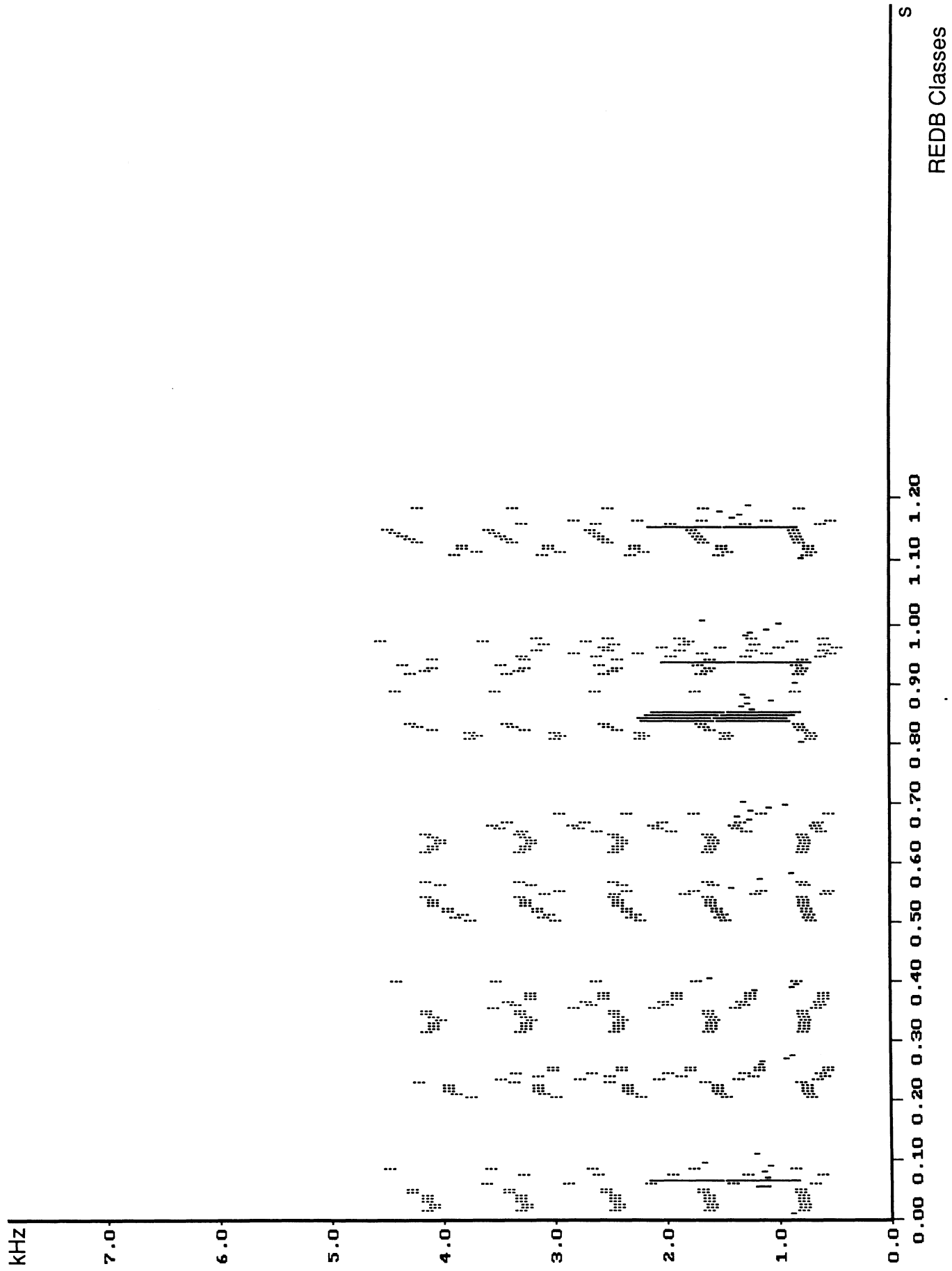
REDB1A.CF
High_pass_freq: 0.3 kHz
Distance_thresh: 0.3 kHz
Class_mag_thresh: 10 times background

REDB1A.E
Dominance_ratio: 0.9 of entire element
END REDB1A.E
END REDB1A.CF
END REDB1A.LPF
END REDB1A.SF
END REDB1.ADS
```

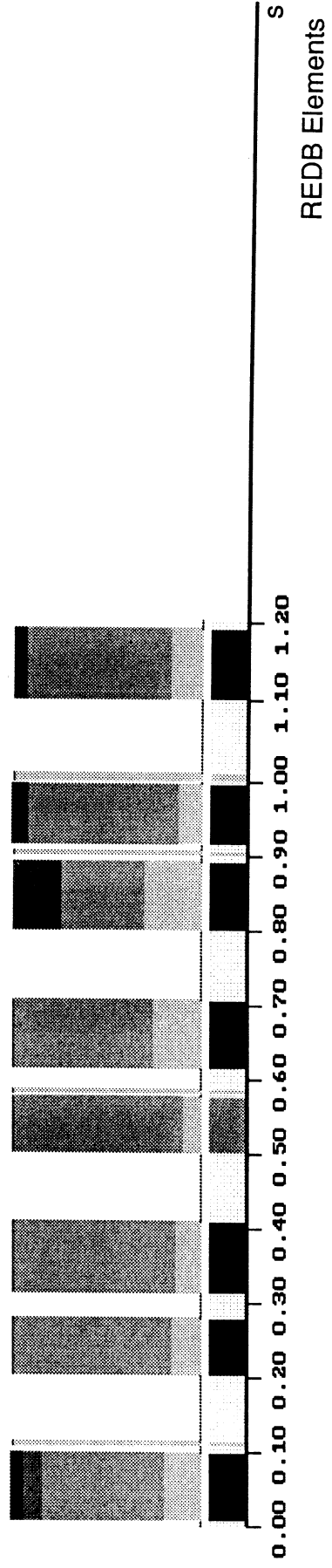
F1.1.2 REDB Plots







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.1.3 REDB Elements

Element text file

DURN 9.97 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 0.94 CLASS MIXED SINGLE: 0.196 HARMONIC: 0.648	MULTIPLE: 0.099	NOISE: 0.056
DURN 9.97 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 4.99 FREQ 1.19 CLASS SINGLE SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 74.81 FREQ 0.77 CLASS MIXED SINGLE: 0.159 HARMONIC: 0.841	MULTIPLE: 0.000	NOISE: 0.000
DURN 34.91 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 94.76 FREQ 0.81 CLASS MIXED SINGLE: 0.137 HARMONIC: 0.863	MULTIPLE: 0.000	NOISE: 0.000
DURN 94.76 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 74.81 FREQ 0.80 CLASS HARMONIC SINGLE: 0.099 HARMONIC: 0.901	MULTIPLE: 0.000	NOISE: 0.000
DURN 4.99 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 4.99 FREQ 0.89 CLASS SINGLE SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 29.92 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 0.87 CLASS MIXED SINGLE: 0.261 HARMONIC: 0.739	MULTIPLE: 0.000	NOISE: 0.000
DURN 94.76 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 1.09 CLASS MIXED SINGLE: 0.309 HARMONIC: 0.437	MULTIPLE: 0.000	NOISE: 0.254
DURN 9.97 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 4.99 FREQ 0.83 CLASS SINGLE SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 9.97 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 79.80 FREQ 0.82 CLASS MIXED SINGLE: 0.126 HARMONIC: 0.798	MULTIPLE: 0.000	NOISE: 0.075
DURN 4.99 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 9.97 FREQ 1.33 CLASS SINGLE SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 89.77 FREQ 0.93 CLASS MIXED SINGLE: 0.172 HARMONIC: 0.765	MULTIPLE: 0.000	NOISE: 0.063
DURN 9.97 FREQ 0.00 CLASS SILENT SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000

F1.1.4 REDB Syntax Specification

SYNTAX SPECIFICATION

BIRD: Redbilled Hornbill

Although the syntax is simple, the spec is longish because there is no syntax for iteration. Also provision for short "pip"s after the main "honks" are provided. The syntax as specified here is that the call should consist of no less than three pairs of honks, each honk can be followed by a little pip. The number three is arbitrary - probably not true in general.

ELEMENTS:

Honk: Essential
frequency 0.75 to 1.15 kHz
duration 70 to 100 ms
single 18 harmonic 78 multiple 0 noise 4 %
occurrence_distance 20 %

Honk-first-to-second:
silence 20 to 40 ms

Inter-double-honk:
silence 70 to 100 ms

Pip:
frequency 0.8 to 1.4 kHz
duration 3 to 12 ms
single 100 harmonic 0 multiple 0 noise 0 %
occurrence_distance 10 %

Honk-to-Pip:
silence 3 to 12 ms

GeneralSilence:
silence 0 to 0 ms

SYNTAX:

Double_honk_1:
Honk Inter_honk_silence_1 Inter_honk_1

Inter_honk_1:
Honk-to-Pip First_pip_1

First_pip_1:
Pip Inter_honk_silence_1

Inter_honk_silence_1:
Honk-first-to-second Second_honk_1

Second_honk_1:
Honk After_honk_1 Inter_double_1

After_honk_1:
Honk-to-Pip Second_pip_1

Second_pip_1:
Pip Inter_double_1

Inter_double_1:
Inter-double-honk Double_honk_2

Double_honk_2:
Honk Inter_honk_silence_2 Inter_honk_2

Inter_honk_2:
Honk-to-Pip First_pip_2

First_pip_2:
Pip Inter_honk_silence_2

Inter_honk_silence_2:
Honk-first-to-second Second_honk_2

Second_honk_2:

```
Honk After_honk_2 Inter_double_2

After_honk_2:
  Honk-to-Pip Second_pip_2

Second_pip_2:
  Pip Inter_double_2

Inter_double_2:
  Inter-double-honk Double_honk_3


Double_honk_3:
  Honk Inter_honk_silence_3 Inter_honk_3

Inter_honk_3:
  Honk-to-Pip First_pip_3

First_pip_3:
  Pip Inter_honk_silence_3

Inter_honk_silence_3:
  Honk-first-to-second Second_honk_3

Second_honk_3:
  Honk After_honk_3 Loop

After_honk_3:
  Honk-to-Pip Second_pip_3

Second_pip_3:
  Pip Loop

Loop:
  GeneralSilence Double_honk_1
```

F1.1.5 REDB Track

Track/s of call in REDB1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
>
| SILENT 10.0 --- INTER_DOUBLE 2: 1
| MIXED 89.8 --- DOUBLE_HONK_3: 4
| SILENT 10.0 --- INTER_HONK_3: 4
| SINGLE 5.0 --- FIRST_PIP_3: 4
| SILENT 89.8 --- INTER_HONK_SILENCE_3: 1
| MIXED 74.8 --- SECOND_HONK_3: 4
| SILENT 34.9 --- LOOP: 4
| MIXED 94.8 --- DOUBLE_HONK_1: 4
| SILENT 94.8 --- INTER_HONK_SILENCE_1: 1
| HARMONIC 74.8 --- SECOND_HONK_1: 4
| SILENT 5.0 --- AFTER_HONK_1: 4
| SINGLE 5.0 --- SECOND_PIP_1: 4
| SILENT 29.9 --- INTER_DOUBLE_1: 1
| MIXED 89.8 --- DOUBLE_HONK_2: 4
| SILENT 94.8 --- INTER_HONK_SILENCE_2: 1
| MIXED 89.8 --- SECOND_HONK_2: 3
| SILENT 10.0 --- AFTER_HONK_2: 4
| SINGLE 5.0 --- SECOND_PIP_2: 4
| SILENT 10.0 --- INTER_DOUBLE_2: 1
| MIXED 79.8 --- DOUBLE_HONK_3: 4
| SILENT 5.0 --- INTER_HONK_3: 4
| SINGLE 10.0 --- FIRST_PIP_3: 4
| SILENT 89.8 --- INTER_HONK_SILENCE_3: 1
| MIXED 89.8 --- SECOND_HONK_3: 4
| SILENT 10.0 --- AFTER_HONK_3: 4
|
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 0
| Match total 78
```

Syntax spec: SOUT.S (Southern Boubou)

```
>
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 89.77 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 4.99 --- no match
| >
| SILENT 89.8 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 74.81 --- no match
| >
| SILENT 34.9 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 94.76 --- no match
| >
| SILENT 94.8 --- C_WHEEP-WHEEO_3: 4
| >
| HARMONIC 74.81 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 4.99 --- no match
| >
| SILENT 29.9 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 89.77 --- no match
| >
| SILENT 94.8 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 89.77 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 4.99 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
```

```
| >  
| MIXED 79.80 --- no match  
| >  
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4  
| >  
| SINGLE 9.97 --- no match  
| >  
| SILENT 89.8 --- C_WHEEP-WHEEO_3: 4  
| >  
| MIXED 89.77 --- no match  
| >  
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4  
|  
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:  
| Failures 24  
| Match total 52  
-----
```

Syntax spec: GREY.S (Grey Lourie)

```
| Essentials not present.  
-----
```

Syntax spec: FISC.S (Fiscal Shrike)

```
-----  
| >  
| SILENT 10.0 --- LOOP: 4  
| >  
| MIXED 89.77 --- no match  
| >  
| SILENT 10.0 --- LOOP: 4  
| >  
| SINGLE 4.99 --- no match  
| >  
| SILENT 89.8 --- SECOND_SILENCE: 1  
| MIXED 74.8 --- WHISTLE_NODE: 2  
| SILENT 34.9 --- THIRD_SILENCE: 1  
| >  
| MIXED 94.76 --- no match  
| >  
| SILENT 94.8 --- SECOND_SILENCE: 1  
| HARMONIC 74.8 --- WHISTLE_NODE: 2  
| SILENT 5.0 --- THIRD_SILENCE: 1  
| >  
| SINGLE 4.99 --- no match  
| >  
| SILENT 29.9 --- LOOP: 4  
| >  
| MIXED 89.77 --- no match  
| >  
| SILENT 94.8 --- LOOP: 4  
| >  
| MIXED 89.77 --- no match  
| >  
| SILENT 10.0 --- LOOP: 4  
| >  
| SINGLE 4.99 --- no match  
| >  
| SILENT 10.0 --- SECOND_SILENCE: 1  
| MIXED 79.8 --- WHISTLE_NODE: 2  
| SILENT 5.0 --- THIRD_SILENCE: 1  
| >  
| SINGLE 9.97 --- no match  
| >  
| SILENT 89.8 --- LOOP: 4  
| >  
| MIXED 89.77 --- no match  
| >  
| SILENT 10.0 --- LOOP: 4  
|  
| Score for C:\BCR\BIRDS\FISC\FISC.S:  
| Failures 18  
| Match total 40  
-----
```

Syntax spec: HOOP.S (African Hoopoe)

```
| Essentials not present.  
-----
```

Syntax spec: MOUR.S (Mourning Dove)

```
>
SILENT 10.0 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 89.8 --- LOOP: 4
>
MIXED 74.81 --- no match
>
SILENT 34.9 --- LOOP: 4
>
MIXED 94.76 --- no match
>
SILENT 94.8 --- LOOP: 4
>
HARMONIC 74.81 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 29.9 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 94.8 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 10.0 --- LOOP: 4
>
MIXED 79.80 --- no match
>
SILENT 5.0 --- LOOP: 4
SINGLE 10.0 --- KREOW_1: 2
SILENT 89.8 --- KREOW_1S: 1
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4

Score for C:\BCR\BIRDS\MOUR\MOUR.S:
Failures 22
Match total 51
```

Syntax spec: OLIV.S (Olivetree Warbler)

```
>
SILENT 10.0 --- KRIK TO KREEUP: 1
MIXED 89.8 --- KREEUP_18: 2
SILENT 10.0 --- KREEUP_19: 1
>
SINGLE 5.0 --- KRRR_38: 2
SILENT 89.8 --- LOOP: 4
>
MIXED 74.81 --- no match
>
SILENT 34.9 --- KRRREK TO KRUP: 1
MIXED 94.8 --- KRUP_10: 2
SILENT 94.8 --- KRUP_11: 1
>
HARMONIC 74.81 --- no match
>
SILENT 5.0 --- KRRR_37: 1
SINGLE 5.0 --- KRRR_38: 2
SILENT 29.9 --- LOOP: 4
>
MIXED 89.8 --- KREEUP_18: 2
SILENT 94.8 --- KREEUP_19: 1
>
MIXED 89.8 --- KREEUP_18: 2
SILENT 10.0 --- KREEUP_19: 1
>
```

```
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 10.0 --- LOOP: 4
| >
| MIXED 79.80 --- no match
| >
| SILENT 5.0 --- KRUP TO KRIK: 1
| SINGLE 10.0 --- KRIK_14: 2
| SILENT 89.8 --- KRIK_15: 1
| >
| MIXED 89.8 --- KREEUP 18: 2
| SILENT 10.0 --- KREEUP_19: 1
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 11
| Match total 40
-----
```

Syntax spec: JACO.S (Jacobin Cuckoo)

```
-----
| Essentials not present.
-----
```

Syntax spec: CROW.S (Pied Crow)

```
-----
| Essentials not present.
-----
```

Syntax spec: SWAI.S (Swainson's Francolin)

```
-----
| Essentials not present.
-----
```

Syntax spec: WILL.S (Willow Warbler)

```
-----
| >
| SILENT 10.0 --- NODE_30: 4
| MIXED 89.8 --- NODE_31: 2
| SILENT 10.0 --- NODE_32: 1
| >
| SINGLE 5.0 --- NODE_25: 2
| SILENT 89.8 --- NODE_26: 1
| MIXED 74.8 --- NODE_27: 2
| SILENT 34.9 --- NODE_28: 1
| >
| MIXED 94.76 --- no match
| >
| SILENT 94.8 --- NODE_26: 1
| HARMONIC 74.8 --- NODE_27: 2
| SILENT 5.0 --- NODE_28: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 29.9 --- NODE_36: 1
| >
| MIXED 89.8 --- NODE_31: 2
| SILENT 94.8 --- NODE_32: 4
| >
| MIXED 89.8 --- NODE_31: 2
| SILENT 10.0 --- NODE_32: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 10.0 --- NODE_36: 1
| >
| MIXED 79.80 --- no match
| >
| SILENT 5.0 --- NODE_8: 1
| SINGLE 10.0 --- NODE_9: 2
| SILENT 89.8 --- NODE_10: 4
| >
| MIXED 89.8 --- NODE_31: 2
| SILENT 10.0 --- NODE_32: 1
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 10
| Match total 42
-----
```

```

>
SILENT 10.0 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 89.8 --- LOOP: 4
>
MIXED 74.81 --- no match
>
SILENT 34.9 --- STOWEET SILENCE: 1
MIXED 94.8 --- WEET NODE: 2
SILENT 94.8 --- LOOP: 4
>
HARMONIC 74.81 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 29.9 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 94.8 --- LOOP: 4
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 4.99 --- no match
>
SILENT 10.0 --- LOOP: 4
>
MIXED 79.80 --- no match
>
SILENT 5.0 --- IS_1S: 4
SINGLE 10.0 --- IS_2: 2
SILENT 89.8 --- IS_2S: 1
>
MIXED 89.77 --- no match
>
SILENT 10.0 --- LOOP: 4
>
Score for C:\BCR\BIRDS\MONO\MONO.S:
Failures 20
Match total 50

```

F1.1.6 REDB Trial results

Recognition scores for call REDB1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
Redbilled Hornbill	Y	4.00	0	78
Southern Boubou	Y	1.77	24	52
Grey Lourie	N	2.38		
Fiscal Shrike	Y	1.50	18	40
African Hoopoe	N	1.25		
Mourning Dove	Y	1.57	22	51
Olivetree Warbler	Y	1.10	11	40
Jacobin Cuckoo	N	2.38		
Pied Crow	N	1.67		
Swainson's Francolin	N	1.50		
Willow Warbler	Y	1.30	10	42
Monotonous Lark	Y	1.94	20	50

F1.2 SOUT
Southern Boubou
Lanarius ferrugineus
736 (709)

F1.2.1 SOUT Bird Call Descriptor

```
SOUT1.ADS Southern Boubou Shrike 736 (709)
Sampling_frequency: 20 kHz

SOUT1A.SF
Window_duration: 5.000000000000000E+0000 ms
Frequency_resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 100 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 402
Max_magnitude: 2.79408648400307E+0004
Background_mag: 7.3896611943E+01

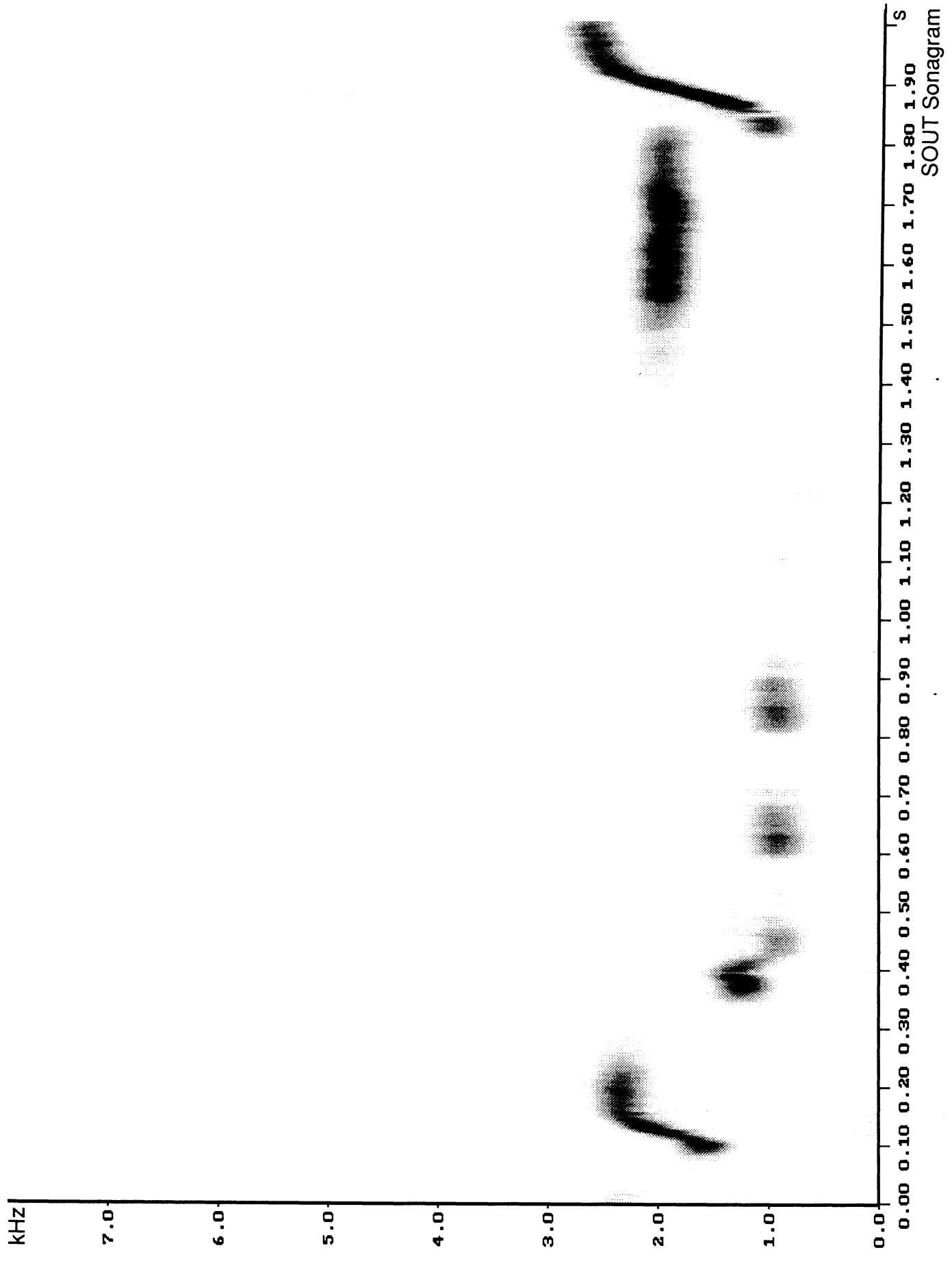
SOUT1A.SS Sonagram storage file
Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.500000000000000E+0001
LinesPerMsec: 4.000000000000091E-0001
END SOUT1A.SS

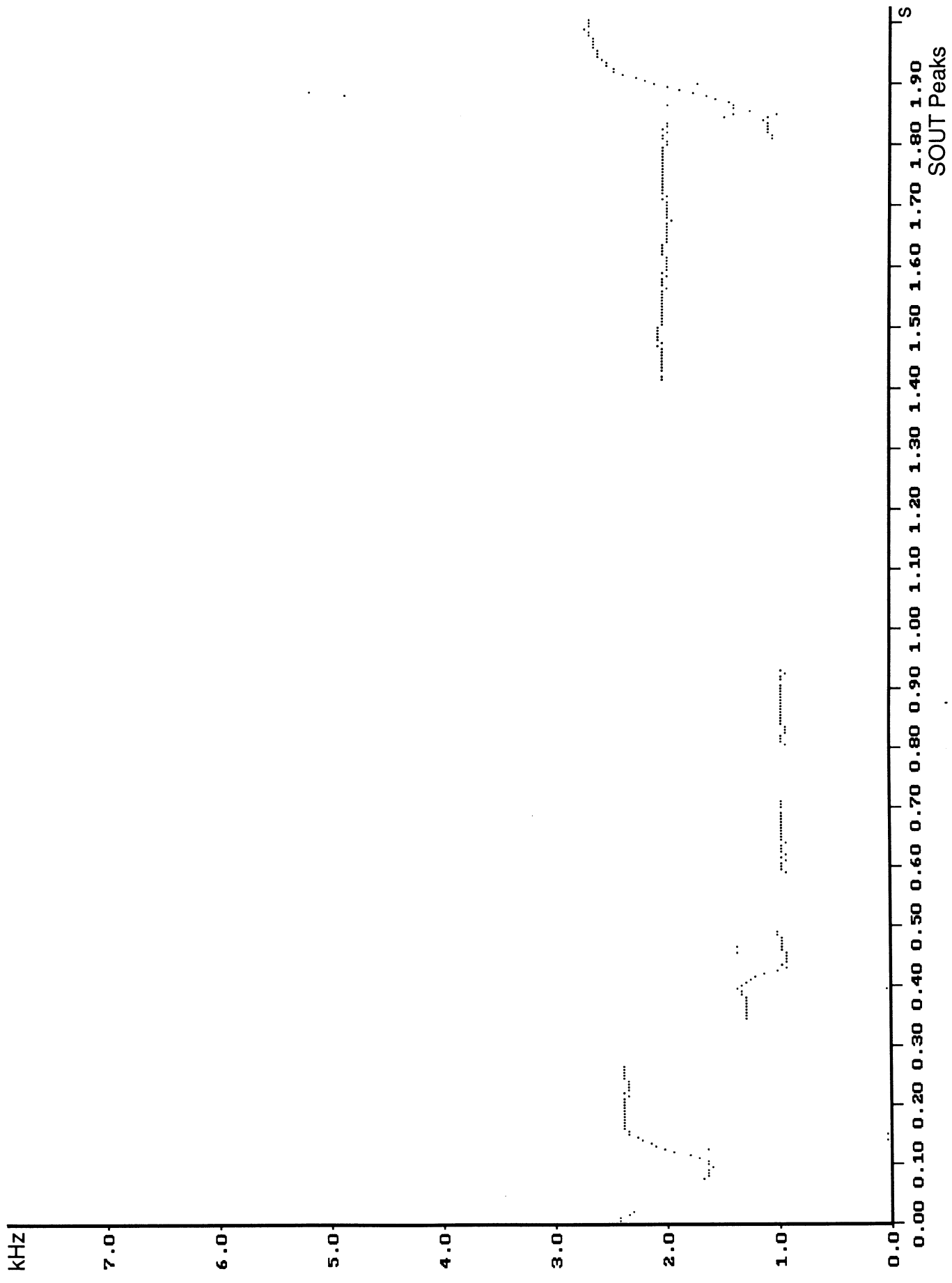
SOUT1A.LPF Linked Peak frame file
snr: 20

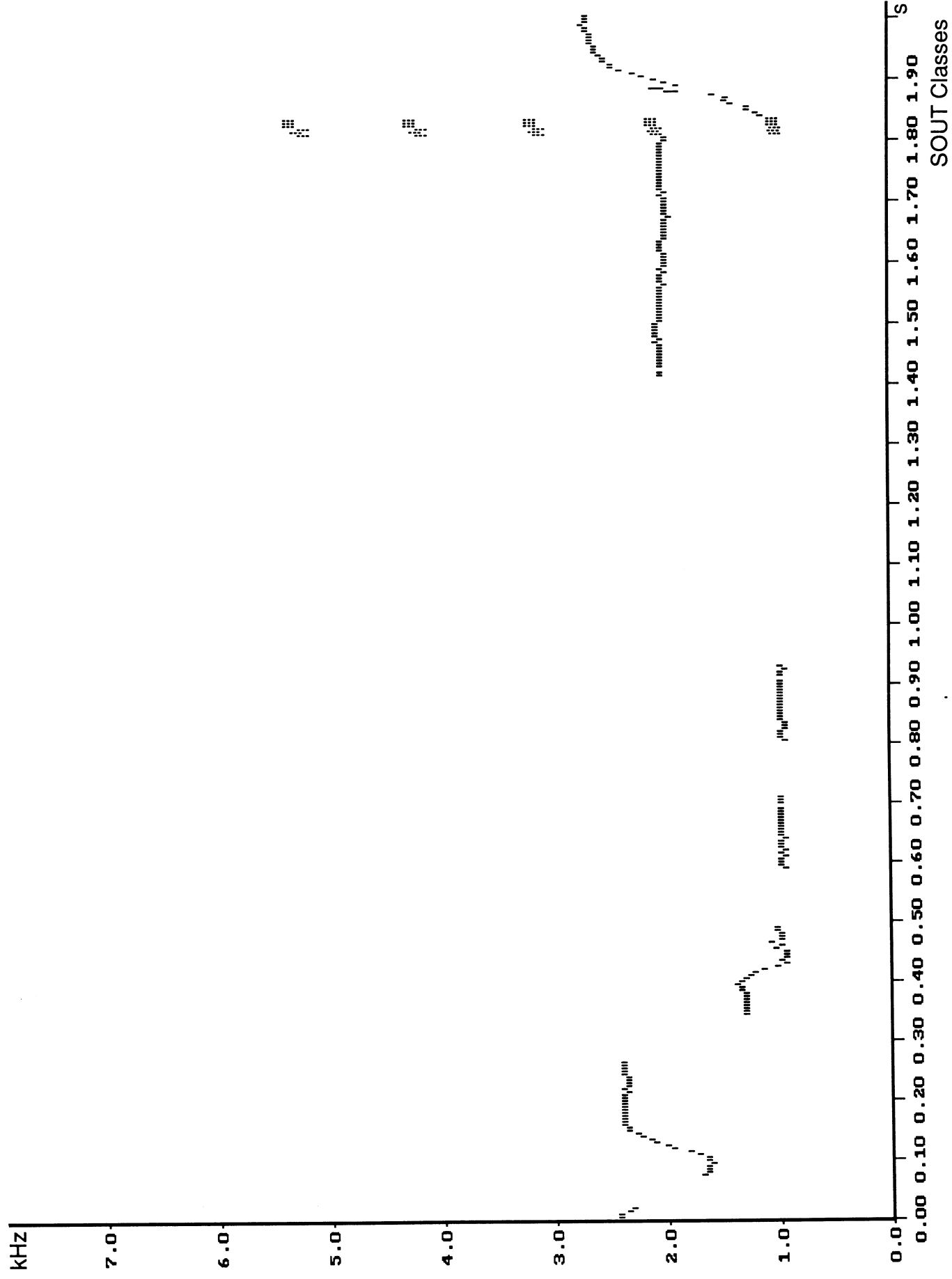
SOUT1A.CF Classified frame file
High_pass_freq: 0.5 kHz (lower cutoff)
Distance_thresh: 0.3 kHz between adjacent peaks
Class_mag_thresh: 0 times background magnitude

SOUT1A.E Elements file
Dominance_ratio: 0.9
END SOUT1A.E
END SOUT1A.CF
END SOUT1A.LPF
END SOUT1A.SF
END SOUT1.ADS
```

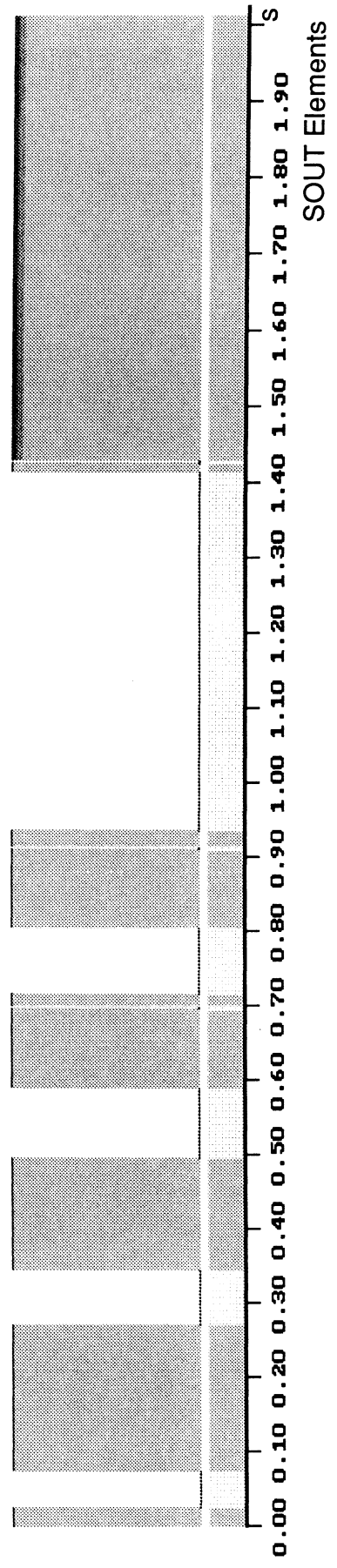
F1.2.2 SOUT Plots







☐ MIXED
☐ NOISE
☒ MULTIPLE
☐ HARMONIC
☐ SINGLE
☐ SILENT



F1.2.3 SOUT Elements

Element text file

DURN 25.00 FREQ 2.38 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 50.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 195.00 FREQ 2.17 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 75.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 150.00 FREQ 1.14 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 95.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 105.00 FREQ 0.97 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 15.00 FREQ 0.98 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 90.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 105.00 FREQ 0.97 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 20.00 FREQ 0.97 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 480.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 10.00 FREQ 2.03 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 580.00 FREQ 2.02 CLASS SINGLE			
SINGLE: 0.946	HARMONIC: 0.029	MULTIPLE: 0.025	NOISE: 0.000

F1.2.4 SOUT Syntax Specification

SYNTAX SPECIFICATION

NOTES

Calls are often duets. This spec illustrates how duets may be specified.

Swoop-Twhee is actually composed of a call and answer which overlap in time and thus appear as a single element. To be comprehensive, the syntax spec should have separate Swoop and a Twhee elements if these can occur separately in some order in nature.

Due to lack of information at this stage, sequences will be assumed to occur in arbitrary order, although in reality it may be impossible for a particular sequence to initiate a duet, or to be followed by some other sequence.

According to Roberts, the initiating and responding sequences always differ, so this has been taken into account:

Let us say there are four types of sequence. They are duplicated, one set being used as the initiating call (prefix C_) and one as the responding call (prefix R). If we call the four types A B C and D, then the last node of the C_A sequence leads to R_B, R_C and R_D, ie R_A is omitted from the possibilities. Similarly R_B is omitted from the list of C_B's last node, and so on.

In this example only the three sequences (Wheep-wheeo keeu-ko-ko and swoop-twhee) occurring in the sample are included in the spec - the other two mentioned in Roberts are left out. In addition, swoop-twhee spec corresponds to the sequence (or rather element) in the sample, which was cut short, and is therefore not true to life.

BIRD: Southern Boubou

ELEMENTS:

Wheep:

frequency 2 to 2.4 kHz (no sample - visual estimate from Roberts)
duration 180 to 220 ms (ditto)
single 100 harmonic 0 multiple 0 noise 0 % (ditto)
occurrence_distance 10 %

WheepToWheeo:

silence 40 to 60 ms

Wheeo:

frequency 2.1 to 2.3 kHz (2.17)
duration 180 to 210 ms (195)
single 100 harmonic 0 multiple 0 noise 0 % (100 0 0 0)
occurrence_distance 10 %

Keeu:

frequency 1.0 to 1.3 kHz (1.14)
duration 140 to 160 ms (150)
single 100 harmonic 0 multiple 0 noise 0 % (100 0 0 0)
occurrence_distance 10 %

KeeuToKoToKo:

silence 85 to 100 ms (95, 90)

Ko:

frequency 0.9 to 1.1 kHz (0.97, 0.97)
duration 95 to 115 ms (105, 105)
single 100 harmonic 0 multiple 0 noise 0 % (100 0 0 0)
occurrence_distance 10 %

KoToEnd:

silence 2 to 12 ms

KoEnd:

frequency 0.95 to 1.05 kHz (0.98, 0.97)
duration 12 to 22 ms
single 100 harmonic 0 multiple 0 noise 0 % (100 0 0 0)
occurrence_distance 10 %

SwoopStart:
frequency 1.9 to 2.1 (2.03)
duration 8 to 17 ms (10)
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

StartToSwoop:
silence 2 to 12 ms

SwoopTwhee:
frequency 1.8 to 2.2 kHz (2.02)
duration 560 to 600 ms (580)
single 95 harmonic 3 multiple 2 noise 0
occurrence_distance 20 %

GeneralSilence:
silence 0 to 0 ms

CtoRsilence:
silence 0 to 100 ms (total guess)

SYNTAX:

Start:
GeneralSilence C_Wheep-wheeo_0 C_Keeu-ko-ko_0 C_Swoop-twhee_0

C_Wheep-Wheeo_0:
Wheep C_Wheep-wheeo_1

C_Wheep-wheeo_1:
WheepToWheeo C_Wheep-Wheeo_2

C_Wheep-wheeo_2:
Wheeo C_Wheep-wheeo_3

C_Wheep-wheeo_3:
CtoRsilence R_Keeu-ko-ko_0 R_Swoop-twhee_0

C_Keeu-ko-ko_0:
Keeu C_Keeu_ko_ko_1

C_Keeu_ko_ko_1:
KeeuToKoToKo C_Keeu-ko-ko_2

C_Keeu-ko-ko_2:
Ko C_Keeu-ko-ko_2.1 C_Keeu-ko-ko_3

C_Keeu-ko-ko_2.1:
KoToEnd C_Keeu-ko-ko_2.2

C_Keeu-ko-ko_2.2:
KoEnd C_Keeu-ko-ko_3

C_Keeu-ko-ko_3:
KeeutoKoToKo C_Keeu-ko-ko_4

C_Keeu-ko-ko_4:
Ko C_Keeu-ko-ko_4.1 C_Keeu-ko-ko_5

C_Keeu-ko-ko_4.1:
KoToEnd C_Keeu-ko-ko_4.2

C_Keeu-ko-ko_4.2:
KoEnd C_Keeu-ko-ko_5

C_Keeu-ko-ko_5:
CtoRsilence R_Wheep-wheeo_0 R_Swoop-twhee_0

C_Swoop-twhee_0:
SwoopTwhee C_Swoop-twhee_1

C_Swoop-twhee_1:
CtoRsilence R_Wheep-wheeo_0 R_Keeu-ko-ko_0

R_Wheep-Wheeo_0:
Wheep R_Wheep-wheeo_1

```

R_Weep-wheeo_1:
  WheepToWheeo R_Weep-Wheeo_2

R_Weep-wheeo_2:
  Wheeo R_Weep-wheeo_3

R_Weep-wheeo_3:
  . Start

R_Keeu-ko-ko_0:
  Keeu R_Keeu_ko_ko_1

R_Keeu_ko_ko_1:
  KeeuToKoToKo R_Keeu-ko-ko_2

R_Keeu-ko-ko_2:
  Ko R_Keeu-ko-ko_2.1 R_Keeu-ko-ko_3

R_Keeu-ko-ko_2.1:
  KoToEnd R_Keeu-ko-ko_2.2

R_Keeu-ko-ko_2.2:
  KoEnd R_Keeu-ko-ko_3

R_Keeu-ko-ko_3:
  KeeutoKoToKo R_Keeu-ko-ko_4

R_Keeu-ko-ko_4:
  Ko R_Keeu-ko-ko_4.1 R_Keeu-ko-ko_5

R_Keeu-ko-ko_4.1:
  KoToEnd R_Keeu-ko-ko_4.2

R_Keeu-ko-ko_4.2:
  KoEnd R_Keeu-ko-ko_5

R_Keeu-ko-ko_5:
  . Start

R_Swoop-twhee_0:
  SwoopTwhee R_Swoop-twhee_1

R_Swoop-twhee_1:
  . Start

```

F1.2.5 SOUT Track

Track/s of call in SOUT1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SINGLE 25.00 --- no match
| >
| SILENT 50.0 --- C_WHEEP-WHEEO_1: 4
| SINGLE 195.0 --- C_WHEEP-WHEEO_2: 4
| SILENT 75.0 --- C_WHEEP-WHEEO_3: 4
| SINGLE 150.0 --- R_KEEU-KO-KO_0: 4
| SILENT 95.0 --- R_KEEU-KO-KO_1: 4
| SINGLE 105.0 --- R_KEEU-KO-KO_2: 4
| SILENT 5.0 --- R_KEEU-KO-KO_2.1: 4
| SINGLE 15.0 --- R_KEEU-KO-KO_2.2: 4
| SILENT 90.0 --- R_KEEU-KO-KO_3: 4
| SINGLE 105.0 --- R_KEEU-KO-KO_4: 4
| SILENT 5.0 --- R_KEEU-KO-KO_4.1: 4
| SINGLE 20.0 --- R_KEEU-KO-KO_4.2: 4
| SILENT 480.0 --- START: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| SINGLE 580.0 --- R_SWOOP-TWHEE_0: 4
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 3
Match total 60

Syntax spec: GREY.S (Grey Lourie)

Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

| >
| SINGLE 25.00 --- no match
| >
| SILENT 50.0 --- LOOP: 4
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- LOOP: 4
| >
| SINGLE 150.00 --- no match
| >
| SILENT 95.0 --- LOOP: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 90.0 --- LOOP: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 480.0 --- LOOP: 4
| >
| >
| >

```

| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 17
| Match total 32
|-----

```

Syntax spec: HOOP.S (African Hoopoe)

```

| >
| SINGLE 25.00 --- no match
| >
| SILENT 50.0 --- LOOP: 4
| SINGLE 195.0 --- HOOP_1 NODE: 2
| SILENT 75.0 --- INTER_HOOP NODE: 1
| SINGLE 150.0 --- HOOP_2 NODE: 2
| SILENT 95.0 --- LOOP: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 90.0 --- LOOP: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 480.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\HOOP\HOOP.S:
| Failures 13
| Match total 33
|-----

```

Syntax spec: MOUR.S (Mourning Dove)

```

| >
| SINGLE 25.0 --- R_1: 2
| SILENT 50.0 --- R_1S: 1
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- LOOP: 4
| >
| SINGLE 150.00 --- no match
| >
| SILENT 95.0 --- LOOP: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| SINGLE 15.0 --- KREOW_1: 4
| SILENT 90.0 --- KREOW_1S: 1
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| SINGLE 20.0 --- KREOW_1: 4
| SILENT 480.0 --- KREOW_1S: 1
| SINGLE 10.0 --- KREOW_2: 2
| SILENT 5.0 --- KREOW_2S: 1
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:

```

| Failures 10
| Match total 32

Syntax spec: OLIV.S (Olivetree Warbler)

| >
| SINGLE 25.0 --- KRR 28: 2
| SILENT 50.0 --- LOOP: 4
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- KRRR_TO_LAST: 1
| >
| SINGLE 150.00 --- no match
| >
| SILENT 95.0 --- KRRREK TO KRUP: 1
| SINGLE 105.0 --- KRUP_10: 2
| SILENT 5.0 --- KRUP_11: 1
| >
| SINGLE 15.0 --- KRRR_36: 2
| SILENT 90.0 --- KRRR_37: 1
| >
| SINGLE 105.0 --- KRUP_10: 2
| SILENT 5.0 --- KRUP_11: 1
| SINGLE 20.0 --- KRUP_12: 2
| SILENT 480.0 --- LOOP: 4
| >
| SINGLE 10.0 --- T_NODE: 2
| SILENT 5.0 --- T_TO_KRR: 1
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 9
| Match total 26

Syntax spec: JACO.S (Jacobin Cuckoo)

| >
| SINGLE 25.00 --- no match
| >
| SILENT 50.0 --- LOOP: 4
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- LOOP: 4
| SINGLE 150.0 --- J_NODE 1: 2
| SILENT 95.0 --- FIRST_SILENCE: 1
| SINGLE 105.0 --- J_NODE 2: 2
| SILENT 5.0 --- SECOND_SILENCE: 1
| >
| SINGLE 15.0 --- EXCEPTION_NODE_6: 2
| SILENT 90.0 --- LOOP: 4
| >
| SINGLE 105.0 --- J_NODE 2: 2
| SILENT 5.0 --- SECOND_SILENCE: 1
| >
| SINGLE 20.0 --- EXCEPTION_NODE_6: 2
| SILENT 480.0 --- LOOP: 4
| >
| SINGLE 10.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\JACO\JACO.S:
| Failures 9
| Match total 35

Syntax spec: CROW.S (Pied Crow)

| Essentials not present.

Syntax spec: SWAI.S (Swainson's Francolin)

| Essentials not present.

Syntax spec: WILL.S (Willow Warbler)

| >
| SINGLE 25.0 --- NODE_23: 2
| SILENT 50.0 --- NODE_24: 1
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- NODE_40: 4
| >
| SINGLE 150.00 --- no match
| >
| SILENT 95.0 --- NODE_40: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- NODE_8: 1
| SINGLE 15.0 --- NODE_9: 2
| SILENT 90.0 --- NODE_10: 4
| >
| SINGLE 105.00 --- no match
| >
| SILENT 5.0 --- NODE_6: 4
| SINGLE 20.0 --- NODE_7: 2
| SILENT 480.0 --- NODE_8: 1
| SINGLE 10.0 --- NODE_9: 2
| SILENT 5.0 --- NODE_10: 1
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 10
| Match total 28

Syntax spec: MONO.S (Monotonous Lark)

| >
| SINGLE 25.00 --- no match
| >
| SILENT 50.0 --- LOOP: 4
| >
| SINGLE 195.00 --- no match
| >
| SILENT 75.0 --- LOOP: 4
| >
| SINGLE 150.00 --- no match
| >
| SILENT 95.0 --- STOWEET SILENCE: 1
| SINGLE 105.0 --- WEET_NODE: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 15.0 --- S_2: 2
| SILENT 90.0 --- STOWEET SILENCE: 1
| SINGLE 105.0 --- WEET_NODE: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 480.0 --- IS_1S: 1
| SINGLE 10.0 --- IS_2: 3
| SILENT 5.0 --- IS_2S: 4
| >
| SINGLE 580.00 --- no match
|
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 10
| Match total 32

F1.2.6 SOUT Trial results

Recognition scores for call SOUT1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	N	2.50		
Southern Boubou	Y	4.00	3	60
Grey Lourie	N	2.00		
Fiscal Shrike	Y	1.63	17	32
African Hoopoe	Y	3.00	13	33
Mourning Dove	Y	1.71	10	32
Olivetree Warbler	Y	1.48	9	26
Jacobin Cuckoo	Y	2.38	9	35
Pied Crow	N	1.67		
Swainson's Francolin	N	2.17		
Willow Warbler	Y	1.07	10	28
Monotonous Lark	Y	2.06	10	32

F1.3 GREY
Grey Lourie
Corythaixoides concolor
373 (339)

F1.3.1 GREY Bird Call Descriptor

```
GREY1.ADS Southern Boubou Shrike 373 (339)
  Sampling_frequency: 20 kHz

GREY1A.SF
  Window_duration: 5.000000000000000E+0000 ms
  Frequency_resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)
  FFT_Length: 512 points
  Window_length: 100 samples (filled in by SPECTRA)
  Window_type: Hamming
  Start_time: 0 ms
  Finish_time: -1 (to end of data)
  Number_of_frames: 402
  Max_magnitude: 2.85036948606670E+0004
  Background_mag: 9.4329848804E+01

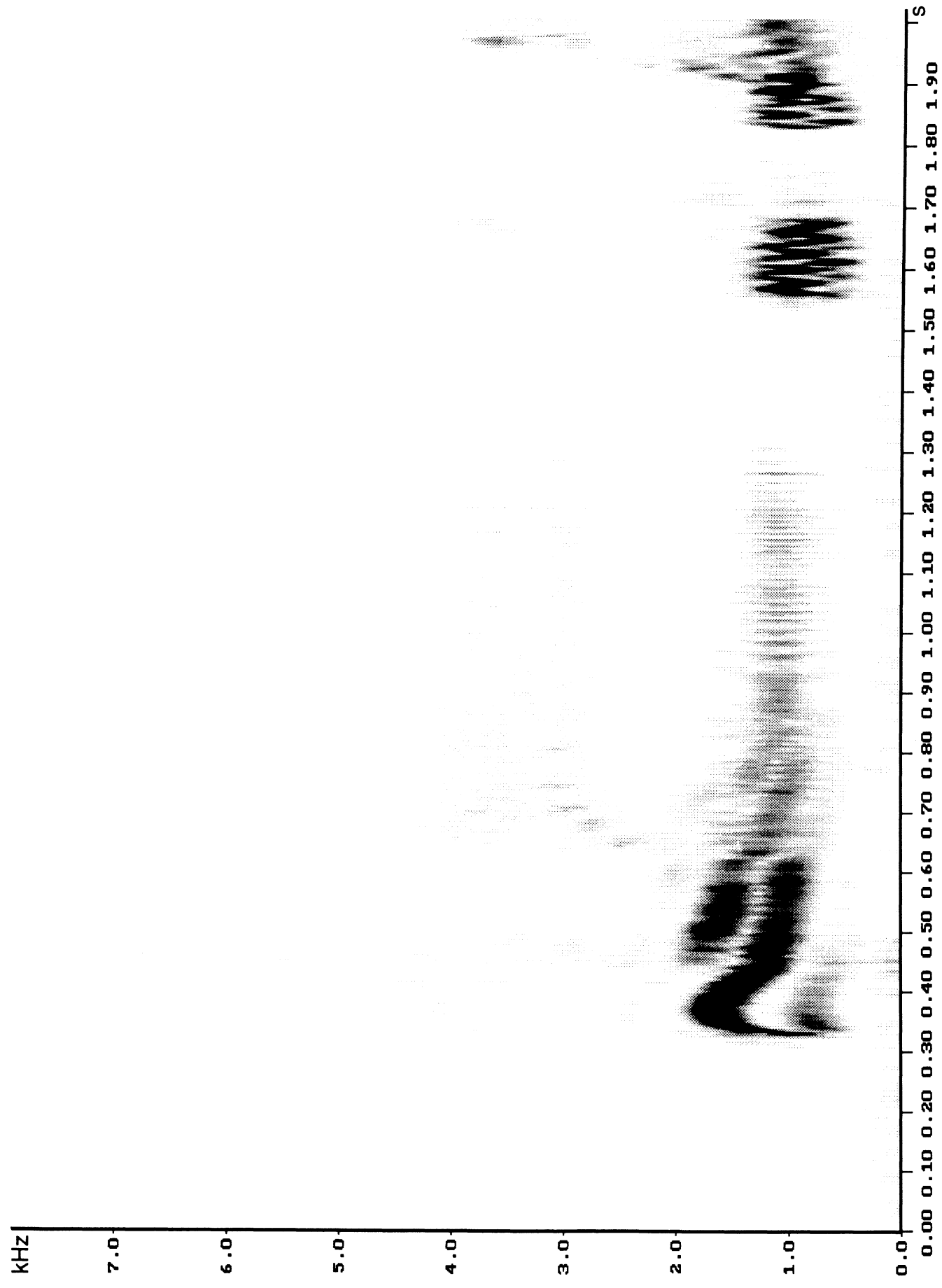
GREY1A.SS Sonagram storage file
  Frequency_scale: 8 kHz full scale screen width
  Time_scale: 500 ms full scale screen length
  Min_factor: 0.0 of max magnitude
  Max_factor: 0.5 of max magnitude
  PixelsPerkHz: 7.500000000000000E+0001
  LinesPerMsec: 4.000000000000091E-0001
END GREY1A.SS

GREY1A.LPF Linked Peak frame file
  snr: 20

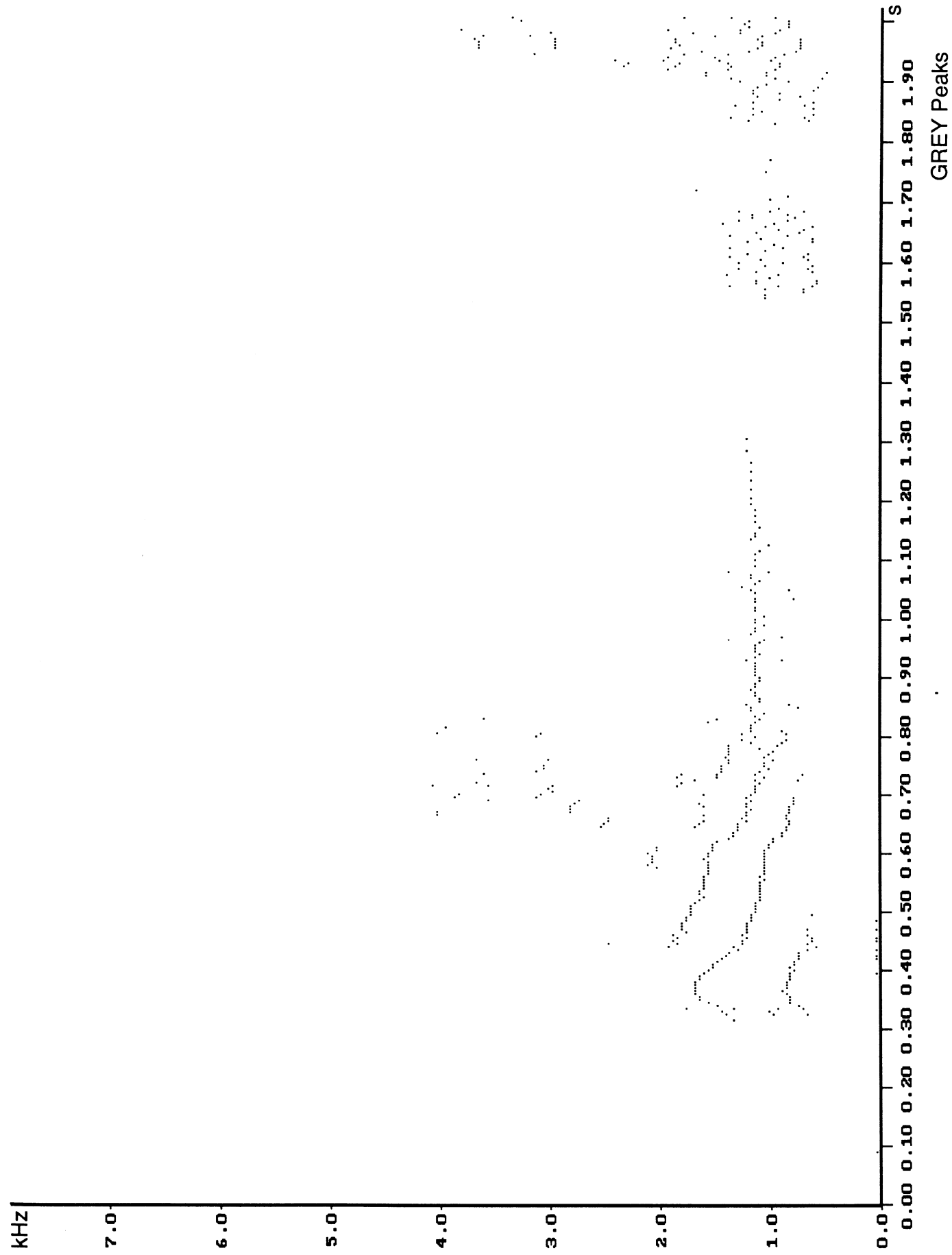
GREY1A.CF Classified frame file
  High_pass_freq: 0.3 kHz (lower cutoff)
  Distance_thresh: 0.3 kHz between adjacent peaks
  Class_mag_thresh: 0 times background

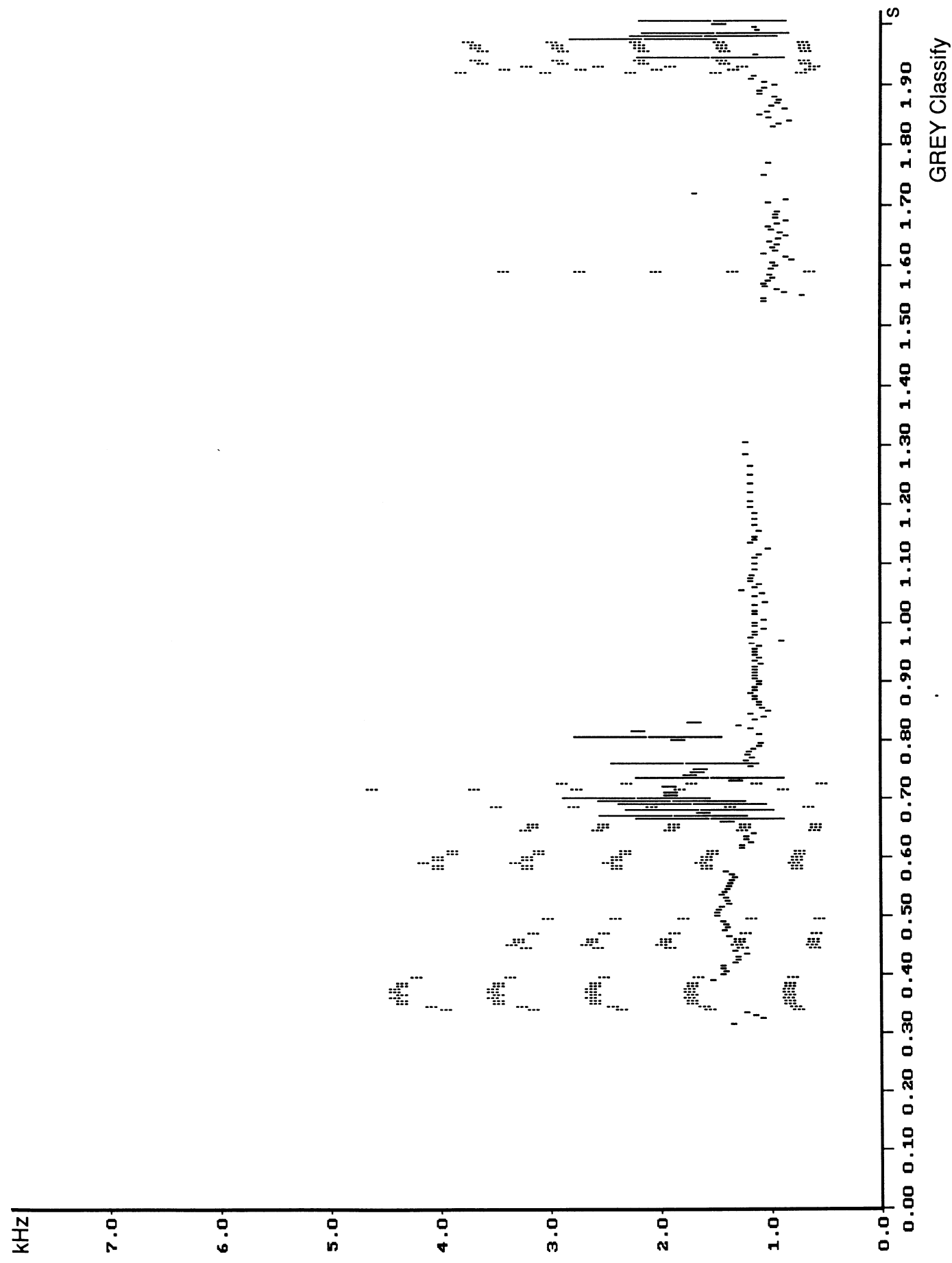
  GREY1A.E
    Dominance_ratio: 0.9
  END GREY1A.E
END GREY1A.CF
END GREY1A.LPF
END GREY1A.SF
END GREY1.ADS
```

F1.3.2 GREY Plots

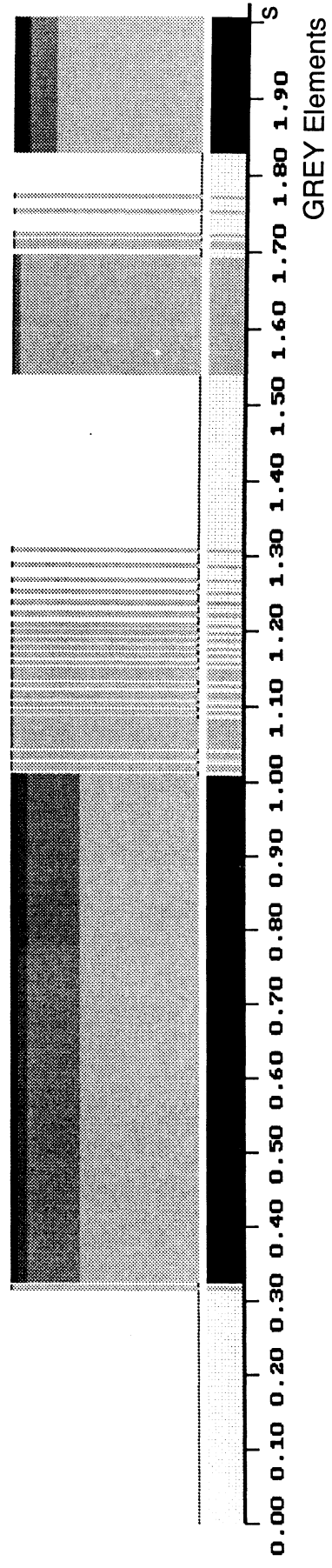


GREY Sonagram





MIXED
NOISE
MULTIPLE
HARMONIC
SINGLE
SILENT



F1.3.3 GREY Elements

Element text file

DURN 310.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.33	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 685.00	FREQ 1.20	CLASS MIXED		
SINGLE: 0.640	HARMONIC: 0.281	MULTIPLE: 0.046	NOISE: 0.033	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.13	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.09	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 40.00	FREQ 1.15	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.13	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.13	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.11	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.02	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.15	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.09	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.13	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.13	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

GREY Elements F30

DURN 180.00 FREQ 1.04 CLASS MIXED
SINGLE: 0.785 HARMONIC: 0.135 MULTIPLE: 0.013 NOISE: 0.067

F1.3.4 GREY Syntax Specification

SYNTAX SPECIFICATION

BIRD: Grey Lourie

Allows a "Gwaa" followed by optional, indefinite trail of short "y"s, which are quicker and then slower. "Gwaayy" is followed by either one or two "Croak"s, which can optionally have trailers (or not) made up of same "y"s and either of the two inter-y gaps. This syntax spec doesn't loop, so multiple Gwaay's will add an extra failure each.

ELEMENTS:

Gwaa-: Essential (main part of gwaayyyy)
frequency 1 to 1.4 kHz (1.2)
duration 650 to 700 ms (685)
single 64 harmonic 28 multiple 5 noise 3 %
occurrence_distance 10 %

-yk1silence: (silences in the first part of the trailing -yyyy, and in -kkkk)
silence 3 to 8 ms (5)

-yk2silence: (silences in the second part of the trailing -yyyy, and in -kkkk)
silence 9 to 17 ms (10, 15)

y:
frequency 1.05 to 1.2 kHz (1.09...1.17)
duration 3 to 12 ms (5,10)
single 100 harmonic 0 multiple 0 noise 0 %
occurrence_distance 10 %

GwayToCroak:
silence 220 to 240 ms (230)

Croak:
frequency 0.85 to 1.10 kHz (0.94, 1.05)
duration 145 to 190 ms (155, 180)
single 85 harmonic 10 multiple 0 noise 5 %
occurrence_distance 20 %

k:
frequency 0.9 to 1.05 kHz
duration 3 to 12 ms
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

InterCroak:
silence 50 to 100 ms (55, but more if croak trailers are suppressed)

SYNTAX:

Gway_node:
Gwaa- Gway_trail_1

Gway_trail_1:
-yk1silence Gway_trail_2

Gway_trail_2:
y Gway_trail_1 Gway_trail_3

Gway_trail_3:
-yk2silence Gway_trail_4

Gway_trail_4:
y Gway_trail_3 Croak_1_node

Croak_1_node:
GwayToCroak Croak_1_sound

Croak_1_sound:
Croak Croak_1_trail Croak_2_node

Croak_2_node:
InterCroak Croak_2_sound

Croak_2_sound:

```

Croak Croak_2_trail

Croak_1_trail:
. Croak_1_trail_left Croak_1_trail_right

Croak_1_trail_left:
-yk1silence Croak_1_trail_sound

Croak_1_trail_right:
-yk2silence Croak_1_trail_sound

Croak_1_trail_sound:
k Croak_1_tFail Croak_2_node

Croak_2_trail:
. Croak_2_trail_left Croak_2_trail_right

Croak_2_trail_left:
-yk1silence Croak_2_trail_sound

Croak_2_trail_right:
-yk2silence Croak_2_trail_sound

Croak_2_trail_sound:
k Croak_2_tFail

```

F1.3.5 GREY Track

Track/s of call in GREY1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SILENT 310.0 --- C_WHEEP-WHEEO_3: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 685.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 40.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| >

```

| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 230.0 --- C_WHEEP-WHEEO_3: 1
| SINGLE 155.0 --- R_KEEU-KO-KO_0: 2
| SILENT 10.0 --- R_KEEU_KO_KO_1: 1
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 25.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 55.0 --- C_KEEU-KO-KO_5: 4
| MIXED 180.0 --- R_WHEEP-WHEEO_0: 2
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 50
| Match total 106

```

Syntax spec: GREY.S (Grey Lourie)

```

| >
| SILENT 310.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 2
| SILENT 5.0 --- GWAY TRAIL_3: 1
| >
| MIXED 685.0 --- GWAY_NODE: 4
| SILENT 5.0 --- GWAY TRAIL_1: 4
| SINGLE 10.0 --- GWAY TRAIL_2: 4
| SILENT 5.0 --- GWAY TRAIL_1: 4
| SINGLE 10.0 --- GWAY TRAIL_2: 4
| SILENT 5.0 --- GWAY TRAIL_1: 4
| >
| SINGLE 40.00 --- no match
| >
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 10.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 2
| SILENT 5.0 --- GWAY TRAIL_3: 1
| >
| SINGLE 15.00 --- no match
| >
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4
| SILENT 5.0 --- GWAY TRAIL_3: 1
| SINGLE 5.0 --- GWAY TRAIL_4: 4

```

```

| SILENT 5.0 --- GWAY_TRAIL_3: 1
| SINGLE 5.0 --- GWAY_TRAIL_4: 4
| SILENT 10.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 4
| SILENT 10.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 4
| SILENT 10.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 4
| SILENT 10.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 4
| SILENT 15.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 2
| SILENT 15.0 --- GWAY_TRAIL_3: 4
| SINGLE 5.0 --- GWAY_TRAIL_4: 2
| SILENT 230.0 --- CROAK_1_NODE: 4
| SINGLE 155.0 --- CROAK_1_SOUND: 4
| SILENT 10.0 --- CROAK_1_TRAIL_RIGHT: 4
| SINGLE 10.0 --- CROAK_1_TRAIL_SOUND: 4
| SILENT 5.0 --- CROAK_1_TRAIL_LEFT: 4
| SINGLE 5.0 --- CROAK_1_TRAIL_SOUND: 2
| SILENT 25.0 --- CROAK_1_TRAIL_LEFT: 1
| SINGLE 5.0 --- CROAK_1_TRAIL_SOUND: 2
| SILENT 15.0 --- CROAK_1_TRAIL_RIGHT: 4
| SINGLE 5.0 --- CROAK_1_TRAIL_SOUND: 4
| SILENT 55.0 --- CROAK_2_NODE: 4
| MIXED 180.0 --- CROAK_2_SOUND: 4
|
| Score for C:\BCR\BIRDS\GREY\GREY.S:
| Failures 5
| Match total 162
|-----

```

Syntax spec: FISC.S (Fiscal Shrike)

```

| >
| SILENT 310.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 685.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- THIRD_SILENCE: 1
| SINGLE 40.0 --- CHINK_NODE: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match

```

```

>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 230.0 --- LOOP: 4
>
SINGLE 155.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 10.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 25.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 55.0 --- LOOP: 4
>
MIXED 180.00 --- no match
Score for C:\BCR\BIRDS\FISC\FISC.S:
Failures 54
Match total 111
-----

```

Syntax spec: HOOP.S (African Hoopoe)

```

-----
| Essentials not present.
-----

```

Syntax spec: MOUR.S (Mourning Dove)

```

-----
| >
| SILENT 310.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 685.00 --- no match
| >

```

```

| SILENT 5.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW_1: 4
| SILENT 5.0 --- KREOW_1s: 1
| SINGLE 10.0 --- KREOW_2: 4
| SILENT 5.0 --- KREOW_2s: 1
| >
| SINGLE 40.0 --- ENDR_1: 3
| SILENT 5.0 --- ENDR_1s: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW_1: 4
| SILENT 5.0 --- KREOW_1s: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| SINGLE 15.0 --- KREOW_1: 4
| SILENT 5.0 --- KREOW_1s: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 230.0 --- LOOP: 4
| >
| SINGLE 155.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW_1: 2
| SILENT 5.0 --- KREOW_1s: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 25.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4

```

```

>
SINGLE 5.00 --- no match
>
SILENT 55.0 --- LOOP: 4
>
MIXED 180.00 --- no match
Score for C:\BCR\BIRDS\MOUR\MOUR.S:
Failures 45
Match total 115
-----

```

Syntax spec: OLIV.S (Olivetree Warbler)

```

>
SILENT 310.0 --- KRRR 37: 1
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
MIXED 685.00 --- no match
>
SILENT 5.0 --- TO T: 1
SINGLE 10.0 --- T_NODE: 2
SILENT 5.0 --- T_TO_KRR: 1
>
SINGLE 10.0 --- T_NODE: 2
SILENT 5.0 --- T_TO_KRR: 1
>
SINGLE 40.0 --- KRRR 32: 2
SILENT 5.0 --- KRRR 33: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 10.0 --- T_NODE: 2
SILENT 5.0 --- T_TO_KRR: 1
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 15.0 --- KRRR 36: 2
SILENT 5.0 --- KRRR 37: 1
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 230.0 --- TO T: 4
>
SINGLE 155.00 --- no match
>
SILENT 10.0 --- TO T: 1

```

```

| SINGLE 10.0 --- T_NODE: 2
| SILENT 5.0 --- T_TO_KRR: 1
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 25.0 --- LOOP: 4
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 55.0 --- LOOP: 4
| >
| MIXED 180.0 --- LAST_SOUND: 2
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 26
| Match total 140
|-----

```

Syntax spec: JACO.S (Jacobin Cuckoo)

```

| >
| SILENT 310.0 --- EXCEPTION_NODE_5: 1
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 685.00 --- no match
| >
| SILENT 5.0 --- EXCEPTION_NODE_5: 4
| SINGLE 10.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 10.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 40.00 --- no match
| >
| SILENT 5.0 --- EXCEPTION_NODE_5: 4
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 10.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 15.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2

```

```

| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 230.0 --- LOOP: 4
| SINGLE 155.0 --- J_NODE_1: 2
| SILENT 10.0 --- FIRST_SILENCE: 1
| >
| SINGLE 10.0 --- EXCEPTION_NODE_6: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 25.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 5.0 --- EXCEPTION_NODE_6: 2
| SILENT 55.0 --- LOOP: 4
| >
| MIXED 180.00 --- no match
|
| Score for C:\BCR\BIRDS\JACO\JACO.S:
| Failures 27
| Match total 156
|-----

```

Syntax spec: CROW.S (Pied Crow)

```

|-----
| Essentials not present.
|-----

```

Syntax spec: SWAI.S (Swainson's Francolin)

```

|-----
| Essentials not present.
|-----

```

Syntax spec: WILL.S (Willow Warbler)

```

|-----
| >
| SILENT 310.0 --- NODE_12: 1
| SINGLE 5.0 --- NODE_13: 2
| SILENT 5.0 --- NODE_14: 1
| >
| MIXED 685.00 --- no match
| >
| SILENT 5.0 --- NODE_8: 1
| SINGLE 10.0 --- NODE_9: 2
| SILENT 5.0 --- NODE_10: 1
| >
| SINGLE 10.0 --- NODE_29: 2
| SILENT 5.0 --- NODE_30: 4
| >
| SINGLE 40.0 --- NODE_39: 2
| SILENT 5.0 --- NODE_40: 4
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| SINGLE 10.0 --- NODE_23: 2
| SILENT 5.0 --- NODE_24: 4
| SINGLE 5.0 --- NODE_25: 2
| SILENT 5.0 --- NODE_26: 1
| >
| SINGLE 15.0 --- NODE_23: 2
| SILENT 5.0 --- NODE_24: 4
| SINGLE 5.0 --- NODE_25: 2
| SILENT 5.0 --- NODE_26: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| >

```

```

| SINGLE 5.0 --- NODE_35: 2
| SILENT 5.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 10.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 10.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 10.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 10.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 15.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 15.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 230.0 --- NODE_36: 1
| >
| SINGLE 155.00 --- no match
| >
| SILENT 10.0 --- NODE_22: 1
| SINGLE 10.0 --- NODE_23: 2
| SILENT 5.0 --- NODE_24: 4
| SINGLE 5.0 --- NODE_25: 2
| SILENT 25.0 --- NODE_26: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 15.0 --- NODE_36: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 55.0 --- NODE_36: 1
| >
| MIXED 180.00 --- no match
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 25
| Match total 93

```

Syntax spec: MONO.S (Monotonous Lark)

```

| >
| SILENT 310.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 685.00 --- no match
| >
| SILENT 5.0 --- IS_1S: 4
| SINGLE 10.0 --- IS_2: 2
| SILENT 5.0 --- IS_2S: 4
| SINGLE 10.0 --- IS_3: 2
| SILENT 5.0 --- IS_3S: 4
| >
| SINGLE 40.0 --- UP: 2
| SILENT 5.0 --- UTOP_SILENCE: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- IS_1S: 4
| SINGLE 10.0 --- IS_2: 2
| SILENT 5.0 --- IS_2S: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- S_1S: 1
| SINGLE 15.0 --- S_2: 2
| SILENT 5.0 --- STOWEET_SILENCE: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4

```

```

>
SINGLE 5.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 5.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 10.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 230.0 --- LOOP: 4
>
SINGLE 155.00 --- no match
>
SILENT 10.0 --- IS_1S: 4
SINGLE 10.0 --- IS_2: 2
SILENT 5.0 --- IS_2S: 4
>
SINGLE 5.00 --- no match
>
SILENT 25.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- LOOP: 4
>
SINGLE 5.00 --- no match
>
SILENT 55.0 --- LOOP: 4
>
MIXED 180.00 --- no match

Score for C:\BCR\BIRDS\MONO\MONO.S:
Failures 45
Match total 115
-----

```

F1.3.6 GREY Trial results

Recognition scores for call GREY1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	==	=====	=====	=====
Redbilled Hornbill	N	2.83		
Southern Boubou	Y	2.38	50	106
Grey Lourie	Y	4.00	5	162
Fiscal Shrike	Y	1.13	54	111
African Hoopoe	N	1.75		
Mourning Dove	Y	2.29	45	115
Olivetree Warbler	Y	1.68	26	140
Jacobin Cuckoo	Y	1.75	27	156
Pied Crow	N	1.67		
Swainson's Francolin	N	2.67		
Willow Warbler	Y	1.48	25	93
Monotonous Lark	Y	2.69	45	115

F1.4 FISC
Fiscal Shrike
Lanius collaris
732 (707)

F1.4.1 FISC Bird Call Descriptor

```
FISC1.ADS Fiscal Shrike 732 (707)
Sampling_frequency: 20 kHz

FISC1A.SF
Window_duration: 5.000000000000000E+0000 ms
Frequency_resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 100 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 402
Max_magnitude: 1.13909610511363E+0004
Background_mag: 1.1580608541E+02

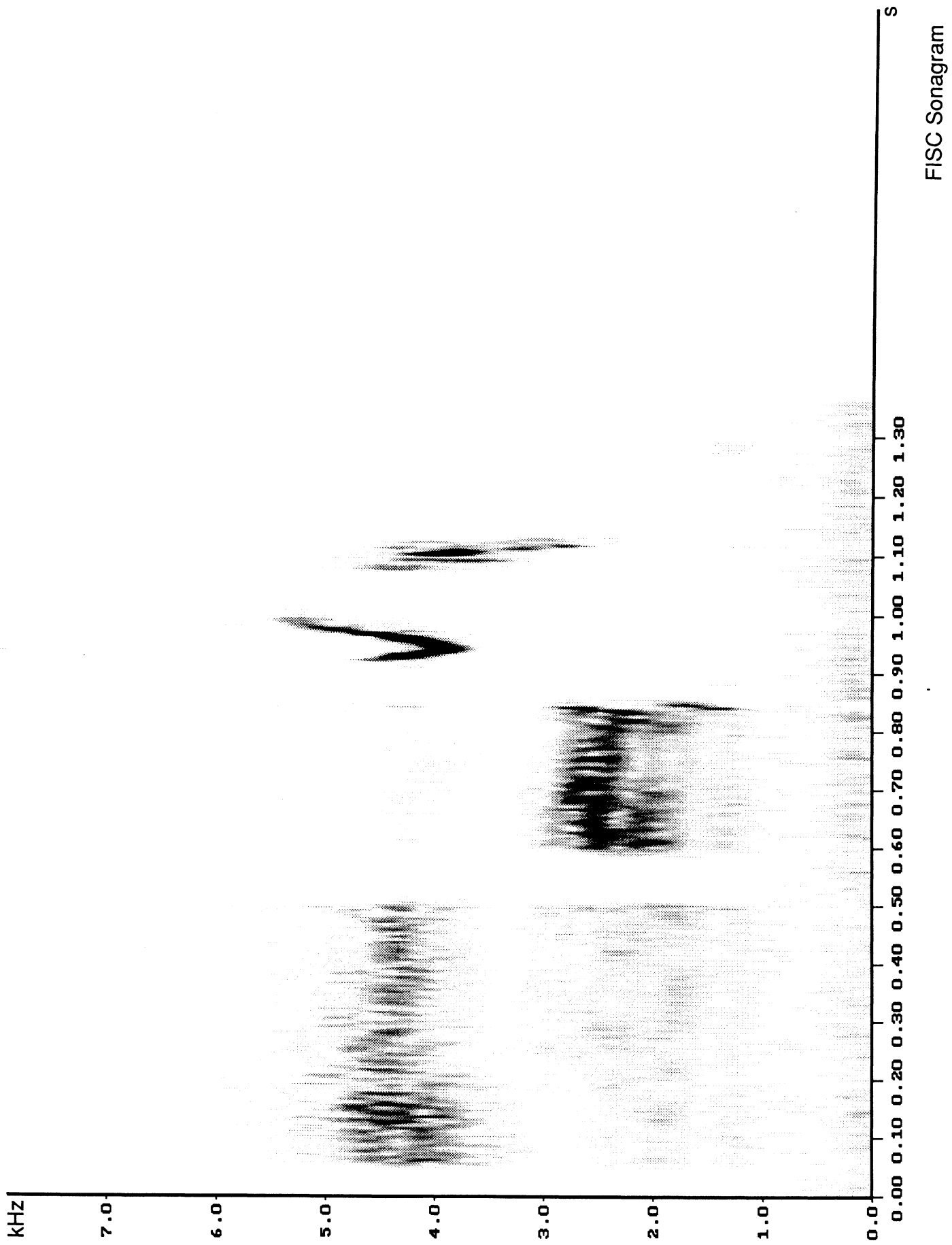
FISC1A.SS Sonagram storage file
Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.500000000000000E+0001
LinesPerMsec: 4.000000000000091E-0001
END FISC1A.SS

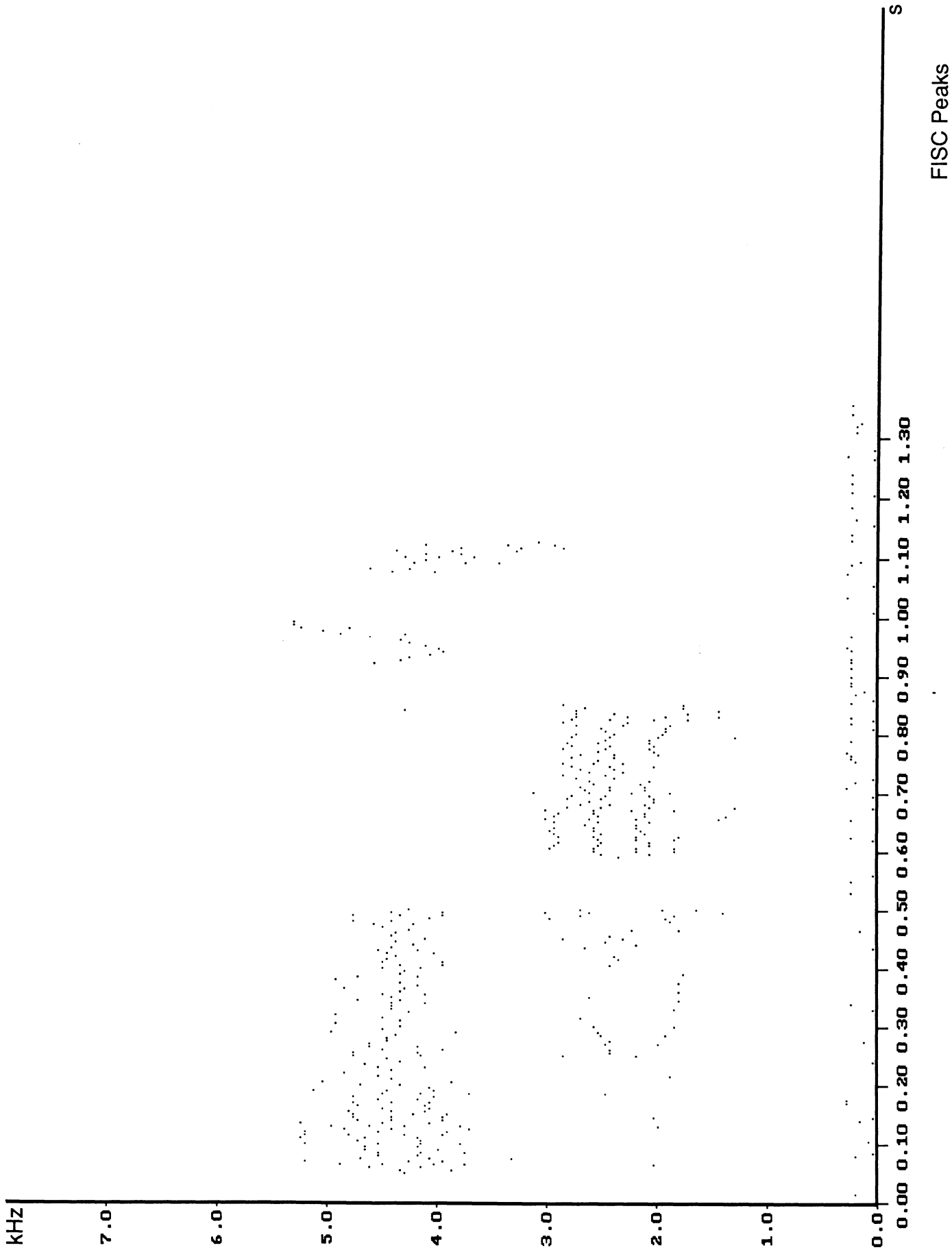
FISC1A.LPF Linked peak frame file
snr: 10

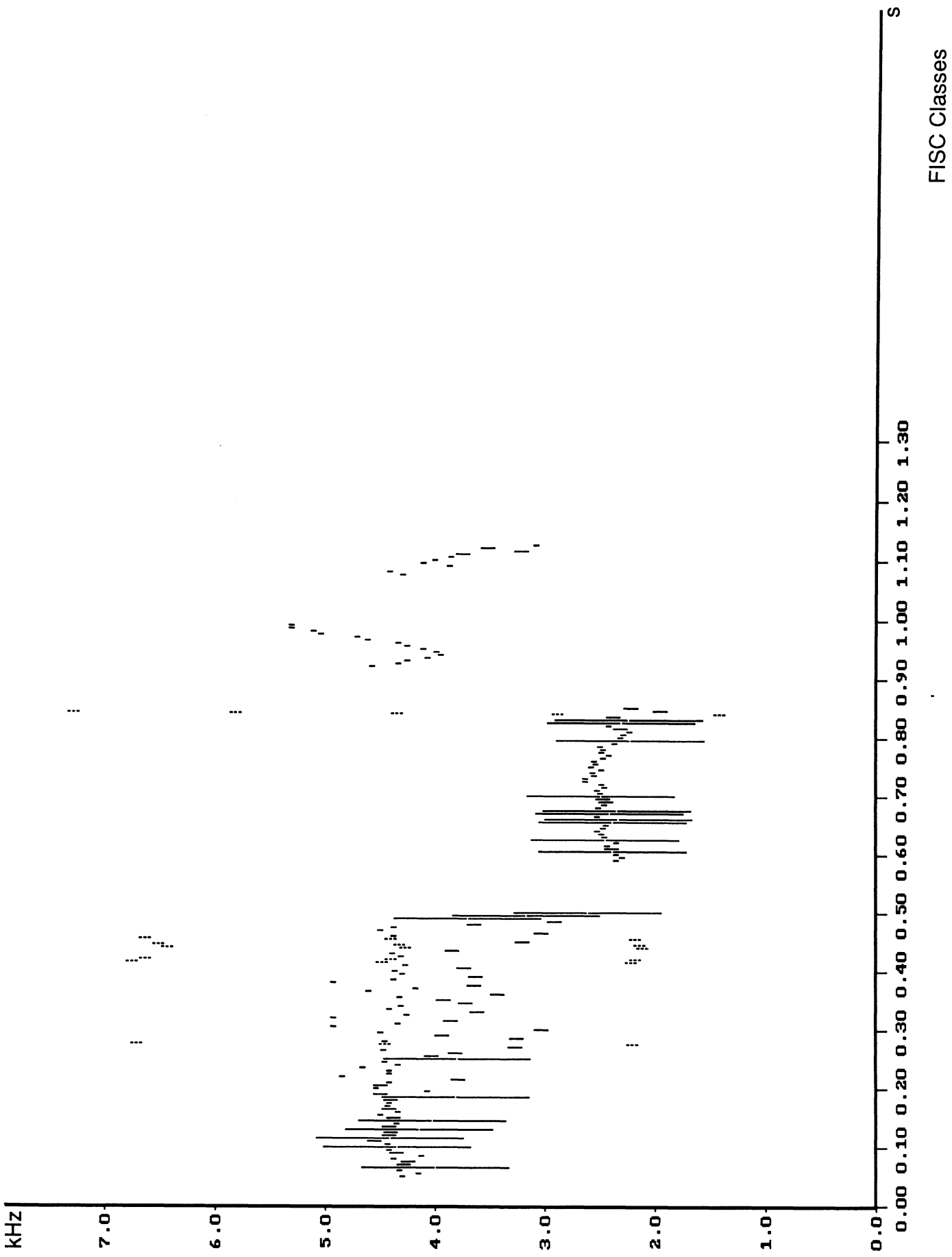
FISC1A.CF
High_pass_freq: 0.5 kHz (lower cutoff)
Distance_thresh: 0.3 kHz between adjacent peaks
Class_mag_thresh: 10 times background

FISC1A.E
Dominance_ratio: 0.9
END FISC1A.E
END FISC1A.CF
END FISC1A.LPF
END FISC1A.SF
END FISC1.ADS
```

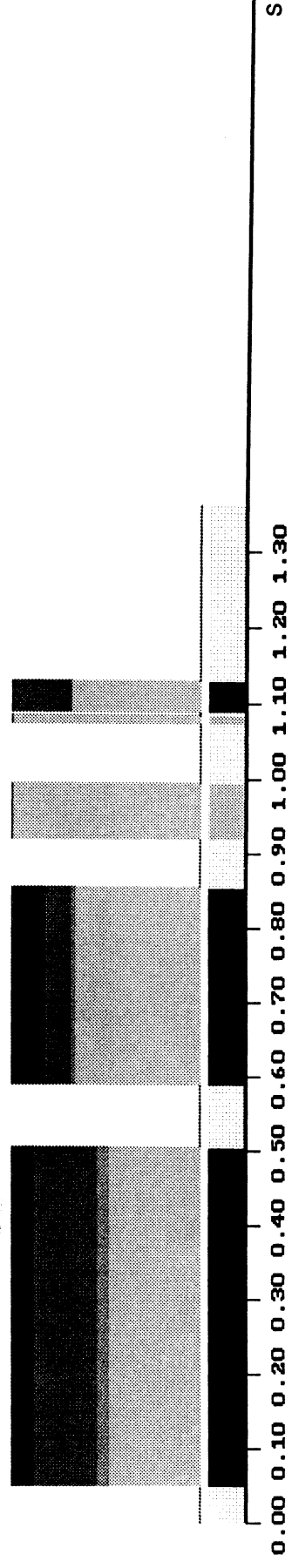
F1.4.2 FISC Plots







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



FISC Elements

F1.4.3 FISC Elements

Element text file

DURN 45.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 455.00 FREQ 4.01 CLASS MIXED			
SINGLE: 0.495	HARMONIC: 0.061	MULTIPLE: 0.339	NOISE: 0.105
DURN 85.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 265.00 FREQ 2.40 CLASS MIXED			
SINGLE: 0.674	HARMONIC: 0.024	MULTIPLE: 0.137	NOISE: 0.166
DURN 65.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 75.00 FREQ 4.53 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 80.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 10.00 FREQ 4.35 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 40.00 FREQ 3.67 CLASS MIXED			
SINGLE: 0.693	HARMONIC: 0.000	MULTIPLE: 0.307	NOISE: 0.000
DURN 880.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000

F1.4.4 FISC Syntax Specification

SYNTAX SPECIFICATION

BIRD: Fiscal Shrike

Simple loop of four distinct elements - actual calls are probably much more complex.

ELEMENTS:

Hiss:

frequency 3.95 to 4.05 kHz (4.01)
duration 450 to 460 ms (455)
single 50 harmonic 6 multiple 34 noise 10
occurrence_distance 10 %

HissToScrape:

silence 80 to 90 ms (85)

Scrape:

frequency 2.35 to 2.45 kHz (2.40)
duration 260 to 270 ms (265)
single 67 harmonic 2 multiple 14 noise 17
occurrence_distance 10 %

ScrapeToWhistle:

silence 60 to 70 ms (65)

Whistle:

frequency 4.4 to 4.6 kHz (4.53)
duration 70 to 80 ms (75)
single 100 harmonic 0 multiple 0 noise 0 %
occurrence_distance 10 %

WhistleToChink:

silence 75 to 85 ms (80)

Chink:

frequency 3.5 to 4.0 kHz (3.67, plus possibly the previous short element)
duration 30 to 60 ms (40, plus possibly the previous short element)
single 70 harmonic 0 multiple 30 noise 0 %
occurrence_distance 15 %

GeneralSilence:

silence 0 to 0 ms

SYNTAX:

Hiss_node:

Hiss First_silence

First_silence:

HissToScrape Scrape_node

Scrape_node:

Scrape Second_silence

Second_silence:

ScrapeToWhistle Whistle_node

Whistle_node:

Whistle Third_silence

Third_silence:

WhistleToChink Chink_node

Chink_node:

Chink Loop

Loop:

GeneralSilence Hiss_node

F1.4.5 FISC Track

Track/s of call in FISC1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
-----
| >
| SILENT 45.0 --- LOOP: 4
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- LOOP: 4
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- LOOP: 4
| SINGLE 75.0 --- DOUBLE_HONK_1: 2
| SILENT 80.0 --- INTER_HONK_SILENCE_1: 1
| >
| SINGLE 10.0 --- FIRST_PIP_1: 2
| SILENT 5.0 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 40.00 --- no match
| >
| SILENT 880.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 7
| Match total 22
|
-----
```

Syntax spec: SOUT.S (Southern Boubou)

```
-----
| >
| SILENT 45.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 75.00 --- no match
| >
| SILENT 80.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 40.00 --- no match
| >
| SILENT 880.0 --- C_WHEEP-WHEEO_3: 1
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 10
| Match total 21
|
-----
```

Syntax spec: GREY.S (Grey Lourie)

```
-----
| Essentials not present.
|
-----
```

Syntax spec: FISC.S (Fiscal Shrike)

```
-----
| >
| SILENT 45.0 --- LOOP: 4
| MIXED 455.0 --- HISS_NODE: 4
| SILENT 85.0 --- FIRST_SILENCE: 4
|
-----
```

```
| MIXED 265.0 --- SCRAPE_NODE: 4
| SILENT 65.0 --- SECOND_SILENCE: 4
| SINGLE 75.0 --- WHISTLE_NODE: 4
| SILENT 80.0 --- THIRD_SILENCE: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- THIRD_SILENCE: 1
| MIXED 40.0 --- CHINK_NODE: 4
| SILENT 880.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 2
| Match total 37
|-----
```

Syntax spec: HOOP.S (African Hoopoe)

```
| Essentials not present.
|-----
```

Syntax spec: MOUR.S (Mourning Dove)

```
| >
| SILENT 45.0 --- LOOP: 4
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- LOOP: 4
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- LOOP: 4
| >
| SINGLE 75.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW_1: 2
| SILENT 5.0 --- KREOW_1s: 1
| >
| MIXED 40.0 --- ENDR_1: 2
| SILENT 880.0 --- ENDR_1s: 1
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 7
| Match total 22
|-----
```

Syntax spec: OLIV.S (Olivetree Warbler)

```
| >
| SILENT 45.0 --- KRRR_TO_LAST: 1
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- KRRR_TO_LAST: 1
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- KRRR_TO_LAST: 1
| >
| SINGLE 75.00 --- no match
| >
| SILENT 80.0 --- TO T: 1
| SINGLE 10.0 --- T_NODE: 2
| SILENT 5.0 --- T_TO_KRR: 1
| >
| MIXED 40.0 --- KRRR_32: 2
| SILENT 880.0 --- KRRR_33: 1
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 7
| Match total 10
|-----
```

Syntax spec: JACO.S (Jacobin Cuckoo)

| Essentials not present.

Syntax spec: CROW.S (Pied Crow)

| >
| SILENT 45.0 --- LOOP: 4
| MIXED 455.0 --- FIRST_CAW: 2
| SILENT 85.0 --- FIRST_SILENCE: 1
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- LOOP: 4
| >
| SINGLE 75.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 40.00 --- no match
| >
| SILENT 880.0 --- LOOP: 4
| >
| Score for C:\BCR\BIRDS\CROW\CROW.S:
| Failures 8
| Match total 23

Syntax spec: SWAI.S (Swainson's Francolin)

| >
| SILENT 45.0 --- LOOP: 4
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- KR_3S: 1
| MIXED 265.0 --- AAK_NODE_1: 2
| SILENT 65.0 --- LOOP: 4
| >
| SINGLE 75.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| MIXED 40.0 --- KR_1L: 2
| SILENT 880.0 --- KR_1S: 1
| >
| Score for C:\BCR\BIRDS\SWAI\SWAI.S:
| Failures 6
| Match total 22

Syntax spec: WILL.S (Willow Warbler)

| >
| SILENT 45.0 --- NODE_40: 4
| >
| MIXED 455.00 --- no match
| >
| SILENT 85.0 --- NODE_40: 4
| >
| MIXED 265.00 --- no match
| >
| SILENT 65.0 --- NODE_26: 1
| SINGLE 75.0 --- NODE_27: 2
| SILENT 80.0 --- NODE_28: 4
| SINGLE 10.0 --- NODE_29: 2
| SILENT 5.0 --- NODE_30: 4
| >
| MIXED 40.0 --- NODE_39: 2
| SILENT 880.0 --- NODE_40: 4
|

```
| Score for C:\BCR\BIRDS\WILL\WILL.S:  
| Failures 5  
| Match total 27  
-----
```

```
Syntax spec: MONO.S ( Monotonous Lark)  
-----
```

```
| >  
| SILENT 45.0 --- LOOP: 4  
| >  
| >  
| MIXED 455.00 --- no match  
| >  
| SILENT 85.0 --- LOOP: 4  
| >  
| MIXED 265.00 --- no match  
| >  
| SILENT 65.0 --- LOOP: 4  
| >  
| SINGLE 75.00 --- no match  
| >  
| SILENT 80.0 --- IS_1S: 1  
| SINGLE 10.0 --- IS_2: 2  
| SILENT 5.0 --- IS_2S: 4  
| >  
| MIXED 40.0 --- UP: 2  
| SILENT 880.0 --- UTOP_SILENCE: 1  
|  
| Score for C:\BCR\BIRDS\MONO\MONO.S:  
| Failures 7  
| Match total 22  
-----
```

F1.4.6 FISC Trial results

Recognition scores for call FISC1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	Y	2.83	7	22
Southern Boubou	Y	2.00	10	21
Grey Lourie	N	1.75		
Fiscal Shrike	Y	4.00	2	37
African Hoopoe	N	2.00		
Mourning Dove	Y	1.43	7	22
Olivetree Warbler	Y	1.10	7	10
Jacobin Cuckoo	N	1.75		
Pied Crow	Y	2.33	8	23
Swainson's Francolin	Y	2.17	6	22
Willow Warbler	Y	1.15	5	27
Monotonous Lark	Y	1.88	7	22

F1.5 HOOP

Hoopoe

Upupa epops

451 (418)

F1.5.1 HOOP Bird Call Descriptor

```
HOOP1.ADS Hoopoe 451 (418)
  Sampling_frequency: 20 kHz

HOOP1A.SF
  Window_duration: 5.000000000000000E+0000 ms
  Frequency_resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)
  FFT_Length: 512 points
  Window_length: 100 samples (filled in by SPECTRA)
  Window_type: Hamming
  Start_time: 0 ms
  Finish_time: -1 (to end of data)
  Number_of_frames: 402
  Max_magnitude: 3.43768508586287E+0004
  Background_mag: 9.2945299260E+01

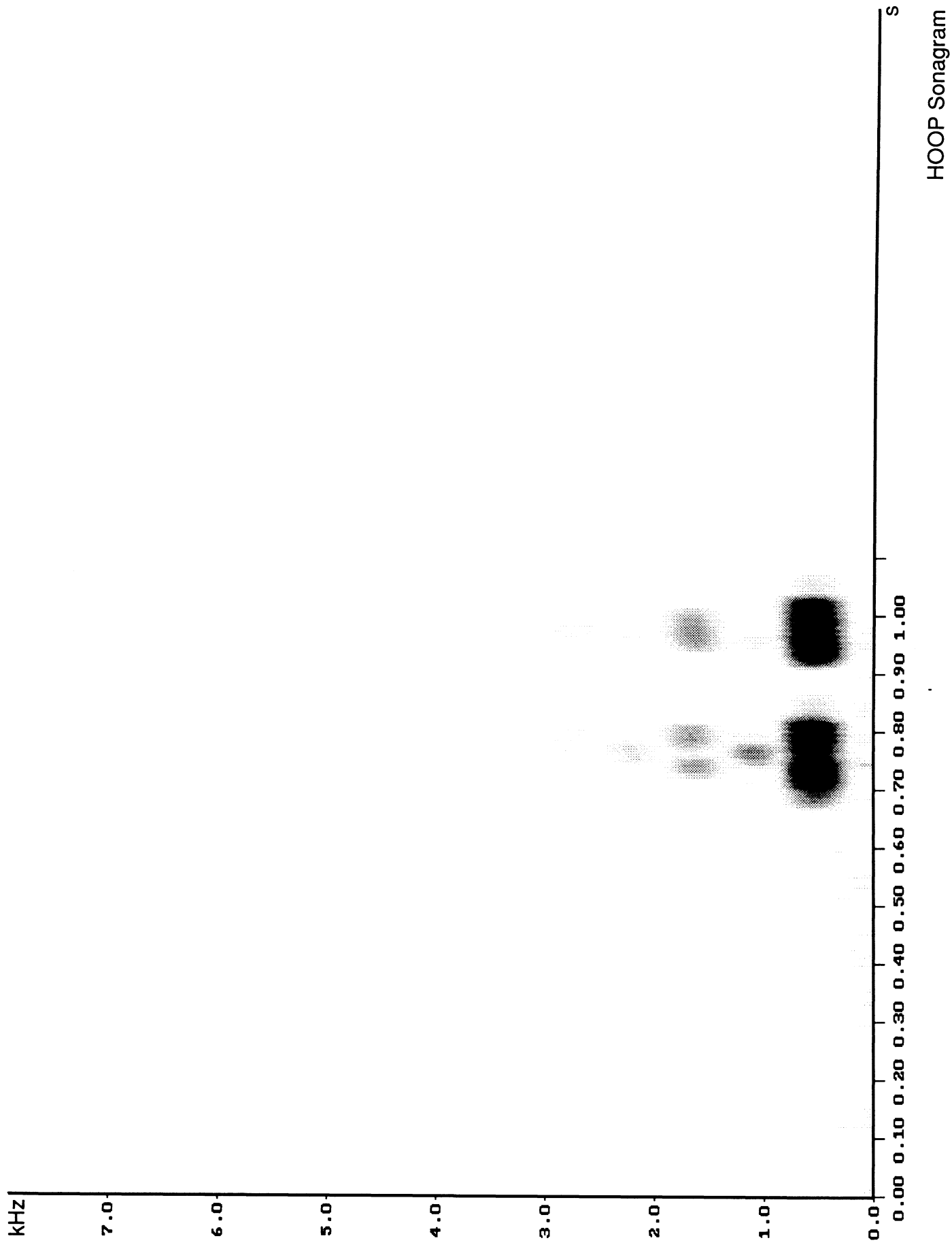
HOOP1A.SS
  Frequency_scale: 8 kHz full scale screen width
  Time_scale: 500 ms full scale screen length
  Min_factor: 0.0 of max magnitude
  Max_factor: 0.5 of max magnitude
  PixelsPerkHz: 7.500000000000000E+0001
  LinesPerMsec: 4.000000000000091E-0001
END HOOP1A.SS

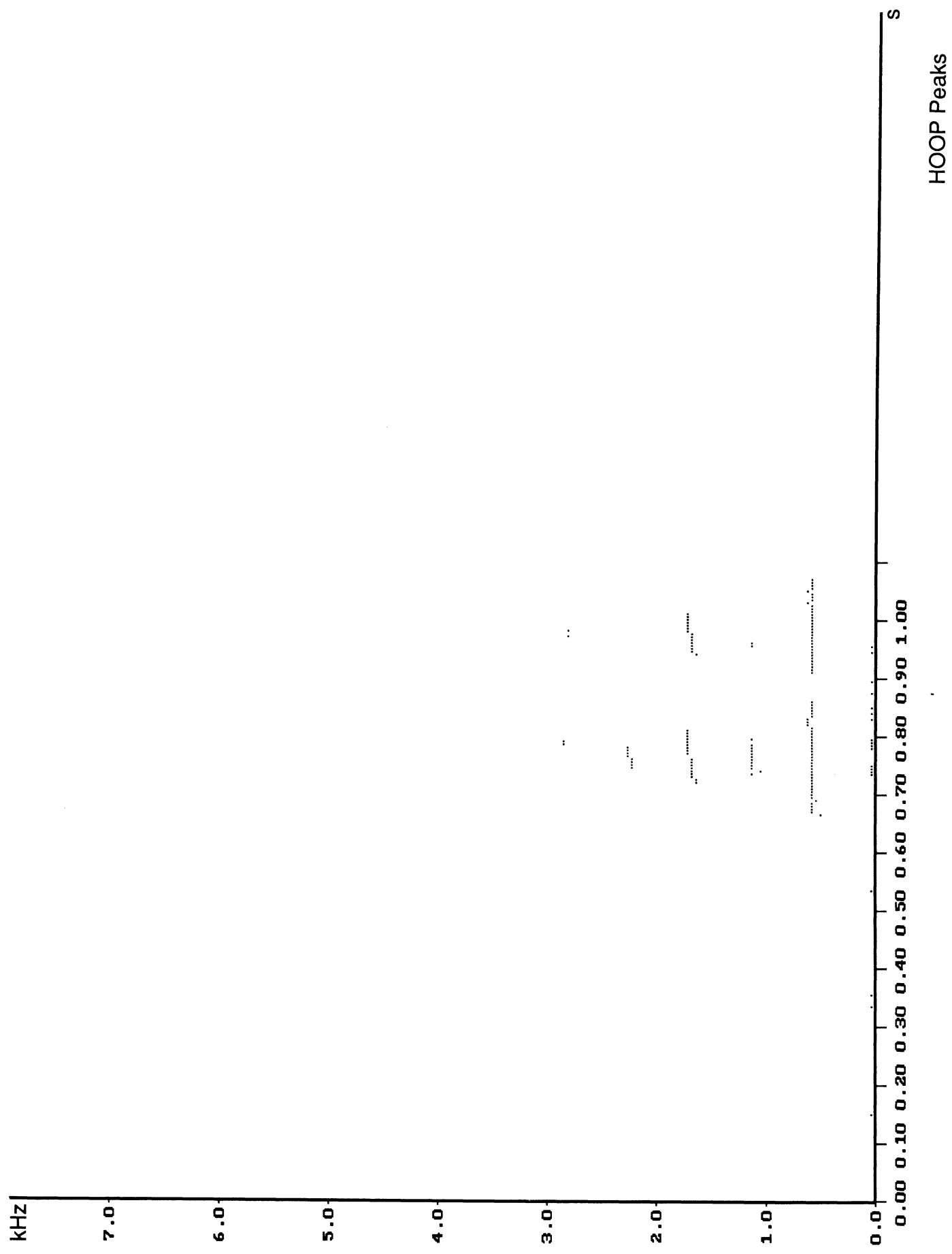
HOOP1A.LPF Linked peak frame file
  snr: 15

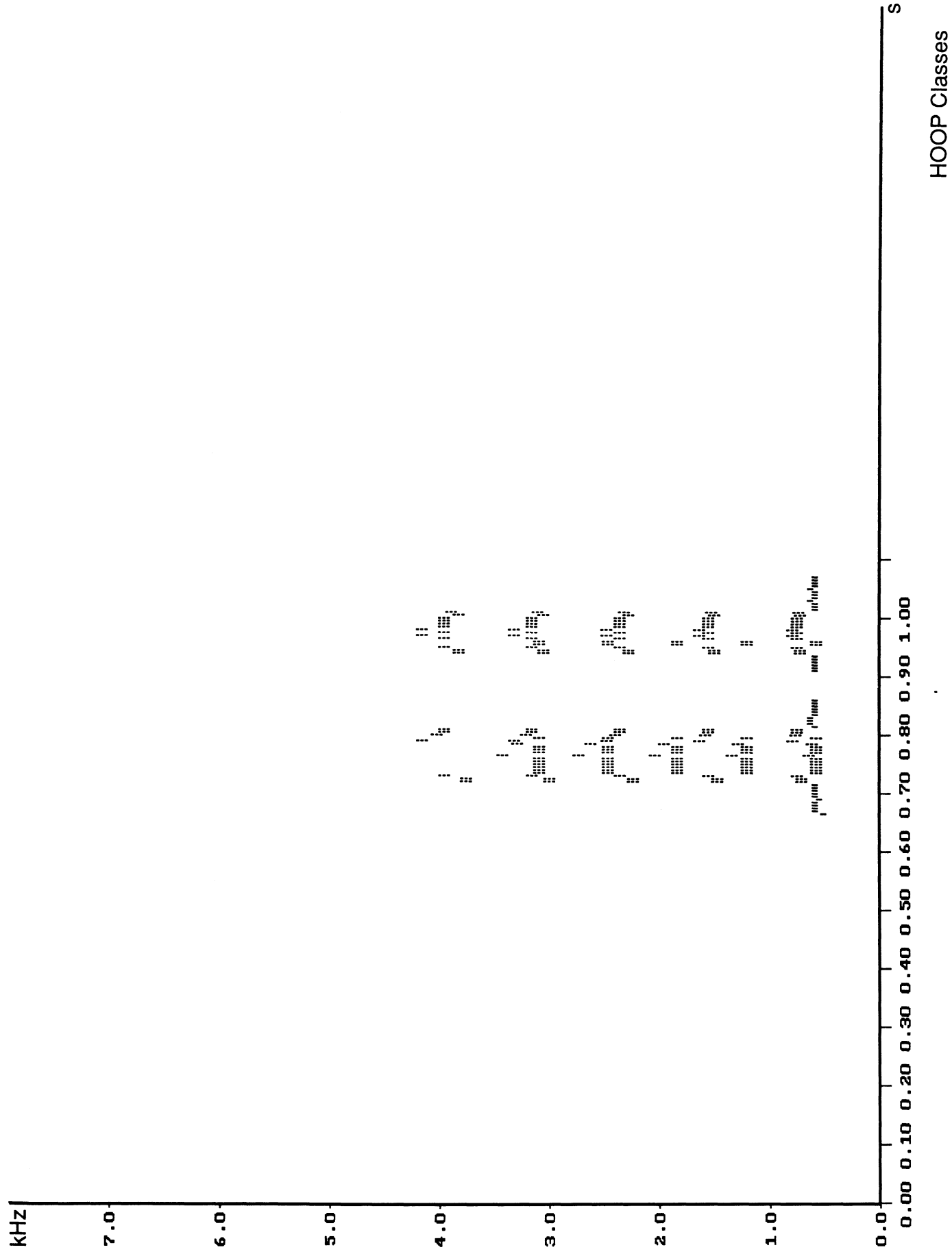
HOOP1A.CF
  High_pass_freq: 0.3 kHz (lower cutoff)
  Distance_thresh: 0.3 kHz between adjacent peaks
  Class_mag_thresh: 10 times background

  HOOP1A.E
    Dominance_ratio: 0.9
  END HOOP1A.E
END HOOP1A.CF
END HOOP1A.LPF
END HOOP1A.SF
END HOOP1A.ADS
```

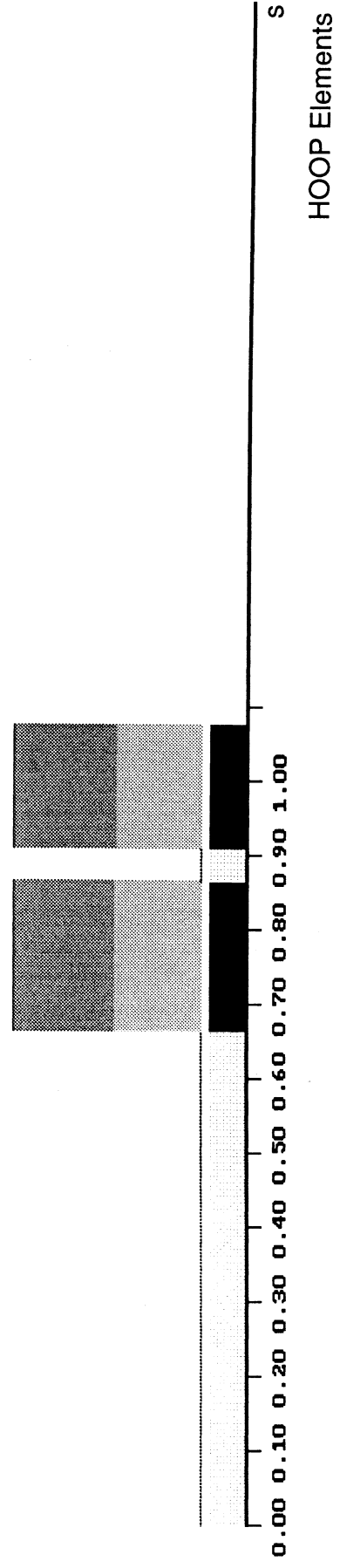
F1.5.2 HOOP Plots







MIXED
 NOISE
 MULTIPLE
 HARMONIC
 SINGLE
 SILENT



F1.5.3 HOOP Elements

Element text file

DURN 665.00 FREQ 0.00 CLASS SILENT
SINGLE: 0.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

DURN 200.00 FREQ 0.61 CLASS MIXED
SINGLE: 0.472 HARMONIC: 0.528 MULTIPLE: 0.000 NOISE: 0.000

DURN 45.00 FREQ 0.00 CLASS SILENT
SINGLE: 0.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

DURN 165.00 FREQ 0.65 CLASS MIXED
SINGLE: 0.458 HARMONIC: 0.542 MULTIPLE: 0.000 NOISE: 0.000

DURN 935.00 FREQ 0.00 CLASS SILENT
SINGLE: 0.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

F1.5.4 HOOP Syntax Specification

SYNTAX SPECIFICATION

BIRD: African Hoopoe

The two parts of the "hoop-hoop" sequence are defined with different elements - in case they are always slightly different in the sample. If they are not always different, the element specs can be combined into one broader one.

ELEMENTS:

Hoop1: Essential
frequency 0.58 to 0.68 kHz (0.61)
duration 190 to 210 ms (200)
single 47 harmonic 53 multiple 0 noise 0
occurrence_distance 10 %

Hoop2: Essential
frequency 0.58 to 0.68 kHz (0.65)
duration 150 to 170 ms (165)
single 46 harmonic 54 multiple 0 noise 0
occurrence_distance 10 %

InterHoop:
silence 40 to 50 ms (45)

GeneralSilence:
silence 0 to 0 ms

SYNTAX:

Hoop_1_node:
Hoop1 Inter_hoop_node

Inter_hoop_node:
InterHoop Hoop_2_node

Hoop_2_node:
Hoop2 Loop

Loop:
GeneralSilence Hoop_1_node

F1.5.5 HOOP Track

Track/s of call in HOOP1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SILENT 665.0 --- C_KEEU-KO-KO_5: 1
| MIXED 200.0 --- R_WHEEP-WHEEO_0: 2
| SILENT 45.0 --- R_WHEEP-WHEEO_1: 4
| >
| MIXED 165.00 --- no match
| >
| SILENT 935.0 --- C_WHEEP-WHEEO_3: 1
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 2
Match total 8

Syntax spec: GREY.S (Grey Lourie)

Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

| >
| SILENT 665.0 --- LOOP: 4
| >
| MIXED 200.00 --- no match
| >
| SILENT 45.0 --- LOOP: 4
| >
| MIXED 165.00 --- no match
| >
| SILENT 935.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failure: 4
Match total 12

Syntax spec: HOOP.S (African Hoopoe)

| >
| SILENT 665.0 --- LOOP: 4
| MIXED 200.0 --- HOOP_1 NODE: 4
| SILENT 45.0 --- INTER_HOOP_NODE: 4
| MIXED 165.0 --- HOOP_2 NODE: 4
| SILENT 935.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\HOOP\HOOP.S:
| Failures 0
Match total 20

Syntax spec: MOUR.S (Mourning Dove)

| >
| SILENT 665.0 --- LOOP: 4
| >
| MIXED 200.00 --- no match
| >
SILENT 45.0 --- LOOP: 4

```
| >  
| MIXED 165.00 --- no match  
| >  
| SILENT 935.0 --- LOOP: 4  
|  
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:  
| Failures 4  
| Match total 12  
-----
```

Syntax spec: OLIV.S (Olivetree Warbler)

```
-----  
| >  
| SILENT 665.0 --- KRRR_TO_LAST: 1  
| >  
| MIXED 200.00 --- no match  
| >  
| SILENT 45.0 --- KRRR_TO_LAST: 1  
| >  
| MIXED 165.00 --- no match  
| >  
| SILENT 935.0 --- KRRR_TO_LAST: 1  
|  
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:  
| Failures 4  
| Match total 3  
-----
```

Syntax spec: JACO.S (Jacobin Cuckoo)

```
-----  
| >  
| SILENT 665.0 --- LOOP: 4  
| >  
| MIXED 200.00 --- no match  
| >  
| SILENT 45.0 --- LOOP: 4  
| MIXED 165.0 --- J_NODE_1: 2  
| SILENT 935.0 --- FIRST_SILENCE: 1  
|  
| Score for C:\BCR\BIRDS\JACO\JACO.S:  
| Failures 2  
| Match total 11  
-----
```

Syntax spec: CROW.S (Pied Crow)

```
-----  
| Essentials not present.  
-----
```

Syntax spec: SWAI.S (Swainson's Francolin)

```
-----  
| Essentials not present.  
-----
```

Syntax spec: WILL.S (Willow Warbler)

```
-----  
| >  
| SILENT 665.0 --- NODE_40: 4  
| >  
| MIXED 200.00 --- no match  
| >  
| SILENT 45.0 --- NODE_40: 4  
| >  
| MIXED 165.00 --- no match  
| >  
| SILENT 935.0 --- NODE_40: 4  
|  
| Score for C:\BCR\BIRDS\WILL\WILL.S:  
| Failures 4  
| Match total 12  
-----
```

Syntax spec: MONO.S (Monotonous Lark)

```
| >  
| SILENT 665.0 --- LOOP: 4  
| >  
| MIXED 200.00 --- no match  
| >  
| SILENT 45.0 --- LOOP: 4  
| >  
| MIXED 165.00 --- no match  
| >  
| SILENT 935.0 --- LOOP: 4  
|  
| Score for C:\BCR\BIRDS\MONO\MONO.S:  
| Failures 4  
| Match total 12
```

F1.5.6 HOOP Trial results

Recognition scores for call HOOP1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	N	1.17		
Southern Boubou	Y	1.46	2	8
Grey Lourie	N	0.75		
Fiscal Shrike	Y	0.88	4	12
African Hoopoe	Y	4.00	0	20
Mourning Dove	Y	0.86	4	12
Olivetree Warbler	Y	0.65	4	3
Jacobin Cuckoo	Y	1.13	2	11
Pied Crow	N	1.67		
Swainson's Francolin	N	1.00		
Willow Warbler	Y	0.37	4	12
Monotonous Lark	Y	1.31	4	12

F1.6 MOUR
Mourning Dove
Streptopelia decipiens
353 (315)

F1.6.1 MOUR Bird Call Descriptor

MOUR1.ADS (Mourning Dove 353 (315)). Other birds are superimposed.

Sampling_frequency: 2.0000000000E+01 kHz

MOUR1A.SF

Window_duration: 5.0000000000000E+0000 ms

Frequency_resolution: 3.9062500000000E-0002 kHz (filled in by SPECTRA)

FFT_Length: 512 points

Window_length: 100 samples (filled in by SPECTRA)

Window_type: Hamming

Start_time: 250 ms

Finish_time: -1 (to end of data)

Number_of_frames: 351

Max_magnitude: 2.69094403978884E+0004

Background_mag: 2.2706384078E+02

MOUR1A.SS

Frequency_scale: 8 kHz full scale screen width

Time_scale: 500 ms full scale screen length

Min_factor: 0.0 of max magnitude

Max_factor: 0.5 of max magnitude

PixelsPerkHz: 7.5000000000000E+0001

LinesPerMsec: 4.00000000000091E-0001

END MOUR1A.SS

MOUR1A.LPF Linked peak frame file

snr: 20

MOUR1A.CF

High_pass_freq: 0.3 kHz

Distance_thresh: 0.3 kHz

Class_mag_thresh: 10 times background

MOUR1A.E

Dominance_ratio: 0.9

END MOUR1A.E

END MOUR1A.CF

END MOUR1A.LPF

END MOUR1A.SF

END MOUR1A.ADS

F1.6.2 MOUR Plots

kHz

7.0

6.0

5.0

4.0

3.0

2.0

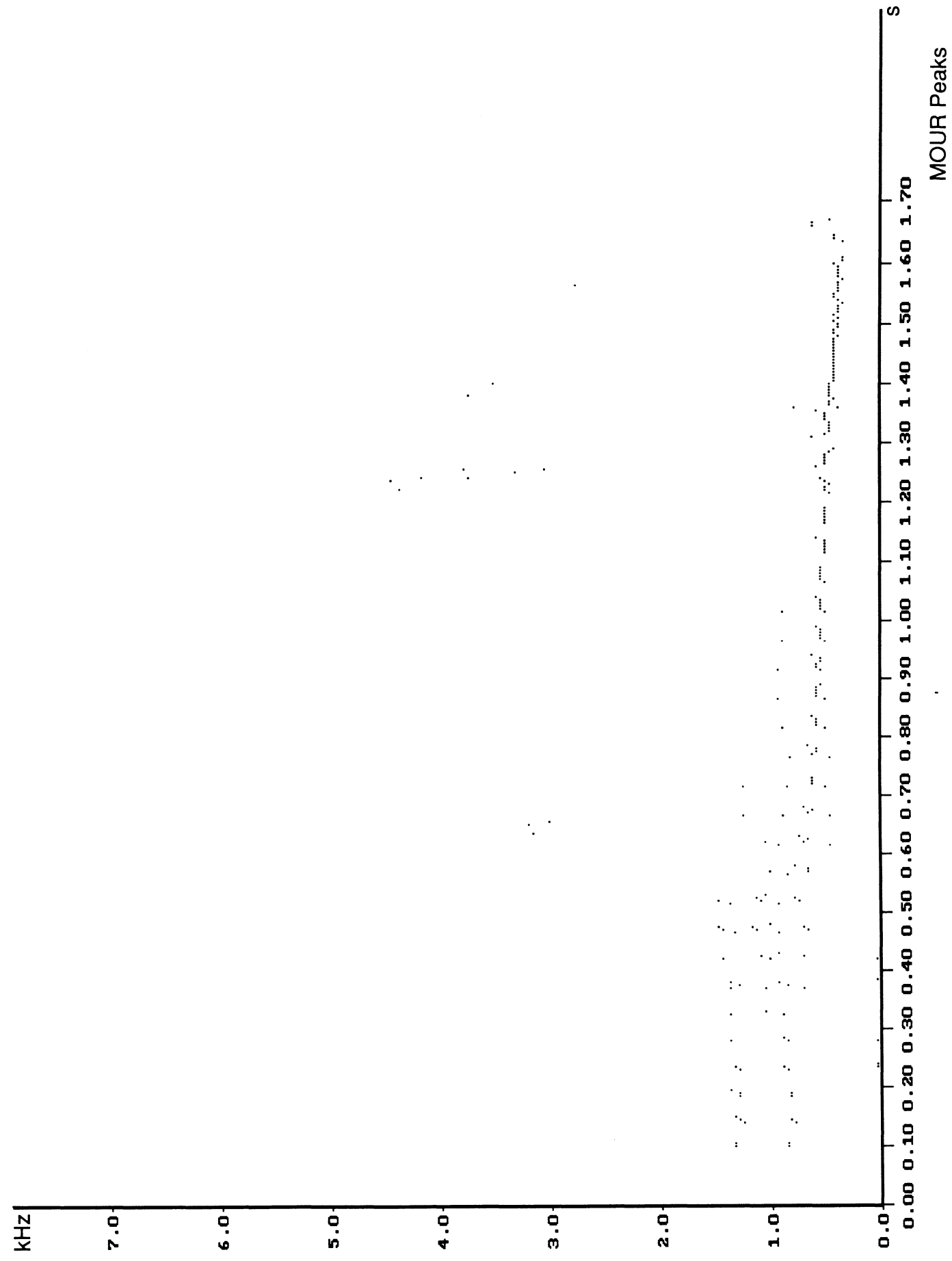
1.0

0.0

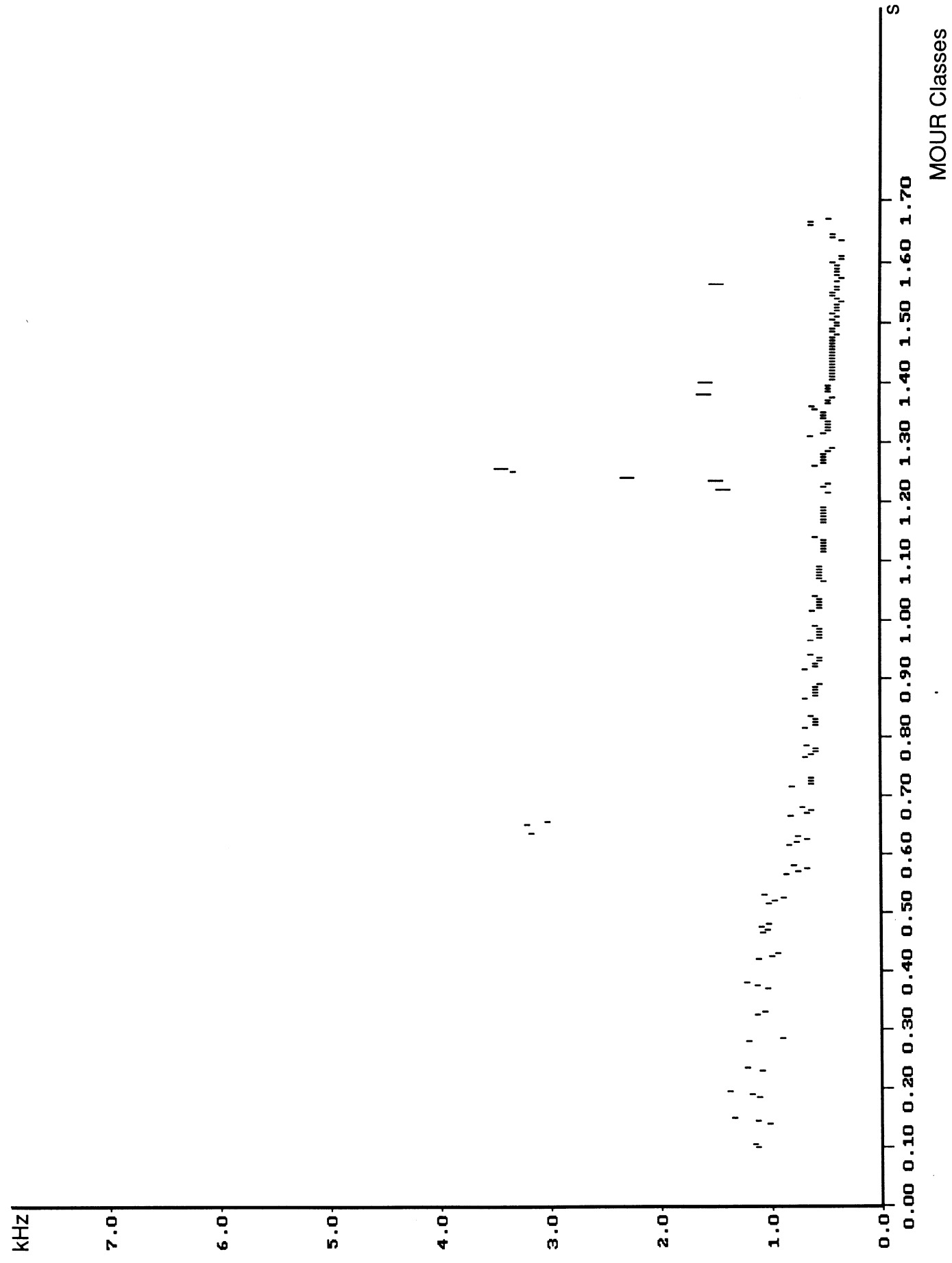
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50 1.60 1.70

S

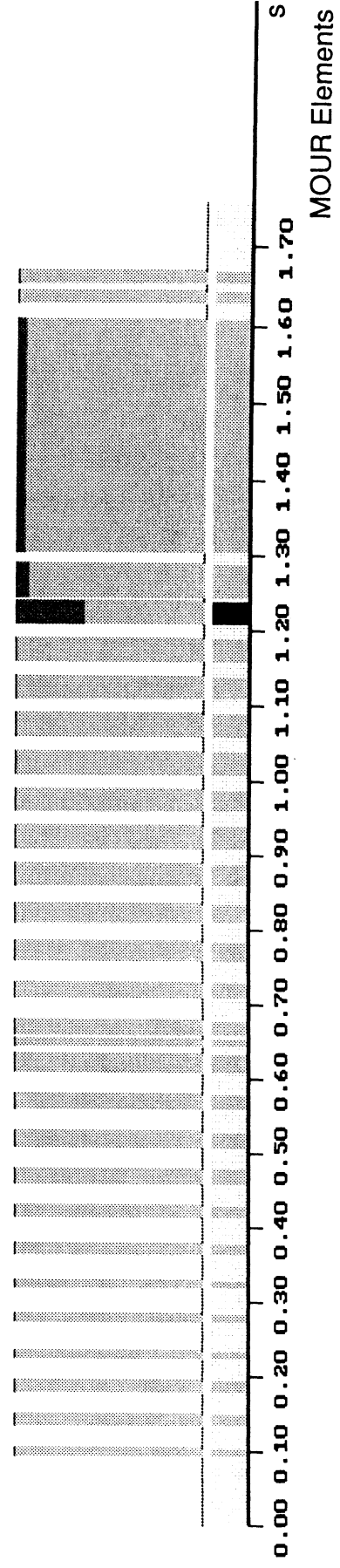
MOUR Sonagram



MOUR Peaks



■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.6.3 MOUR Elements

Element text file

DURN 95.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.14	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.15	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.22	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.15	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 40.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.05	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 35.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 1.09	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 35.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.12	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 35.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.01	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 1.05	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 0.97	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 0.76	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 30.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 25.00	FREQ 1.23	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 3.11	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

DURN 15.00	FREQ 0.40	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 0.57	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 85.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

F1.6.4 MOUR Syntax Specification

SYNTAX SPECIFICATION

BIRD: Mourning Dove

This spec is basically a copy of the sample. Too many alternatives were avoided because it has many elements, and would confuse things - pointless in the absence of multiple samples from which the true and necessary alternatives can be deduced.

ELEMENTS:

KreowUnit:

frequency 0.95 to 1.25 kHz
duration 8 to 22 ms
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 5 %

RUnit:

frequency 0.5 to 0.8 kHz
duration 18 to 32 ms
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

ShortEndR:

frequency 0.95 to 1.25 kHz
duration 28 to 50 ms
single 65 harmonic 0 multiple 35 noise 0
occurrence_distance 10 %

LongEndR:

frequency 0.4 to 0.55 kHz
duration 290 to 320 ms
single 95 harmonic 0 multiple 5 noise 0
occurrence_distance 10 %

Ksilence:

silence 28 to 42 ms

Rsilence:

silence 18 to 27 ms

GeneralSilence:

silence 0 to 0 ms

SYNTAX:

Kreow_1:

KreowUnit Kreow_1S

Kreow_1S:

Ksilence Kreow_2

Kreow_2:

KreowUnit Kreow_2S

Kreow_2S:

Ksilence Kreow_3

Kreow_3:

KreowUnit Kreow_3S

Kreow_3S:

Ksilence Kreow_4

Kreow_4:

KreowUnit Kreow_4S

Kreow_4S:

Ksilence Kreow_5

Kreow_5:

KreowUnit Kreow_5S

Kreow_5S:

Ksilence Kreow_6

Kreow_6:

KreowUnit Kreow_6S

Kreow_6S:
Ksilence Kreow_7
Kreow_7:
KreowUnit Kreow_7S
Kreow_7S:
Ksilence Kreow_8
Kreow_8:
KreowUnit Kreow_8S
Kreow_8S:
Ksilence Kreow_9
Kreow_9:
KreowUnit Kreow_9S
Kreow_9S:
Ksilence Kreow_10
Kreow_10:
KreowUnit Kreow_10S
Kreow_10S:
Ksilence Kreow_11
Kreow_11:
Ksilence Kreow_11S
Kreow_11S:
Ksilence Kreow_12
Kreow_12:
KreowUnit R_1

R_1:
RUnit R_1S
R_1S:
Rsilence R_2
R_2:
RUnit R_2S
R_2S:
Rsilence R_3
R_3:
RUnit R_3S
R_3S:
Rsilence R_4
R_4:
RUnit R_4S
R_4S:
Rsilence R_5
R_5:
RUnit R_5S
R_5S:
Rsilence R_6
R_6:
RUnit R_6S
R_6S:
Rsilence R_7
R_7:
RUnit R_7S
R_7S:
Rsilence R_8
R_8:
RUnit R_8S
R_8S:
Rsilence R_9

```

R_9:
  RUnit R_9S

R_9S:
  Rsilence R_10

R_10:
  RUnit R_10S

R_10S:
  Rsilence R_11

R_11:
  RUnit R_11S

R_11S:
  Rsilence R_12

R_12:
  RUnit R_12S

R_12S:
  Rsilence EndR_1

EndR_1:
  ShortEndR EndR_1S

EndR_1S:
  Rsilence EndR_2

EndR_2:
  ShortEndR EndR_2S

EndR_2S:
  Rsilence EndR_3

EndR_3:
  LongEndR EndR_3S Loop

EndR_3S:
  Rsilence EndR_4

EndR_4:
  Runit EndR_4S Loop

EndR_4S:
  Rsilence EndR_5

EndR_5:
  Runit Loop

Loop:
  GeneralSilence Kreow_1

```

F1.6.5 MOUR Track

Track/s of call in MOUR1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SILENT 95.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 30.0 --- C_KEEU-KO-KO_2.1: 1
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 10.00 --- no match
| >
| SILENT 40.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- C_KEEU-KO-KO_2.1: 1
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 35.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 4
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 4
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 4
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 25.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 30.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >

```

| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 30.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 30.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 45.00 --- no match
| >
| SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 305.00 --- no match
| >
| SILENT 20.0 --- C_KEEU-KO-KO_2.1: 1
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 10.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 85.0 --- C_KEEU-KO-KO_3: 4
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 43
| Match total 109

```

Syntax spec: GREY.S (Grey Lourie)

```

| Essentials not present.

```

Syntax spec: FISC.S (Fiscal Shrike)

```

| >
| SILENT 95.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 40.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 35.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >

```

```

| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- THIRD SILENCE: 1
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 30.0 --- CHINK_NODE: 2
| SILENT 20.0 --- LOOP: 4
| >
| MIXED 30.0 --- CHINK_NODE: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 45.0 --- CHINK_NODE: 2
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 305.00 --- no match
| >
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 85.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 48
| Match total 135
| -----

```

Syntax spec: HOOP.S (African Hoopoe)

| Essentials not present.

Syntax spec: MOUR.S (Mourning Dove)

```
| >
| SILENT 95.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW 1: 4
| SILENT 30.0 --- KREOW_1S: 4
| SINGLE 15.0 --- KREOW_2: 4
| SILENT 30.0 --- KREOW_2S: 4
| SINGLE 15.0 --- KREOW_3: 4
| SILENT 30.0 --- KREOW_3S: 4
| SINGLE 10.0 --- KREOW_4: 4
| SILENT 40.0 --- KREOW_4S: 4
| SINGLE 10.0 --- KREOW_5: 4
| SILENT 35.0 --- KREOW_5S: 4
| SINGLE 10.0 --- KREOW_6: 4
| SILENT 35.0 --- KREOW_6S: 4
| SINGLE 15.0 --- KREOW_7: 4
| SILENT 35.0 --- KREOW_7S: 4
| SINGLE 15.0 --- KREOW_8: 4
| SILENT 30.0 --- KREOW_8S: 4
| SINGLE 20.0 --- KREOW_9: 4
| SILENT 30.0 --- KREOW_9S: 4
| SINGLE 20.0 --- KREOW_10: 4
| SILENT 30.0 --- KREOW_10S: 4
| >
| SINGLE 20.0 --- R 1: 4
| SILENT 30.0 --- R_1S: 1
| SINGLE 25.0 --- R_2: 2
| SILENT 10.0 --- R_2S: 1
| >
| SINGLE 10.0 --- KREOW 1: 2
| SILENT 5.0 --- KREOW_1S: 1
| SINGLE 20.0 --- KREOW_2: 2
| SILENT 30.0 --- KREOW_2S: 4
| SINGLE 20.0 --- KREOW_3: 2
| SILENT 30.0 --- KREOW_3S: 4
| >
| SINGLE 25.0 --- R 4: 4
| SILENT 25.0 --- R_4S: 4
| SINGLE 25.0 --- R_5: 4
| SILENT 25.0 --- R_5S: 4
| SINGLE 30.0 --- R_6: 4
| SILENT 20.0 --- R_6S: 4
| SINGLE 30.0 --- R_7: 4
| SILENT 20.0 --- R_7S: 4
| SINGLE 30.0 --- R_8: 4
| SILENT 20.0 --- R_8S: 4
| SINGLE 30.0 --- R_9: 4
| SILENT 20.0 --- R_9S: 4
| SINGLE 30.0 --- R_10: 4
| SILENT 20.0 --- R_10S: 4
| SINGLE 30.0 --- R_11: 4
| SILENT 20.0 --- R_11S: 4
| SINGLE 30.0 --- R_12: 4
| SILENT 20.0 --- R_12S: 4
| MIXED 30.0 --- ENDR 1: 4
| SILENT 5.0 --- ENDR_1S: 1
| SINGLE 45.0 --- ENDR_2: 3
| SILENT 15.0 --- ENDR_2S: 1
| SINGLE 305.0 --- ENDR 3: 4
| SILENT 20.0 --- ENDR_3S: 4
| >
| SINGLE 15.0 --- KREOW 1: 2
| SILENT 10.0 --- KREOW_1S: 1
| SINGLE 15.0 --- KREOW_2: 2
| SILENT 85.0 --- KREOW_2S: 1
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 4
| Match total 202
```

MOUR Track F76

Syntax spec: JACO.S (Jacobin Cuckoo)

| Essentials not present.

Syntax spec: CROW.S (Pied Crow)

| Essentials not present.

Syntax spec: SWAI.S (Swainson's Francolin)

| >
| SILENT 95.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| SINGLE 15.0 --- KR_1R: 2
| SILENT 30.0 --- KR_1S: 1
| SINGLE 15.0 --- KR_2R: 2
| SILENT 30.0 --- KR_2S: 1
| >
| SINGLE 10.00 --- no match
| >
| SILENT 40.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- LOOP: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 35.0 --- LOOP: 4
| SINGLE 15.0 --- KR_1R: 2
| SILENT 35.0 --- KR_1S: 1
| SINGLE 15.0 --- KR_2R: 2
| SILENT 30.0 --- KR_2S: 1
| SINGLE 20.0 --- KR_3L: 2
| SILENT 30.0 --- KR_3S: 1
| SINGLE 20.0 --- KR_4L: 2
| SILENT 30.0 --- KR_4S: 1
| SINGLE 20.0 --- KR_5L: 2
| SILENT 30.0 --- KR_5S: 1
| SINGLE 25.0 --- KR_6L: 2
| SILENT 10.0 --- KR_6S: 4
| >
| SINGLE 10.00 --- no match
| >
| SILENT 5.0 --- AAAK_NODE_2: 4
| SINGLE 20.0 --- AAAK_NODE_3: 2
| SILENT 30.0 --- LOOP: 4
| SINGLE 20.0 --- KR_1L: 2
| SILENT 30.0 --- KR_1S: 1
| SINGLE 25.0 --- KR_2L: 2
| SILENT 25.0 --- KR_2S: 1
| SINGLE 25.0 --- KR_3L: 2
| SILENT 25.0 --- KR_3S: 1
| SINGLE 30.0 --- KR_4L: 2
| SILENT 20.0 --- KR_4S: 1
| SINGLE 30.0 --- KR_5L: 2
| SILENT 20.0 --- KR_5S: 1
| SINGLE 30.0 --- KR_6L: 2
| SILENT 20.0 --- KR_6S: 1
| >
| SINGLE 30.0 --- KR_1L: 2
| SILENT 20.0 --- KR_1S: 1
| SINGLE 30.0 --- KR_2L: 2
| SILENT 20.0 --- KR_2S: 1
| SINGLE 30.0 --- KR_3L: 2
| SILENT 20.0 --- KR_3S: 1
| SINGLE 30.0 --- KR_4L: 2
| SILENT 20.0 --- KR_4S: 1
| MIXED 30.0 --- KR_5L: 2
| SILENT 5.0 --- KR_5S: 4
| SINGLE 45.0 --- KR_6L: 2
| SILENT 15.0 --- KR_6S: 1
| SINGLE 305.0 --- AAAK_NODE_1: 2
| SILENT 20.0 --- LOOP: 4
| SINGLE 15.0 --- KR_1R: 2
| SILENT 10.0 --- KR_1S: 4
| SINGLE 15.0 --- KR_2R: 2

```
| SILENT 85.0 --- KR_2S: 1
| Score for C:\BCR\BIRDS\SWAI\SWAI.S:
| Failures 11
| Match total 111
-----
```

Syntax spec: WILL.S (Willow Warbler)

```
| >
| SILENT 95.0 --- NODE_8: 1
| SINGLE 10.0 --- NODE_9: 2
| SILENT 30.0 --- NODE_10: 1
| >
| SINGLE 15.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 15.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 10.0 --- NODE_29: 2
| SILENT 40.0 --- NODE_30: 1
| >
| SINGLE 10.0 --- NODE_29: 2
| SILENT 35.0 --- NODE_30: 1
| >
| SINGLE 10.0 --- NODE_29: 2
| SILENT 35.0 --- NODE_30: 1
| >
| SINGLE 15.0 --- NODE_29: 2
| SILENT 35.0 --- NODE_30: 1
| >
| SINGLE 15.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 25.0 --- NODE_7: 2
| SILENT 10.0 --- NODE_8: 1
| SINGLE 10.0 --- NODE_9: 2
| SILENT 5.0 --- NODE_10: 1
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 30.0 --- NODE_30: 1
| >
| SINGLE 25.0 --- NODE_23: 2
| SILENT 25.0 --- NODE_24: 1
| >
| SINGLE 25.0 --- NODE_23: 2
| SILENT 25.0 --- NODE_24: 1
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| SINGLE 30.0 --- NODE_39: 2
| SILENT 20.0 --- NODE_40: 4
| >
| MIXED 30.0 --- NODE_39: 2
| SILENT 5.0 --- NODE_40: 4
```

```

| >
| SINGLE 45.0 --- NODE_15: 2
| SILENT 15.0 --- NODE_16: 1
| >
| SINGLE 305.00 --- no match
| >
| SILENT 20.0 --- NODE_8: 4
| SINGLE 15.0 --- NODE_9: 2
| SILENT 10.0 --- NODE_10: 1
| >
| SINGLE 15.0 --- NODE_29: 2
| SILENT 85.0 --- NODE_30: 1
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 27
| Match total 113
|-----

```

Syntax spec: MONO.S (Monotonous Lark)

```

| >
| SILENT 95.0 --- SYRUPTOIS_SILENCE: 1
| SINGLE 10.0 --- IS_1: 2
| SILENT 30.0 --- IS_1S: 1
| SINGLE 15.0 --- IS_2: 2
| SILENT 30.0 --- IS_2S: 1
| SINGLE 15.0 --- IS_3: 2
| SILENT 30.0 --- IS_3S: 1
| SINGLE 10.0 --- IS_4: 2
| SILENT 40.0 --- IS_4S: 1
| SINGLE 10.0 --- IS_5: 2
| SILENT 35.0 --- ISTOSWEET_SILENCE: 1
| >
| SINGLE 10.0 --- IS_1: 2
| SILENT 35.0 --- IS_1S: 1
| SINGLE 15.0 --- IS_2: 2
| SILENT 35.0 --- IS_2S: 1
| SINGLE 15.0 --- IS_3: 2
| SILENT 30.0 --- IS_3S: 1
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 10.0 --- IS_1S: 4
| SINGLE 10.0 --- IS_2: 2
| SILENT 5.0 --- IS_2S: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 30.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 25.0 --- SYRTOUP_SILENCE: 4
| SINGLE 30.0 --- UP: 2
| SILENT 20.0 --- UTOP_SILENCE: 1
| >
| SINGLE 30.0 --- UP: 2
| SILENT 20.0 --- UTOP_SILENCE: 1
| >
| SINGLE 30.0 --- UP: 2
| SILENT 20.0 --- UTOP_SILENCE: 1
| >
| SINGLE 30.0 --- UP: 2
| SILENT 20.0 --- UTOP_SILENCE: 1

```

```
| >  
| SINGLE 30.0 --- UP: 2  
| SILENT 20.0 --- UTOP_SILENCE: 1  
| >  
| SINGLE 30.0 --- UP: 2  
| SILENT 20.0 --- UTOP_SILENCE: 1  
| >  
| SINGLE 30.0 --- UP: 2  
| SILENT 20.0 --- UTOP_SILENCE: 1  
| >  
| MIXED 30.0 --- UP: 2  
| SILENT 5.0 --- UTOP_SILENCE: 1  
| >  
| SINGLE 45.0 --- SYRUP: 2  
| SILENT 15.0 --- SYRTOUP_SILENCE: 1  
| >  
| SINGLE 305.00 --- no match  
| >  
| SILENT 20.0 --- ISTOSWEET_SILENCE: 1  
| SINGLE 15.0 --- S_1: 2  
| SILENT 10.0 --- S_1S: 4  
| SINGLE 15.0 --- S_2: 2  
| SILENT 85.0 --- STOWEET_SILENCE: 1  
|  
| Score for C:\BCR\BIRDS\MONO\MONO.S:  
| Failures 27  
| Match total 100  
|-----
```

F1.6.6 MOUR Trial results

Recognition scores for call MOUR1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	N	3.33		
Southern Boubou	Y	2.31	43	109
Grey Lourie	N	2.38		
Fiscal Shrike	Y	1.88	48	135
African Hoopoe	N	2.00		
Mourning Dove	Y	4.00	4	202
Olivetree Warbler	Y	1.84	17	95
Jacobin Cuckoo	N	1.88		
Pied Crow	N	1.67		
Swainson's Francolin	Y	2.50	11	111
Willow Warbler	Y	1.44	27	113
Monotonous Lark	Y	2.50	27	100

F1.7 OLIV
Olivtree Warbler
Hippolais olivetorum
626 (597)

F1.7.1 OLIV Bird Call Descriptor

OLIV1.ADS (Olivetree warbler 626). Seems to be the same sample call as Roberts
Sampling_frequency: 27.586 kHz

OLIV1A.SF

Window_duration: 4.96628724715265E+0000 ms
Frequency_resolution: 5.38789062500200E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 137 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 467
Max_magnitude: 3.00931769326031E+0004
Background_mag: 8.7254781204E+01

OLIV1A.SS

Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.50000000000000E+0001
LinesPerMsec: 4.00000000000091E-0001

END OLIV1A.SS

OLIV1A.LPF Linked peak frame file
snr: 5

OLIV1A.CF

High_pass_freq: 1.2 kHz
Distance_thresh: 0.3 kHz
Class_mag_thresh: 20 times background

OLIV1A.E

Dominance_ratio: 0.9

END OLIV1A.E

END OLIV1A.CF

END OLIV1A.LPF

END OLIV1A.SF

END OLIV1A.ADS

F1.7.2 OLIV Plots

kHz

7.0

6.0

5.0

4.0

3.0

2.0

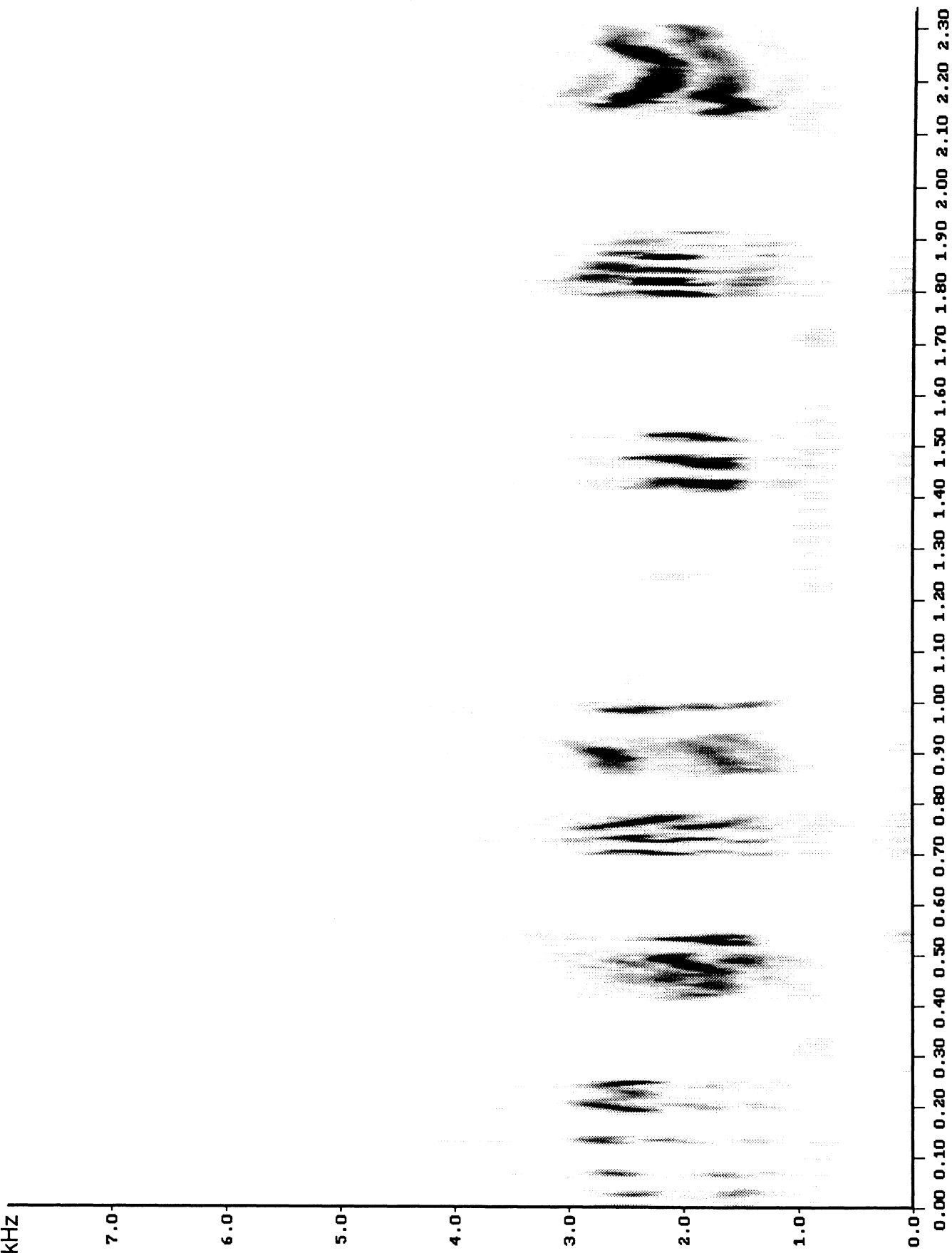
1.0

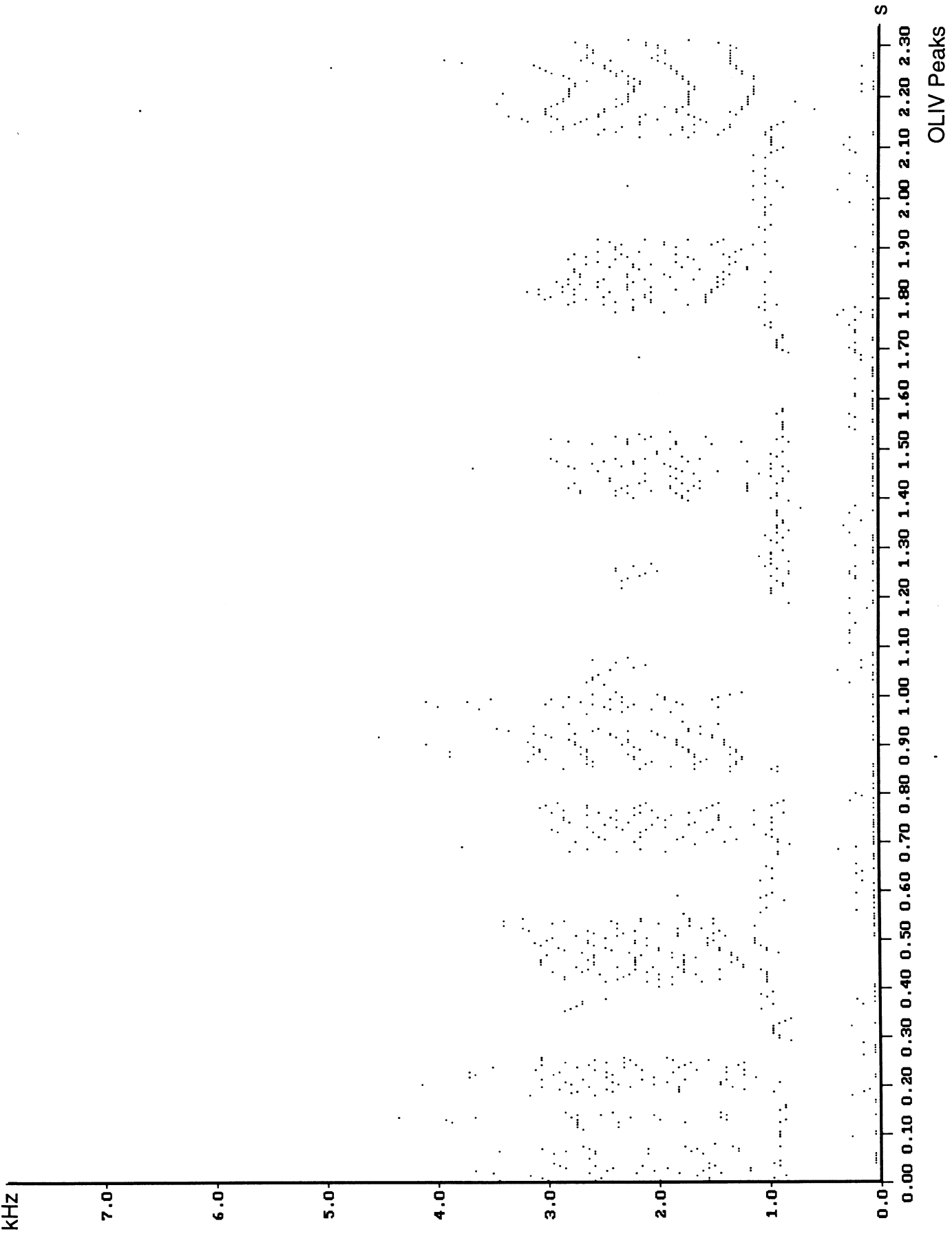
0.0

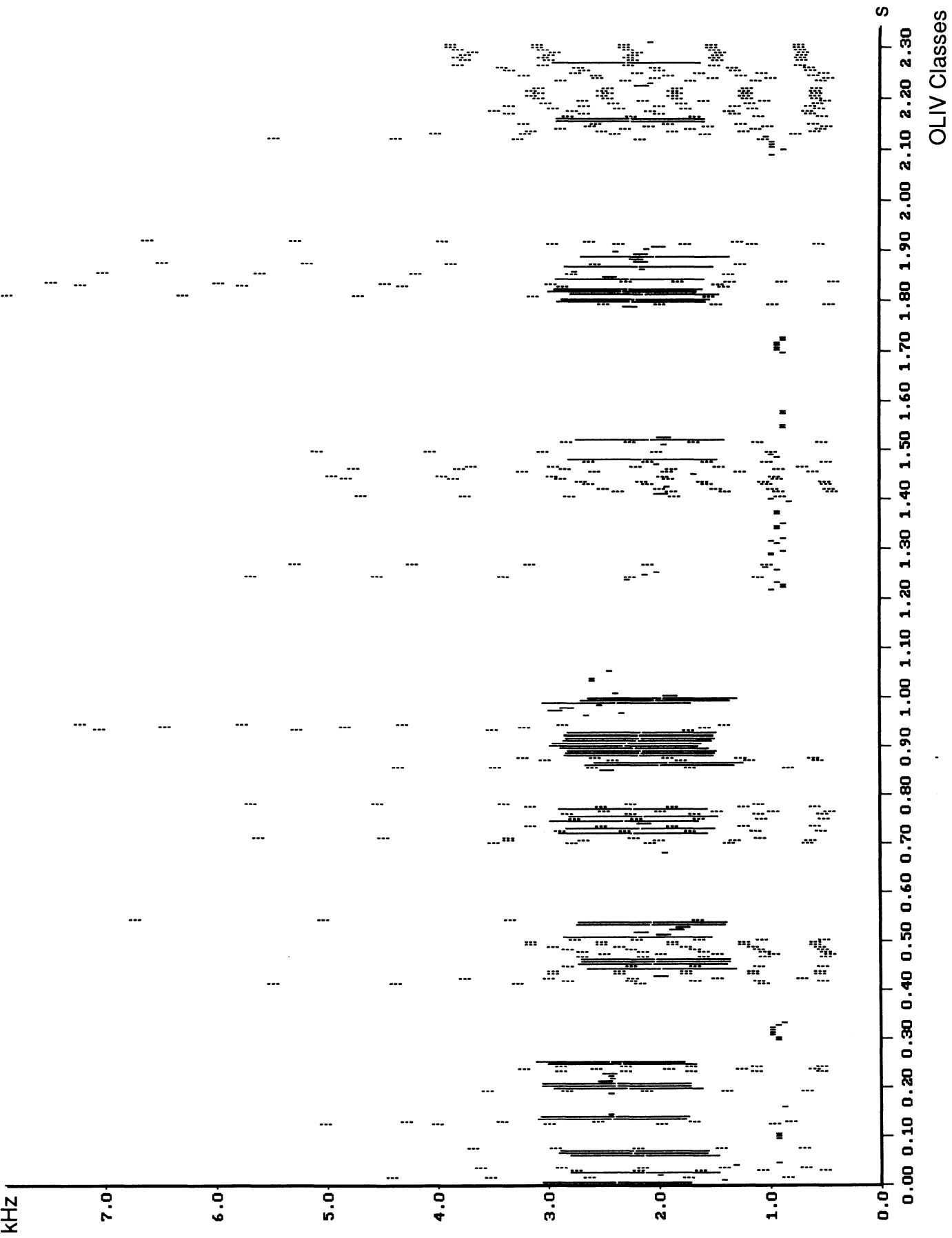
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50 1.60 1.70 1.80 1.90 2.00 2.10 2.20 2.30

OLIV Sonagram

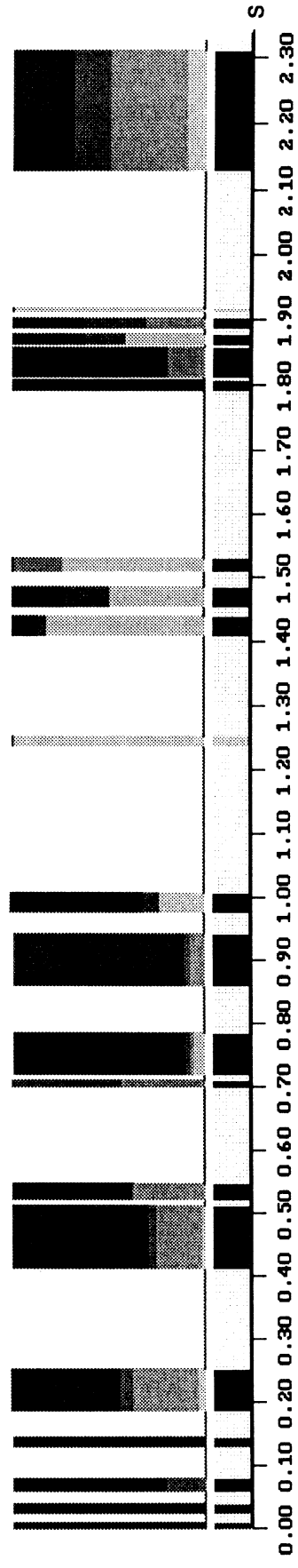
S







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



OLIV Elements

F1.7.3 OLIV Elements

Element text file

DURN 9.93	FREQ 2.32	CLASS NOISE		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 1.000	
DURN 14.90	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.10	CLASS NOISE		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 1.000	
DURN 19.87	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 19.87	FREQ 2.19	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.214	NOISE: 0.786	
DURN 49.66	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.45	CLASS NOISE		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 1.000	
DURN 44.70	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 64.56	FREQ 1.85	CLASS MIXED		
SINGLE: 0.042	HARMONIC: 0.336	MULTIPLE: 0.067	NOISE: 0.555	
DURN 158.92	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 99.33	FREQ 1.68	CLASS MIXED		
SINGLE: 0.017	HARMONIC: 0.243	MULTIPLE: 0.041	NOISE: 0.699	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 24.83	FREQ 1.94	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.376	MULTIPLE: 0.000	NOISE: 0.624	
DURN 153.95	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 9.93	FREQ 1.46	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.439	MULTIPLE: 0.561	NOISE: 0.000	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 64.56	FREQ 2.13	CLASS MIXED		
SINGLE: 0.065	HARMONIC: 0.024	MULTIPLE: 0.031	NOISE: 0.880	
DURN 74.49	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 84.43	FREQ 2.03	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.083	MULTIPLE: 0.033	NOISE: 0.884	
DURN 34.76	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 29.80	FREQ 2.25	CLASS MIXED		
SINGLE: 0.236	HARMONIC: 0.000	MULTIPLE: 0.077	NOISE: 0.687	
DURN 228.45	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.17	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 158.92	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 29.80	FREQ 2.01	CLASS MIXED		
SINGLE: 0.829	HARMONIC: 0.000	MULTIPLE: 0.054	NOISE: 0.117	
DURN 14.90	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

DURN 29.80	FREQ 2.03	CLASS MIXED		
SINGLE: 0.502	HARMONIC: 0.000	MULTIPLE: 0.237	NOISE: 0.261	
DURN 24.83	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 19.87	FREQ 1.67	CLASS MIXED		
SINGLE: 0.750	HARMONIC: 0.250	MULTIPLE: 0.000	NOISE: 0.000	
DURN 263.21	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.21	CLASS NOISE		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 1.000	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 44.70	FREQ 2.02	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.203	MULTIPLE: 0.000	NOISE: 0.797	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.23	CLASS MIXED		
SINGLE: 0.417	HARMONIC: 0.000	MULTIPLE: 0.209	NOISE: 0.373	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 1.78	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.312	MULTIPLE: 0.331	NOISE: 0.357	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 4.97	FREQ 1.98	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 213.55	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 178.79	FREQ 1.53	CLASS MIXED		
SINGLE: 0.103	HARMONIC: 0.397	MULTIPLE: 0.193	NOISE: 0.307	
DURN 14.90	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

F1.7.4 OLIV Syntax Specification

SYNTAX SPECIFICATION

BIRD: Olivetree Warbler

The sample from which this was taken started in the middle of the "krrrek" sequence, so the first part of the "krrrek" is a conjecture element - if it isn't right, a failure occurs and the next part of the sequence should then be found to match. According to Roberts the call is "jumbled" so the syntax specified here is that any sequence may follow any other - which is probably not quite true, and greatly reduces this spec's strictness. The numbers used in the names of many element specs and nodes correspond to element numbers in the original sample - an aid in keeping track when writing the spec.

In the sample, there is a "t" sound between kreeup and krr, so cater here for that and also for possibility that there is no "t".

ELEMENTS:

ConjectureKr:

frequency 1.9 to 2.1 kHz
duration 35 to 55 ms
single 25 harmonic 25 multiple 25 noise 25
occurrence_distance 30 %

r1:

frequency 2.0 to 2.5 kHz (2.1, 2.19, 2.45)
duration 12 to 22 ms (14.9, 19.87, 14.9)
single 0 harmonic 0 multiple 10 noise 90
occurrence_distance 30 %

ek:

frequency 1.75 to 1.95 kHz (1.85)
duration 60 to 70 ms (64.56)
single 5 harmonic 33 multiple 7 noise 55
occurrence_distance 15 %

kru:

frequency 1.63 to 1.72 kHz (1.68)
duration 90 to 110 ms (99.33)
single 2 harmonic 24 multiple 4 noise 70
occurrence_distance 15 %

p:

frequency 1.9 to 2.1 kHz (1.94)
duration 20 to 30 ms (24.83)
single 0 harmonic 38 multiple 0 noise 62 %
occurrence_distance 15 %

k1:

frequency 1.4 to 1.5 kHz (1.46)
duration 4 to 12 ms (9.93)
single 0 harmonic 44 multiple 56 noise 0 %
occurrence_distance 15 %

rik:

frequency 2.07 to 2.2 kHz (2.13)
duration 60 to 70 ms (64.56)
single 7 harmonic 2 multiple 3 noise 88
occurrence_distance 15 %

kree:

frequency 1.98 to 2.08 kHz (2.03)
duration 80 to 90 ms (84.43)
single 0 harmonic 8 multiple 3 noise 88
occurrence_distance 15 %

up:

frequency 2.2 to 2.3 kHz (2.25)
duration 25 to 35 ms (29.8)
single 23 harmonic 0 multiple 8 noise 69
occurrence_distance 15 %

t:

frequency 2.13 to 2.21 kHz (2.17)
duration 10 to 20 ms (14.9)
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

```

kr:
  frequency 2.97 to 2.07 kHz (2.01, 2.03)
  duration 25 to 35 ms (29.8, 29.8)
  single 60 harmonic 0 multiple 25 noise 15
  occurrence_distance 50 %

r2:
  frequency 1.62 to 1.72 kHz (1.67)
  duration 15 to 25 ms (19.87)
  single 75 harmonic 25 multiple 0 noise 0 %
  occurrence_distance 15 %

kr2:
  frequency 1.97 to 2.07 kHz (2.02)
  duration 40 to 50 ms (44.7)
  single 0 harmonic 20 multiple 0 noise 80 %
  occurrence_distance 20 %

r3:
  frequency 2.2 to 2.5 kHz (2.23)
  duration 12 to 17 ms (14.9)
  single 42 harmonic 0 multiple 21 noise 37
  occurrence_distance 10 %

r4:
  frequency 1.75 to 1.82 kHz (1.75)
  duration 12 to 17 ms (14.9)
  single 0 harmonic 31 multiple 33 noise 36
  occurrence_distance 10 %

r5:
  frequency 1.9 to 2.1 kHz (1.98)
  duration 2 to 7 ms (4.97)
  single 100 harmonic 0 multiple 0 noise 0
  occurrence_distance 10 %

LastOne:
  frequency 1.5 to 1.6 kHz (1.53)
  duration 170 to 190 ms (178.79)
  single 10 harmonic 40 multiple 19 noise 31
  occurrence_distance 15 %

GeneralSilence:
  silence 0 to 0 ms

S1-25:
  silence 12 to 17 ms

S3:
  silence 18 to 24 ms

S5-7:
  silence 42 to 52 ms

S9-13-23:
  silence 150 to 170 ms

S11-15-35-37:
  silence 7 to 11 ms

S17:
  silence 70 to 80 ms

S19:
  silence 30 to 40 ms

S21:
  silence 220 to 240 ms

S21+22+23:
  silence 380 to 430 ms

S27:
  silence 22 to 28 ms

S29:
  silence 250 to 275 ms

S31-33:
  silence 2 to 7 ms

S39:
  silence 205 to 225 ms

```

SYNTAX:

```
krrrek_0:
  ConjectureKr krrrek_1

krrrek_1:
  S1-25 krrrek_2

krrrek_2:
  r1 krrrek_3

krrrek_3:
  S3 krrrek_4

krrrek_4:
  r1 krrrek_5

krrrek_5:
  S5-7 krrrek_6

krrrek_6:
  r1 krrrek_7

krrrek_7:
  S5-7 krrrek_8

krrrek_8:
  ek krrrek_to_krup krup_to_krik krik_to_kreeup kreeup_to_krr krr_to_krrr krrr_to_last loop

krrrek_to_krup:
  S9-13-23 krup_10

krup_10:
  kru krup_11

krup_11:
  S11-15-35-37 krup_12

krup_12:
  p krup_to_krik krrrek_to_krup krik_to_kreeup kreeup_to_krr krr_to_krrr krrr_to_last loop

krup_to_krik:
  S9-13-23 krik_14

krik_14:
  k1 krik_15

krik_15:
  S11-15-35-37 krik_16

krik_16:
  rik krik_to_kreeup krup_to_krik krrrek_to_krup kreeup_to_krr krr_to_krrr krrr_to_last
loop

krik_to_kreeup:
  S17 kreeup_18

kreeup_18:
  kree kreeup_19

kreeup_19:
  S19 kreeup_20

kreeup_20:
  up kreeup_to_krr krik_to_kreeup krup_to_krik krrrek_to_krup krr_to_krrr krrr_to_last loop

kreeup_to_krr:
  . to_t straight_to_krr

to_t:
  S21 t_node

t_node:
  t t_to_krr

t_to_krr:
  S9-13-23 krr_24

straight_to_krr:
  S21+22+23 krr_24

krr_24:
  kr krr_25

krr_25:
  S1-25 krr_26
```

```

krr_26:
    kr krr_27

krr_27:
    S27 krr_28

krr_28:
    r2 krr_to_krrr kreeup_to_krr krik_to_kreeup krup_to_krik krrrek_to_krup krrr_to_last loop

krr_to_krrr:
    S29 krrr_30

krrr_30:
    r1 krrr_31

krrr_31:
    S31-33 krrr_32

krrr_32:
    kr2 krrr_33

krrr_33:
    S31-33 krrr_34

krrr_34:
    r3 krrr_35

krrr_35:
    S11-15-35-37 krrr_36

krrr_36:
    r4 krrr_37

krrr_37:
    S11-15-35-37 krrr_38

krrr_38:
    r5 krrr_to_last krr_to_krrr kreeup_to_krr krik_to_kreeup krup_to_krik krrrek_to_krup loop

krrr_to_last:
    S39 last_sound

last_sound:
    LastOne loop

loop:
    GeneralSilence krrrek_1

```

F1.7.5 OLIV Track

Track/s of call in OLIV1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
-----
| >
| NOISE 9.9 --- FIRST_PIP_1: 2
| SILENT 14.9 --- INTER_HONK_SILENCE_1: 1
| >
| NOISE 14.90 --- no match
| >
| SILENT 19.9 --- LOOP: 4
| >
| MIXED 19.87 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| NOISE 14.90 --- no match
| >
| SILENT 44.7 --- LOOP: 4
| >
| MIXED 64.56 --- no match
| >
| SILENT 158.9 --- LOOP: 4
| MIXED 99.3 --- DOUBLE_HONK_1: 2
| SILENT 9.9 --- INTER_HONK_1: 4
| >
| MIXED 24.83 --- no match
| >
| SILENT 154.0 --- INTER_HONK_1: 1
| MIXED 9.9 --- FIRST_PIP_1: 2
| SILENT 9.9 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 64.56 --- no match
| >
| SILENT 74.5 --- LOOP: 4
| MIXED 84.4 --- DOUBLE_HONK_1: 2
| SILENT 34.8 --- INTER_HONK_SILENCE_1: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 228.4 --- LOOP: 4
| >
| SINGLE 14.90 --- no match
| >
| SILENT 158.9 --- LOOP: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 14.9 --- LOOP: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 24.8 --- LOOP: 4
| >
| MIXED 19.87 --- no match
| >
| SILENT 263.2 --- LOOP: 4
| >
| NOISE 14.90 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 44.70 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 9.9 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 9.9 --- INTER_HONK_1: 4
| SINGLE 5.0 --- FIRST_PIP_1: 2
| SILENT 213.6 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 178.79 --- no match
| >
```

```
| SILENT 14.9 --- LOOP: 4
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 32
| Match total 82
-----
```

Syntax spec: SOUT.S (Southern Boubou)

```
| >
| NOISE 9.93 --- no match
| >
| SILENT 14.9 --- C KEEU-KO-KO 2.1: 1
| NOISE 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 19.9 --- C KEEU-KO-KO 3: 1
| >
| MIXED 19.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 49.7 --- C KEEU-KO-KO 3: 1
| >
| NOISE 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 44.7 --- C KEEU-KO-KO 3: 1
| >
| MIXED 64.56 --- no match
| >
| SILENT 158.9 --- C KEEU-KO-KO 1: 1
| MIXED 99.3 --- C KEEU-KO-KO 2: 2
| SILENT 9.9 --- C KEEU-KO-KO 2.1: 4
| >
| MIXED 24.83 --- no match
| >
| SILENT 154.0 --- C WHEEP-WHEEO 3: 1
| >
| MIXED 9.93 --- no match
| >
| SILENT 9.9 --- C WHEEP-WHEEO 3: 4
| >
| MIXED 64.56 --- no match
| >
| SILENT 74.5 --- C WHEEP-WHEEO 3: 4
| >
| MIXED 84.43 --- no match
| >
| SILENT 34.8 --- C WHEEP-WHEEO 3: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 228.4 --- C KEEU-KO-KO 2.1: 1
| SINGLE 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 158.9 --- C KEEU-KO-KO 3: 1
| >
| MIXED 29.80 --- no match
| >
| SILENT 14.9 --- C WHEEP-WHEEO 3: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 24.8 --- C KEEU-KO-KO 2.1: 1
| MIXED 19.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 263.2 --- C KEEU-KO-KO 3: 1
| >
| NOISE 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 5.0 --- C KEEU-KO-KO 3: 1
| >
| MIXED 44.70 --- no match
| >
| SILENT 5.0 --- C KEEU-KO-KO 2.1: 4
| MIXED 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 9.9 --- C KEEU-KO-KO 3: 1
| >
| MIXED 14.9 --- C KEEU-KO-KO 2.2: 2
| SILENT 9.9 --- C KEEU-KO-KO 3: 1
| >
| SINGLE 4.97 --- no match
| >
| SILENT 213.6 --- C WHEEP-WHEEO 3: 1
| >
| MIXED 178.79 --- no match
| >
| SILENT 14.9 --- C WHEEP-WHEEO 3: 4
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 27
| Match total 60
-----
```

Syntax spec: GREY.S (Grey Lourie)

| Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

```
>
NOISE 9.93 --- no match
>
SILENT 14.9 --- LOOP: 4
>
NOISE 14.90 --- no match
>
SILENT 19.9 --- LOOP: 4
>
MIXED 19.87 --- no match
>
SILENT 49.7 --- LOOP: 4
>
NOISE 14.90 --- no match
>
SILENT 44.7 --- LOOP: 4
>
MIXED 64.56 --- no match
>
SILENT 158.9 --- LOOP: 4
>
MIXED 99.33 --- no match
>
SILENT 9.9 --- LOOP: 4
>
MIXED 24.83 --- no match
>
SILENT 154.0 --- LOOP: 4
>
MIXED 9.93 --- no match
>
SILENT 9.9 --- LOOP: 4
>
MIXED 64.56 --- no match
>
SILENT 74.5 --- LOOP: 4
>
MIXED 84.43 --- no match
>
SILENT 34.8 --- LOOP: 4
>
MIXED 29.80 --- no match
>
SILENT 228.4 --- LOOP: 4
>
SINGLE 14.90 --- no match
>
SILENT 158.9 --- LOOP: 4
>
MIXED 29.80 --- no match
>
SILENT 14.9 --- LOOP: 4
>
MIXED 29.80 --- no match
>
SILENT 24.8 --- LOOP: 4
>
MIXED 19.87 --- no match
>
SILENT 263.2 --- LOOP: 4
>
NOISE 14.90 --- no match
>
SILENT 5.0 --- THIRD SILENCE: 1
MIXED 44.7 --- CHINK NODE: 2
SILENT 5.0 --- LOOP: 4
>
MIXED 14.90 --- no match
>
SILENT 9.9 --- LOOP: 4
>
MIXED 14.90 --- no match
>
SILENT 9.9 --- LOOP: 4
>
SINGLE 4.97 --- no match
>
```

```

| SILENT 213.6 --- LOOP: 4
| >
| MIXED 178.79 --- no match
| >
| SILENT 14.9 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 39
| Match total 83

```

Syntax spec: HOOP.S (African Hoopoe)

```

| Essentials not present.

```

Syntax spec: MOUR.S (Mourning Dove)

```

| >
| NOISE 9.9 --- KREOW 1: 2
| SILENT 14.9 --- KREOW_1S: 1
| NOISE 14.9 --- KREOW_2: 2
| SILENT 19.9 --- KREOW_2S: 1
| MIXED 19.9 --- KREOW_3: 2
| SILENT 49.7 --- KREOW_3S: 1
| NOISE 14.9 --- KREOW_4: 2
| SILENT 44.7 --- KREOW_4S: 1
| >
| MIXED 64.56 --- no match
| >
| SILENT 158.9 --- LOOP: 4
| >
| MIXED 99.33 --- no match
| >
| SILENT 9.9 --- ENDR 3S: 1
| MIXED 24.8 --- ENDR_4: 2
| SILENT 154.0 --- LOOP: 4
| MIXED 9.9 --- KREOW 1: 2
| SILENT 9.9 --- KREOW_1S: 1
| >
| MIXED 64.56 --- no match
| >
| SILENT 74.5 --- LOOP: 4
| >
| MIXED 84.43 --- no match
| >
| SILENT 34.8 --- ENDR 3S: 1
| MIXED 29.8 --- ENDR_4: 2
| SILENT 228.4 --- LOOP: 4
| SINGLE 14.9 --- KREOW 1: 2
| SILENT 158.9 --- KREOW_1S: 1
| >
| MIXED 29.8 --- R 1: 2
| SILENT 14.9 --- R_1S: 1
| MIXED 29.8 --- R_2: 2
| SILENT 24.8 --- R_2S: 4
| MIXED 19.9 --- R_3: 2
| SILENT 263.2 --- R_3S: 1
| >
| NOISE 14.9 --- KREOW 1: 2
| SILENT 5.0 --- KREOW_1S: 1
| >
| MIXED 44.7 --- ENDR 1: 2
| SILENT 5.0 --- ENDR_1S: 1
| >
| MIXED 14.9 --- KREOW 1: 2
| SILENT 9.9 --- KREOW_1S: 1
| MIXED 14.9 --- KREOW_2: 2
| SILENT 9.9 --- KREOW_2S: 1
| >
| SINGLE 4.97 --- no match
| >
| SILENT 213.6 --- LOOP: 4
| >
| MIXED 178.79 --- no match
| >
| SILENT 14.9 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 16
| Match total 72

```

Syntax spec: OLIV.S (Olivetree Warbler)

```
| >
| NOISE 9.9 --- KRIK 14: 2
| SILENT 14.9 --- KRIK_15: 1
| >
| NOISE 14.9 --- KRRREK 2: 4
| SILENT 19.9 --- KRRREK_3: 4
| MIXED 19.9 --- KRRREK_4: 4
| SILENT 49.7 --- KRRREK_5: 4
| NOISE 14.9 --- KRRREK_6: 4
| SILENT 44.7 --- KRRREK_7: 4
| MIXED 64.6 --- KRRREK_8: 4
| SILENT 158.9 --- KRRREK_TO_KRUP: 4
| MIXED 99.3 --- KRUP_10: 4
| SILENT 9.9 --- KRUP_11: 4
| MIXED 24.8 --- KRUP_12: 4
| SILENT 154.0 --- KRUP_TO_KRIK: 4
| MIXED 9.9 --- KRIK_14: 4
| SILENT 9.9 --- KRIK_15: 4
| MIXED 64.6 --- KRIK_16: 4
| SILENT 74.5 --- KRIK_TO_KREEUP: 4
| MIXED 84.4 --- KREEUP_18: 4
| SILENT 34.8 --- KREEUP_19: 4
| MIXED 29.8 --- KREEUP_20: 4
| SILENT 228.4 --- TO_T: 4
| SINGLE 14.9 --- T_NODE: 4
| SILENT 158.9 --- T_TO_KRR: 4
| MIXED 29.8 --- KRR_24: 2
| SILENT 14.9 --- KRR_25: 4
| MIXED 29.8 --- KRR_26: 2
| SILENT 24.8 --- KRR_27: 4
| MIXED 19.9 --- KRR_28: 4
| SILENT 263.2 --- KRR_TO_KRRR: 4
| NOISE 14.9 --- KRRR_30: 4
| SILENT 5.0 --- KRRR_31: 4
| MIXED 44.7 --- KRRR_32: 4
| SILENT 5.0 --- KRRR_33: 4
| MIXED 14.9 --- KRRR_34: 4
| SILENT 9.9 --- KRRR_35: 4
| MIXED 14.9 --- KRRR_36: 4
| SILENT 9.9 --- KRRR_37: 4
| SINGLE 5.0 --- KRRR_38: 4
| SILENT 213.6 --- KRRR_TO_LAST: 4
| MIXED 178.8 --- LAST_SOUND: 4
| SILENT 14.9 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 1
| Match total 159
```

Syntax spec: JACO.S (Jacobin Cuckoo)

| Essentials not present.

Syntax spec: CROW.S (Pied Crow)

| Essentials not present.

Syntax spec: SWAI.S (Swainson's Francolin)

| Essentials not present.

Syntax spec: WILL.S (Willow Warbler)

```
| >
| NOISE 9.9 --- NODE 9: 2
| SILENT 14.9 --- NODE_10: 1
| >
| NOISE 14.9 --- NODE 29: 2
| SILENT 19.9 --- NODE_30: 1
| >
| MIXED 19.9 --- NODE 29: 2
| SILENT 49.7 --- NODE_30: 1
```

```

>
NOISE 14.9 --- NODE_29: 2
SILENT 44.7 --- NODE_30: 1
>
MIXED 64.6 --- NODE_37: 2
SILENT 158.9 --- NODE_38: 1
>
MIXED 99.33 --- no match
>
SILENT 9.9 --- NODE_6: 4
MIXED 24.8 --- NODE_7: 2
SILENT 154.0 --- NODE_8: 1
MIXED 9.9 --- NODE_9: 2
SILENT 9.9 --- NODE_10: 1
>
MIXED 64.6 --- NODE_37: 2
SILENT 74.5 --- NODE_38: 1
>
MIXED 84.4 --- NODE_31: 2
SILENT 34.8 --- NODE_32: 1
>
MIXED 29.8 --- NODE_7: 2
SILENT 228.4 --- NODE_8: 1
SINGLE 14.9 --- NODE_9: 2
SILENT 158.9 --- NODE_10: 1
>
MIXED 29.8 --- NODE_7: 2
SILENT 14.9 --- NODE_8: 1
>
MIXED 29.8 --- NODE_7: 2
SILENT 24.8 --- NODE_8: 4
>
MIXED 19.9 --- NODE_29: 2
SILENT 263.2 --- NODE_30: 1
>
NOISE 14.9 --- NODE_29: 2
SILENT 5.0 --- NODE_30: 1
>
MIXED 44.70 --- no match
>
SILENT 5.0 --- NODE_8: 1
MIXED 14.9 --- NODE_9: 2
SILENT 9.9 --- NODE_10: 1
>
MIXED 14.9 --- NODE_23: 2
SILENT 9.9 --- NODE_24: 4
SINGLE 5.0 --- NODE_25: 2
SILENT 213.6 --- NODE_26: 1
>
MIXED 178.79 --- no match
>
SILENT 14.9 --- NODE_40: 4

Score for C:\BCR\BIRDS\WILL\WILL.S:
Failures 18
Match total 69
-----

```

Syntax spec: MONO.S (Monotonous Lark)

```

>
NOISE 9.9 --- IS_1: 2
SILENT 14.9 --- IS_1S: 1
NOISE 14.9 --- IS_2: 2
SILENT 19.9 --- IS_2S: 1
>
MIXED 19.87 --- no match
>
SILENT 49.7 --- S_1S: 1
NOISE 14.9 --- S_2: 2
SILENT 44.7 --- STOWEET_SILENCE: 1
>
MIXED 64.6 --- FOR_NODE: 2
SILENT 158.9 --- FORTOSYRUP_SILENCE: 1
>
MIXED 99.3 --- WEET_NODE: 2
SILENT 9.9 --- LOOP: 4
>
MIXED 24.83 --- no match
>
SILENT 154.0 --- IS_1S: 1
MIXED 9.9 --- IS_2: 2
SILENT 9.9 --- IS_2S: 4
>

```

```
| MIXED 64.6 --- FOR NODE: 2
| SILENT 74.5 --- FORTOSYRUP_SILENCE: 1
| >
| MIXED 84.43 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 228.4 --- S_1S: 1
| SINGLE 14.9 --- S_2: 2
| SILENT 158.9 --- STOWEET_SILENCE: 1
| >
| MIXED 29.80 --- no match
| >
| SILENT 14.9 --- LOOP: 4
| >
| MIXED 29.80 --- no match
| >
| SILENT 24.8 --- LOOP: 4
| >
| MIXED 19.87 --- no match
| >
| SILENT 263.2 --- S_1S: 1
| NOISE 14.9 --- S_2: 2
| SILENT 5.0 --- STOWEET_SILENCE: 1
| >
| MIXED 44.7 --- SYRUP: 2
| SILENT 5.0 --- SYRTOUP_SILENCE: 1
| >
| MIXED 14.9 --- S_1: 2
| SILENT 9.9 --- S_1S: 4
| MIXED 14.9 --- S_2: 2
| SILENT 9.9 --- STOWEET_SILENCE: 1
| >
| SINGLE 4.97 --- no match
| >
| SILENT 213.6 --- LOOP: 4
| >
| MIXED 178.79 --- no match
| >
| SILENT 14.9 --- LOOP: 4
| >
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 23
| Match total 69
|-----
```

F1.7.6 OLIV Trial results

Recognition scores for call OLIV1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	Y	3.33	32	82
Southern Boubou	Y	2.08	27	60
Grey Lourie	N	2.75		
Fiscal Shrike	Y	1.13	39	83
African Hoopoe	N	2.00		
Mourning Dove	Y	2.57	16	72
Olivetree Warbler	Y	3.81	1	159
Jacobin Cuckoo	N	2.75		
Pied Crow	N	1.67		
Swainson's Francolin	N	2.67		
Willow Warbler	Y	1.93	18	69
Monotonous Lark	Y	3.00	23	69

F1.8 JACO
Jacobin Cuckoo
Clamator jacobinus
382 (348)

F1.8.1 JACO Bird Call Descriptor

```
JACO1.ADS Jacobin Cuckoo 341 (348)
Sampling_frequency: 2.7586000000E+01 kHz

JACO1A.SF
Window_duration: 4.96628724715265E+0000 ms
Frequency_resolution: 5.38789062500200E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 137 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 467
Max_magnitude: 3.80879140896797E+0004
Background_mag: 1.8463068963E+02

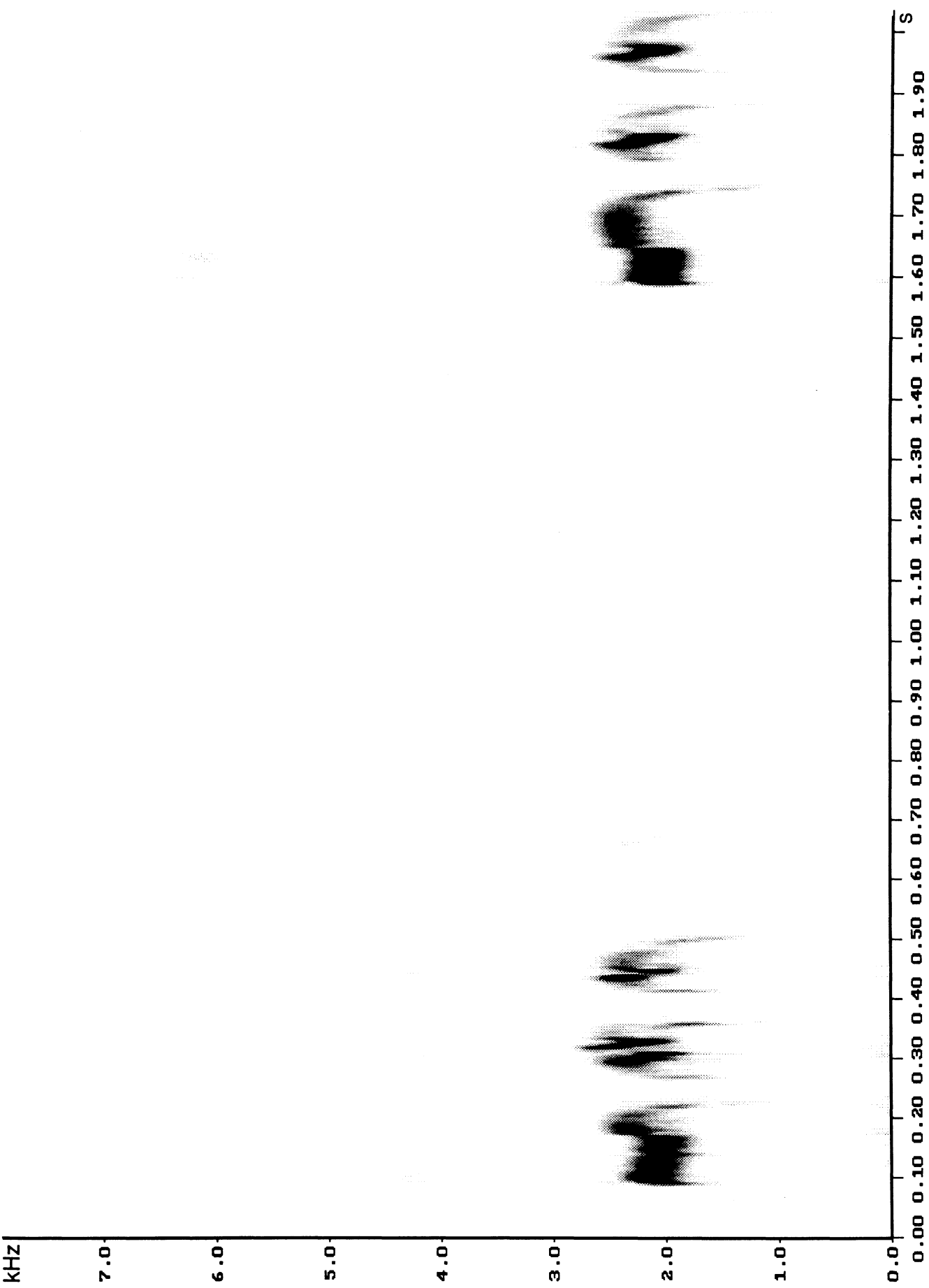
JACO1A.SS
Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.50000000000000E+0001
LinesPerMsec: 4.00000000000091E-0001
END JACO1B.SS

JACO1A.LPF Linked peak frame file
snr: 10

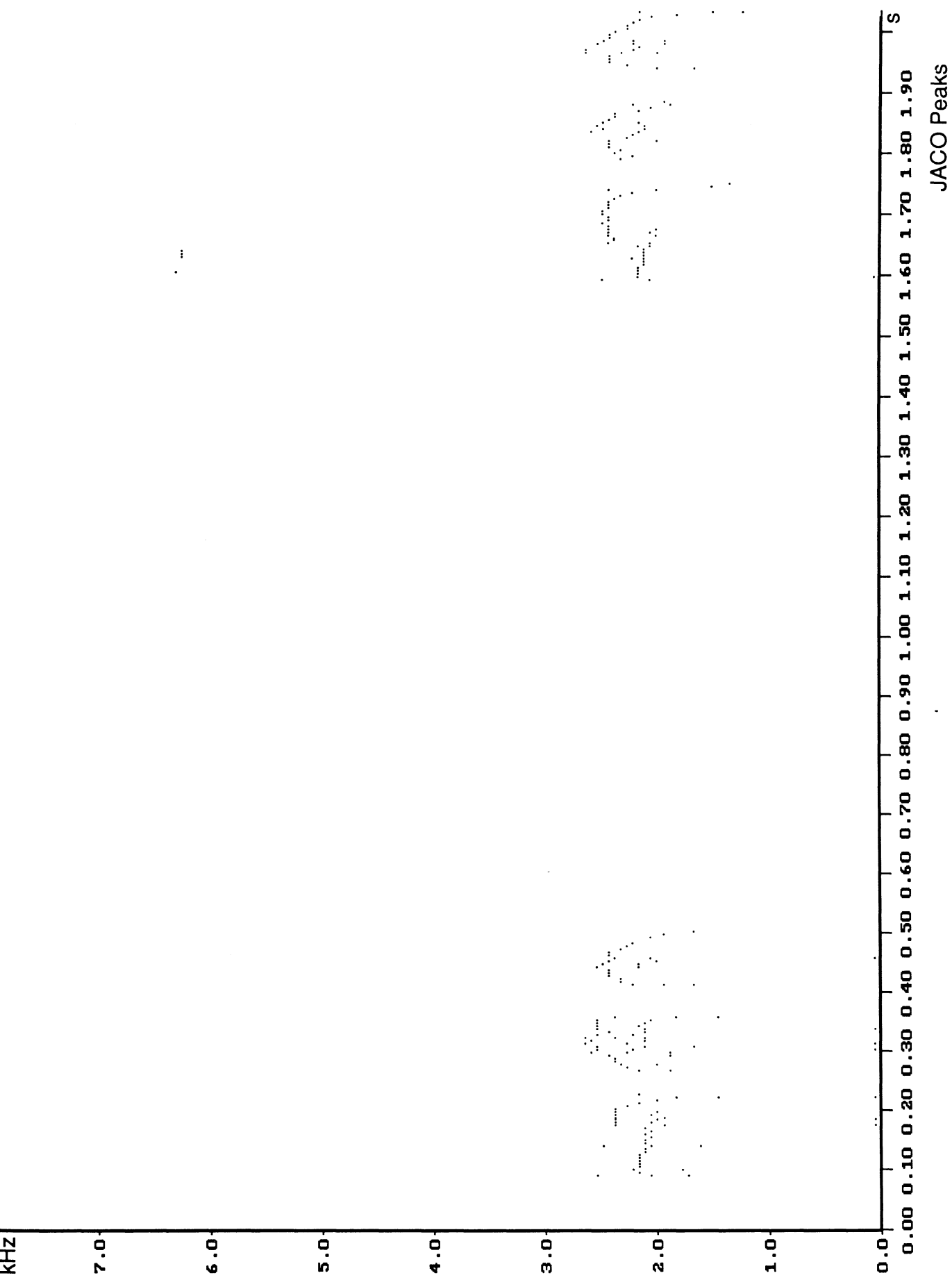
JACO1A.CF
High_pass_freq: 0.3 kHz (lower cutoff)
Distance_thresh: 0.3 kHz between adjacent peaks
Class_mag_thresh: 10 times background

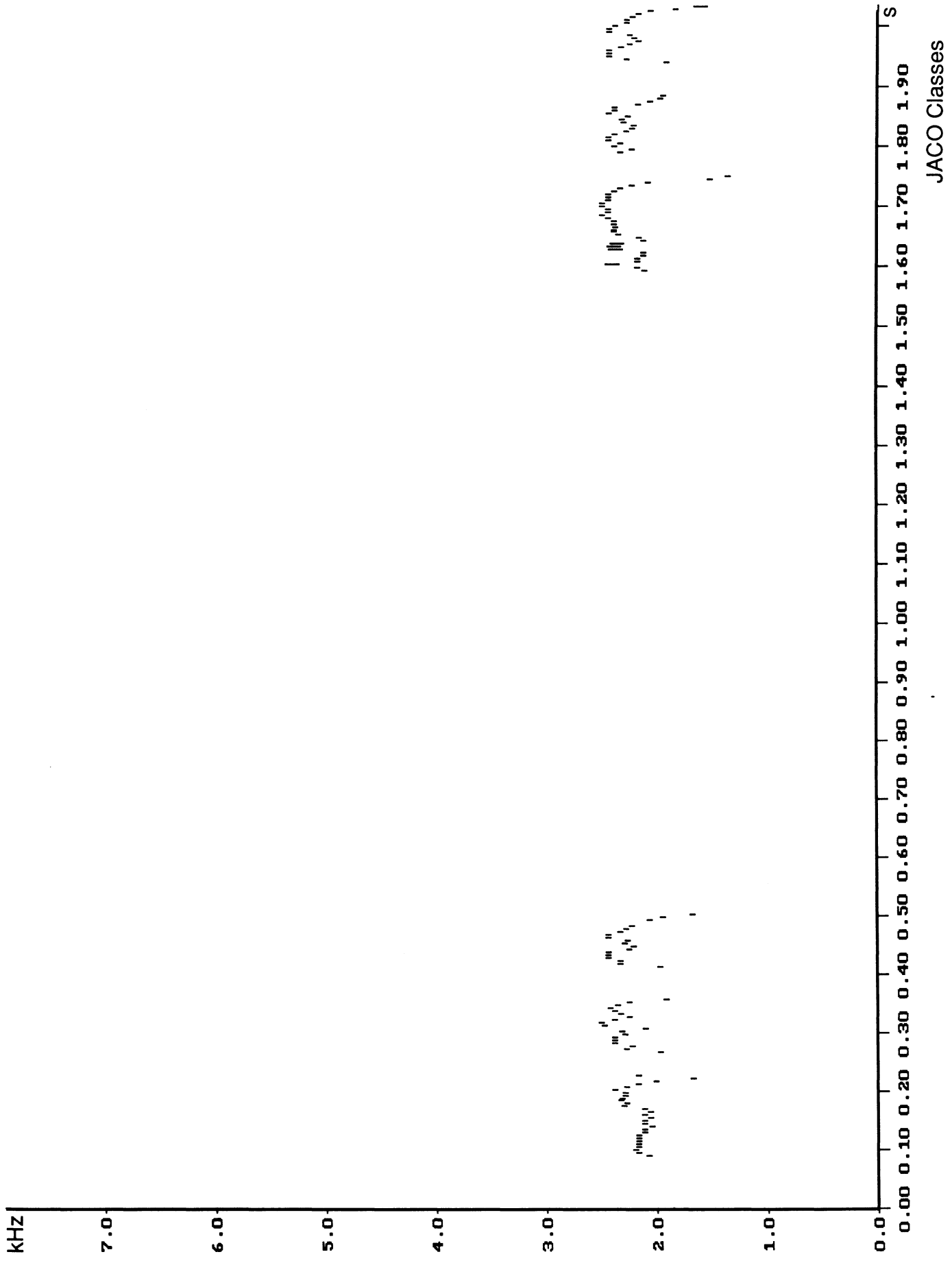
JACO1A.E
Dominance_ratio: 0.9
END JACO1A.E
END JACO1A.CF
END JACO1A.LPF
END JACO1A.SF
END JACO1A.ADS
```

F1.8.2 JACO Plots

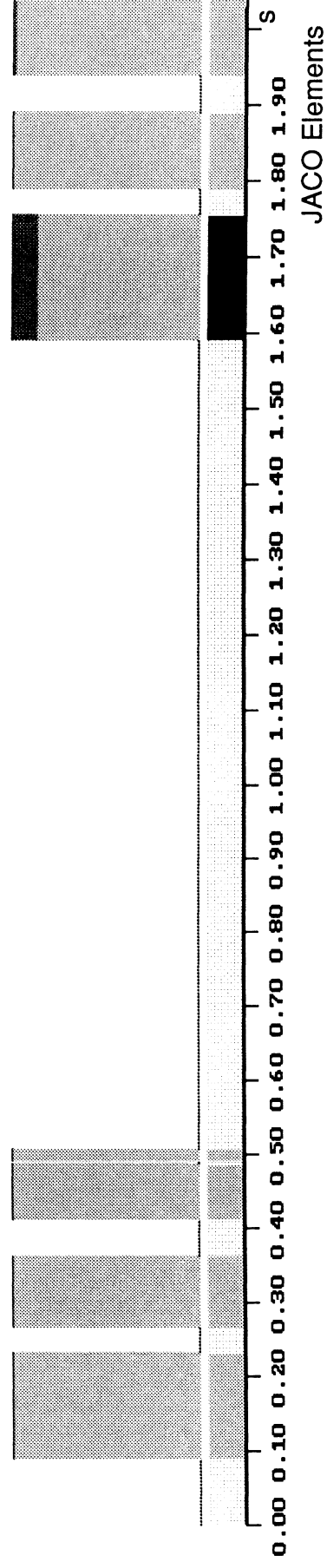


JACO Sonagram





■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.8.3 JACO Elements

Element text file

DURN 84.43	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 144.02	FREQ 2.15	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 34.76	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 94.36	FREQ 2.28	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 49.66	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 74.49	FREQ 2.30	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 1.89	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 1082.65	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 163.89	FREQ 2.26	CLASS MIXED		
SINGLE: 0.872	HARMONIC: 0.000	MULTIPLE: 0.128	NOISE: 0.000	
DURN 34.76	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 99.33	FREQ 2.26	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 49.66	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 104.29	FREQ 2.19	CLASS SINGLE		
SINGLE: 0.985	HARMONIC: 0.000	MULTIPLE: 0.015	NOISE: 0.000	
DURN 124.16	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.21	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 144.02	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

F1.8.4 JACO Syntax Specification

SYNTAX SPECIFICATION

BIRD: Jacobin Cuckoo

Basic sequence is J1-J2-J2 but instead of J2, exception1-exception2 is also allowed. The exception sequence is basically a broken J2.

ELEMENTS:

J1: Essential
frequency 2.1 to 2.3 kHz (2.15, 2.26)
duration 135 to 175 ms (144.02, 163.89)
single 95 harmonic 0 multiple 5 noise 0
occurrence_distance 10 %

J2:
frequency 2.17 to 2.32 kHz (2.19, 2.26, 2.28, 2.30)
duration 90 to 110 ms (94.36, 99.33, 104.29)
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

exception1:
frequency 2.17 to 2.32 khz (same as J2)
duration 70 to 85 ms (74.49)
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

exception2:
frequency 1.8 to 2.0 khz (1.89)
duration 5 to 20 ms (14.90)
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 20 %

J1ToJ2:
silence 32 to 38 ms (34.76, 34.76)

InterJ2:
silence 47 to 53 (49.66, 49.66)

exception1to2:
silence 0 to 7 ms (4.97)

GeneralSilence:
silence 0 to 0 ms

SYNTAX:

J_node_1:
J1 First_silence

First_silence:
J1ToJ2 J_node_2 exception_node_1

J_node_2:
J2 Second_silence

Second_silence:
InterJ2 J_node_3 exception_node_4

J_node_3:
J2 Loop

Loop:
GeneralSilence J_node_1

exception_node_1:
exception1 exception_node_2

exception_node_2:
exception1to2 exception_node_3

exception_node_3:
exception2 J_node_3

exception_node_4:
exception1 exception_node_5

```
exception_node_5:  
  exception1to2 exception_node_6  
  
exception_node_6:  
  exception2 Loop
```

F1.8.5 JACO Track

Track/s of call in JACO1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
-----
| >
| SILENT 84.4 --- LOOP: 4
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| SINGLE 94.4 --- DOUBLE HONK 1: 2
| SILENT 49.7 --- INTER_HONK_SILENCE_1: 1
| SINGLE 74.5 --- SECOND_HONK_1: 2
| SILENT 5.0 --- AFTER_HONK_1: 4
| >
| SINGLE 14.90 --- no match
| >
| SILENT 1082.7 --- LOOP: 4
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| SINGLE 99.3 --- DOUBLE HONK 1: 2
| SILENT 49.7 --- INTER_HONK_SILENCE_1: 1
| >
| SINGLE 104.29 --- no match
| >
| SILENT 124.2 --- LOOP: 4
| >
| SINGLE 14.90 --- no match
| >
| SILENT 144.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 10
| Match total 36
|
-----
```

Syntax spec: SOUT.S (Southern Boubou)

```
-----
| >
| SILENT 84.4 --- C_WHEEP-WHEEO_3: 4
| SINGLE 144.0 --- R_KEEU-KO-KO_0: 2
| SILENT 34.8 --- R_KEEU_KO_KO_1: 1
| >
| SINGLE 94.36 --- no match
| >
| SILENT 49.7 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 74.49 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| SINGLE 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 1082.7 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- C_KEEU_KO_KO_1: 1
| SINGLE 99.3 --- C_KEEU-KO-KO_2: 2
| SILENT 49.7 --- C_KEEU-KO-KO_2.1: 1
| >
| SINGLE 104.3 --- C_KEEU-KO-KO_2: 2
| SILENT 124.2 --- C_KEEU-KO-KO_2.1: 1
| SINGLE 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 144.0 --- C_KEEU-KO-KO_3: 1
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 7
| Match total 28
|
-----
```

Syntax spec: GREY.S (Grey Lourie)

| Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

| >
| SILENT 84.4 --- LOOP: 4
| >
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| >
| SINGLE 94.36 --- no match
| >
| SILENT 49.7 --- SECOND_SILENCE: 1
| SINGLE 74.5 --- WHISTLE_NODE: 2
| SILENT 5.0 --- THIRD_SILENCE: 1
| >
| SINGLE 14.90 --- no match
| >
| SILENT 1082.7 --- LOOP: 4
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| >
| SINGLE 99.33 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| SINGLE 104.29 --- no match
| >
| SILENT 124.2 --- LOOP: 4
| >
| SINGLE 14.90 --- no match
| >
| SILENT 144.0 --- LOOP: 4
| >
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 14
| Match total 32

Syntax spec: HOOP.S (African Hoopoe)

| Essentials not present.

Syntax spec: MOUR.S (Mourning Dove)

| >
| SILENT 84.4 --- LOOP: 4
| >
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| >
| SINGLE 94.36 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| SINGLE 74.49 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| SINGLE 14.9 --- KREOW 1: 2
| SILENT 1082.7 --- KREOW_1S: 1
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- LOOP: 4
| >
| SINGLE 99.33 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| SINGLE 104.29 --- no match
| >
| SILENT 124.2 --- LOOP: 4

```
| SINGLE 14.9 --- KREOW_1: 2
| SILENT 144.0 --- KREOW_1S: 1
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 12
| Match total 34
-----
```

Syntax spec: OLIV.S (Olivetree Warbler)

```
-----
| >
| SILENT 84.4 --- KRRR_TO_LAST: 1
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- KRRREK TO KRUP: 1
| SINGLE 94.4 --- KRUP_10: 2
| SILENT 49.7 --- KRUP_11: 1
| >
| SINGLE 74.49 --- no match
| >
| SILENT 5.0 --- KRRR_33: 4
| SINGLE 14.9 --- KRRR_34: 2
| SILENT 1082.7 --- KRRR_35: 1
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- KRRREK TO KRUP: 1
| SINGLE 99.3 --- KRUP_10: 2
| SILENT 49.7 --- KRUP_11: 1
| >
| SINGLE 104.3 --- KRUP_10: 2
| SILENT 124.2 --- KRUP_11: 1
| >
| SINGLE 14.9 --- KRRR_36: 2
| SILENT 144.0 --- KRRR_37: 1
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 8
| Match total 22
-----
```

Syntax spec: JACO.S (Jacobin Cuckoo)

```
-----
| >
| SILENT 84.4 --- LOOP: 4
| SINGLE 144.0 --- J_NODE_1: 4
| SILENT 34.8 --- FIRST_SILENCE: 4
| SINGLE 94.4 --- J_NODE_2: 4
| SILENT 49.7 --- SECOND_SILENCE: 4
| SINGLE 74.5 --- EXCEPTION_NODE_4: 4
| SILENT 5.0 --- EXCEPTION_NODE_5: 4
| SINGLE 14.9 --- EXCEPTION_NODE_6: 4
| SILENT 1082.7 --- LOOP: 4
| MIXED 163.9 --- J_NODE_1: 3
| SILENT 34.8 --- FIRST_SILENCE: 4
| SINGLE 99.3 --- J_NODE_2: 4
| SILENT 49.7 --- SECOND_SILENCE: 4
| SINGLE 104.3 --- J_NODE_3: 4
| SILENT 124.2 --- LOOP: 4
| >
| SINGLE 14.9 --- EXCEPTION_NODE_6: 2
| SILENT 144.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\JACO\JACO.S:
| Failures 1
| Match total 65
-----
```

Syntax spec: CROW.S (Pied Crow)

```
-----
| Essentials not present.
-----
```

Syntax spec: SWAI.S (Swainson's Francolin)

```
-----
| Essentials not present.
-----
```

Syntax spec: WILL.S (Willow Warbler)

```
>
| SILENT 84.4 --- NODE_40: 4
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- NODE_40: 4
| >
| SINGLE 94.36 --- no match
| >
| SILENT 49.7 --- NODE_26: 1
| SINGLE 74.5 --- NODE_27: 2
| SILENT 5.0 --- NODE_28: 1
| SINGLE 14.9 --- NODE_29: 2
| SILENT 1082.7 --- NODE_30: 1
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- NODE_40: 4
| >
| SINGLE 99.33 --- no match
| >
| SILENT 49.7 --- NODE_40: 4
| >
| SINGLE 104.29 --- no match
| >
| SILENT 124.2 --- NODE_8: 1
| SINGLE 14.9 --- NODE_9: 2
| SILENT 144.0 --- NODE_10: 1
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 10
| Match total 27
```

Syntax spec: MONO.S (Monotonous Lark)

```
>
| SILENT 84.4 --- LOOP: 4
| >
| SINGLE 144.02 --- no match
| >
| SILENT 34.8 --- STOWEET_SILENCE: 1
| SINGLE 94.4 --- WEET_NODE: 2
| SILENT 49.7 --- LOOP: 4
| >
| SINGLE 74.49 --- no match
| >
| SILENT 5.0 --- S_1S: 1
| SINGLE 14.9 --- S_2: 2
| SILENT 1082.7 --- STOWEET_SILENCE: 1
| >
| MIXED 163.89 --- no match
| >
| SILENT 34.8 --- STOWEET_SILENCE: 1
| SINGLE 99.3 --- WEET_NODE: 2
| SILENT 49.7 --- LOOP: 4
| >
| SINGLE 104.3 --- WEET_NODE: 4
| SILENT 124.2 --- LOOP: 4
| >
| SINGLE 14.9 --- S_1: 2
| SILENT 144.0 --- S_1S: 1
|
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 8
| Match total 33
```

F1.8.6 JACO Trial results

Recognition scores for call JAC01A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	Y	3.00	10	36
Southern Boubou	Y	2.23	7	28
Grey Lourie	N	1.50		
Fiscal Shrike	Y	1.88	14	32
African Hoopoe	N	2.50		
Mourning Dove	Y	1.57	12	34
Olivetree Warbler	Y	1.29	8	22
Jacobin Cuckoo	Y	4.00	1	65
Pied Crow	N	1.67		
Swainson's Francolin	N	1.50		
Willow Warbler	Y	0.96	10	27
Monotonous Lark	Y	2.13	8	33

F1.9 CROW

Pied Crow

Corvus Albus

548 (522)

F1.9.1 CROW Bird Call Descriptor

```
CROW1.ADS Pied Crow 548 (522)
Sampling_frequency: 2.00000000000E+01 kHz

CROW1A.SF
Window_duration: 5.0000000000000E+0000 ms
Frequency_resolution: 3.9062500000000E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window_length: 100 samples (filled in by SPECTRA)
Window_type: Hamming
Start_time: 0 ms
Finish_time: -1 (to end of data)
Number_of_frames: 402
Max_magnitude: 2.85943879398406E+0004
Background_mag: 1.9028014450E+02

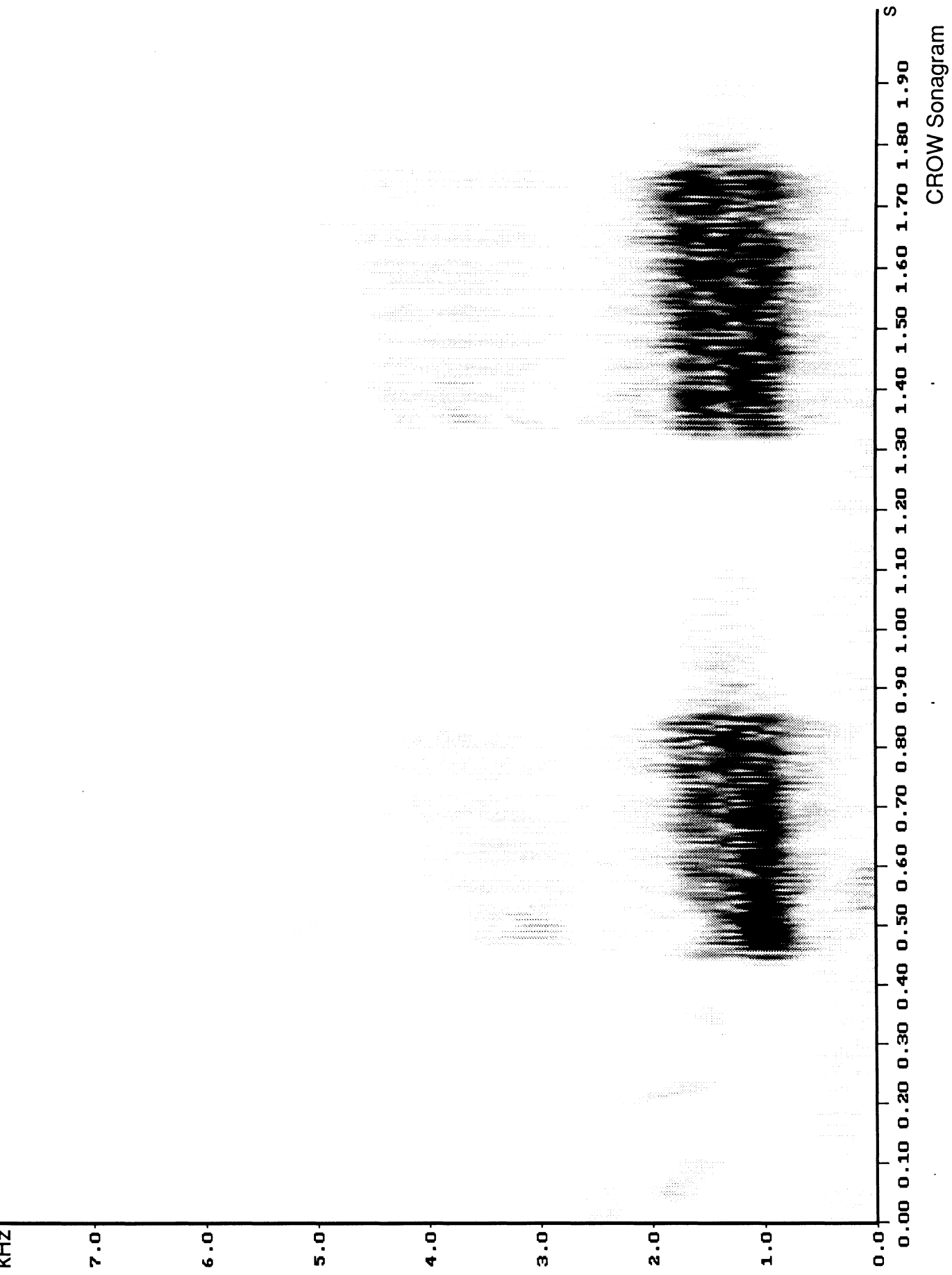
CROW1A.SS
Frequency_scale: 8 kHz full scale screen width
Time_scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.5000000000000E+0001
LinesPerMsec: 4.00000000000091E-0001
END CROW1A.SS

CROW1A.LPF Linked peak frame file
snr: 20

CROW1A.CF
High_pass_freq: 0.5 kHz (lower cutoff)
Distance_thresh: 0.3 kHz between adjacent peaks
Class_mag_thresh: 10 times background

CROW1A.E
Dominance_ratio: 0.9
END CROW1A.E
END CROW1A.CF
END CROW1A.LPF
END CROW1A.SF
END CROW1A.ADS
```

F1.9.2 CROW Plots



KHz

7.0

6.0

5.0

4.0

3.0

2.0

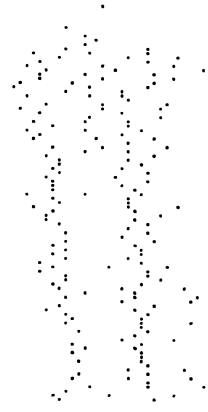
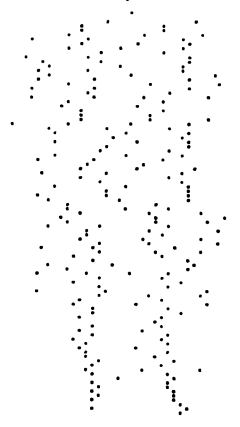
1.0

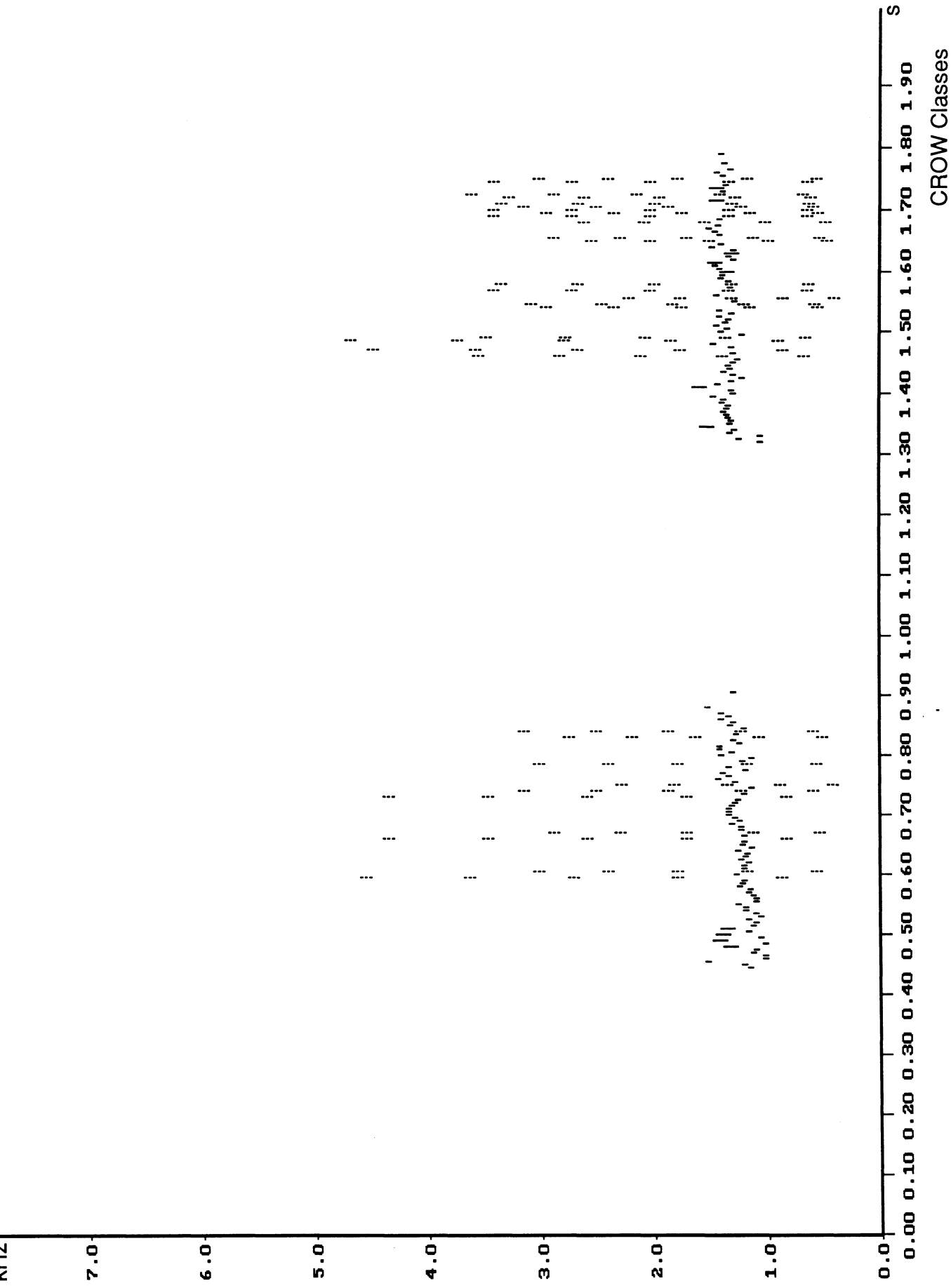
0.0

0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50 1.60 1.70 1.80 1.90 S

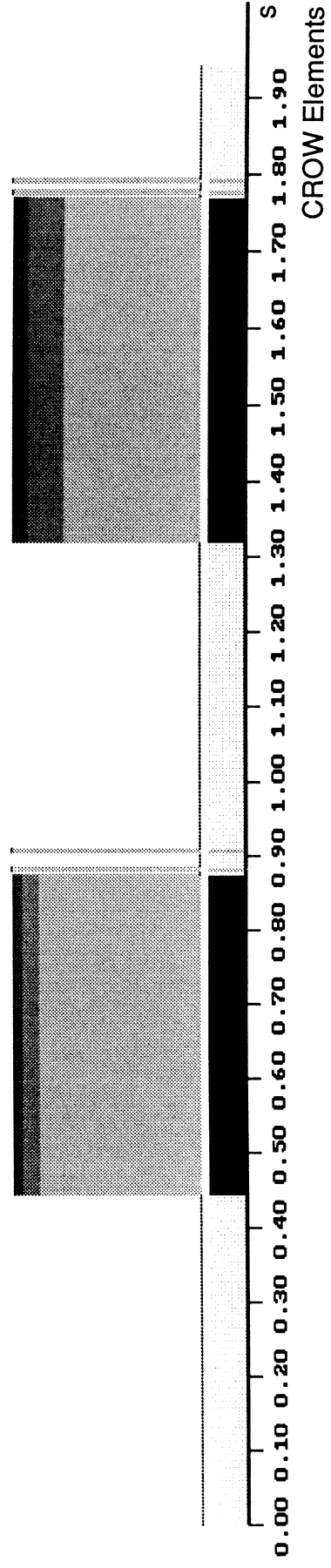
CROW Peaks

...





MIXED
NOISE
MULTIPLE
HARMONIC
SINGLE
SILENT



F1.9.3 CROW Elements

Element text file

DURN 445.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 430.00	FREQ 1.16	CLASS MIXED		
SINGLE: 0.864	HARMONIC: 0.092	MULTIPLE: 0.044	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.52	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.29	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 410.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 450.00	FREQ 1.18	CLASS MIXED		
SINGLE: 0.733	HARMONIC: 0.194	MULTIPLE: 0.073	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.37	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 1.41	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 215.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

F1.9.4 CROW Syntax Specification

SYNTAX SPECIFICATION

BIRD: Pied Crow

ELEMENTS:

Caw: Essential

frequency 1.1 to 1.2 kHz (1.16, 1.18)
duration 440 to 455 ms (445, 450)
single 80 harmonic 15 multiple 5 noise 0 %
occurrence_distance 15 %

InterCawSilence:

silence 400 to 420 ms

GeneralSilence:

silence 0 to 0 ms

SYNTAX:

First_caw:

Caw First_silence

First_silence:

InterCawSilence Second_caw

Second_caw:

Caw Loop

Loop:

GeneralSilence First_caw

F1.9.5 CROW Track

Track/s of call in CROW1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SILENT 445.0 --- C_WHEEP-WHEEO_3: 1
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 410.0 --- C_WHEEP-WHEEO_3: 1
| >
| MIXED 450.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 215.0 --- C_WHEEP-WHEEO_3: 1
| >
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 12
Match total 19

Syntax spec: GREY.S (Grey Lourie)

Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

| >
| SILENT 445.0 --- LOOP: 4
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 410.0 --- LOOP: 4
| MIXED 450.0 --- HISS_NODE: 2
| SILENT 5.0 --- FIRST_SILENCE: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 215.0 --- LOOP: 4
| >

```
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 10
| Match total 27
-----
```

```
Syntax spec: HOOP.S ( African Hoopoe)
-----
```

```
| Essentials not present.
-----
```

```
Syntax spec: MOUR.S ( Mourning Dove)
-----
```

```
| >
| SILENT 445.0 --- LOOP: 4
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 410.0 --- LOOP: 4
| >
| MIXED 450.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 215.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 12
| Match total 28
-----
```

```
Syntax spec: OLIV.S ( Olivetree Warbler)
-----
```

```
| >
| SILENT 445.0 --- KRRR_TO_LAST: 1
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- KRRR_37: 1
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 410.0 --- STRAIGHT_TO_KRR: 4
| >
| MIXED 450.00 --- no match
| >
| SILENT 5.0 --- KRRR_37: 1
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 215.0 --- KRRR_TO_LAST: 4
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 6
| Match total 27
-----
```

```
Syntax spec: JACO.S ( Jacobin Cuckoo)
-----
```

```
| Essentials not present.
-----
```

Syntax spec: CROW.S (Pied Crow)

```
| >
| SILENT 445.0 --- LOOP: 4
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 410.0 --- LOOP: 4
| MIXED 450.0 --- FIRST_CAW: 4
| SILENT 5.0 --- FIRST_SILENCE: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 215.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\CROW\CROW.S:
| Failures 10
| Match total 29
```

Syntax spec: SWAI.S (Swainson's Francolin)

```
| Essentials not present.
```

Syntax spec: WILL.S (Willow Warbler)

```
| >
| SILENT 445.0 --- NODE_40: 4
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- NODE_12: 4
| SINGLE 5.0 --- NODE_13: 2
| SILENT 20.0 --- NODE_14: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 410.0 --- NODE_36: 1
| >
| MIXED 450.00 --- no match
| >
| SILENT 5.0 --- NODE_12: 4
| SINGLE 5.0 --- NODE_13: 2
| SILENT 10.0 --- NODE_14: 1
| >
| SINGLE 5.0 --- NODE_35: 2
| SILENT 215.0 --- NODE_36: 1
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 6
| Match total 24
```

Syntax spec: MONO.S (Monotonous Lark)

```
| >
| SILENT 445.0 --- LOOP: 4
| >
| MIXED 430.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
```

CROW Track F118

```
| SILENT 410.0 --- LOOP: 4
| >
| MIXED 450.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 215.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 12
| Match total 28
|-----
```

F1.9.6 CROW Trial results

Recognition scores for call CROW1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	N	2.83		
Southern Boubou	Y	1.38	12	19
Grey Lourie	N	1.75		
Fiscal Shrike	Y	1.13	10	27
African Hoopoe	N	1.25		
Mourning Dove	Y	1.29	12	28
Olivetree Warbler	Y	1.19	6	27
Jacobin Cuckoo	N	1.50		
Pied Crow	Y	4.00	10	29
Swainson's Francolin	N	2.00		
Willow Warbler	Y	1.19	6	24
Monotonous Lark	Y	1.69	12	28

F1.10 SWAI
Swainson's Francolin
Francolinus swainsonii
199 (185)

F1.10.1 SWAI Bird Call Descriptor

SWAI1.ADS Swainson's Francolin 199 (185). As illustrated in Roberts.
Sampling_frequency: 20 kHz

SWAI1A.SF

Window duration: 5.000000000000000E+0000 ms
Frequency resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)
FFT_Length: 512 points
Window length: 100 samples (filled in by SPECTRA)
Window type: Hamming
Start time: 0 ms
Finish time: -1 (to end of data)
Number of frames: 402
Max magnitude: 2.96762558332086E+0004
Background_mag: 1.2322035184E+02

SWAI1A.SS Sonagram storage file

Frequency scale: 8 kHz full scale screen width
Time scale: 500 ms full scale screen length
Min_factor: 0.0 of max magnitude
Max_factor: 0.5 of max magnitude
PixelsPerkHz: 7.500000000000000E+0001
LinesPerMsec: 4.000000000000091E-0001

END SWAI1A.SS

SWAI1A.LPF

snr: 25

SWAI1A.CF

High_pass_freq: 0.5 kHz
Distance_thresh: 0.3 kHz
Class_mag_thresh: 0 times background

SWAI1A.E

Dominance_ratio: 0.9

END SWAI1A.E

END SWAI1A.CF

END SWAI1A.LPF

END SWAI1A.SF

END SWAI1A.ADS

F1.10.2 SWAI Plots

KHZ

7.0

6.0

5.0

4.0

3.0

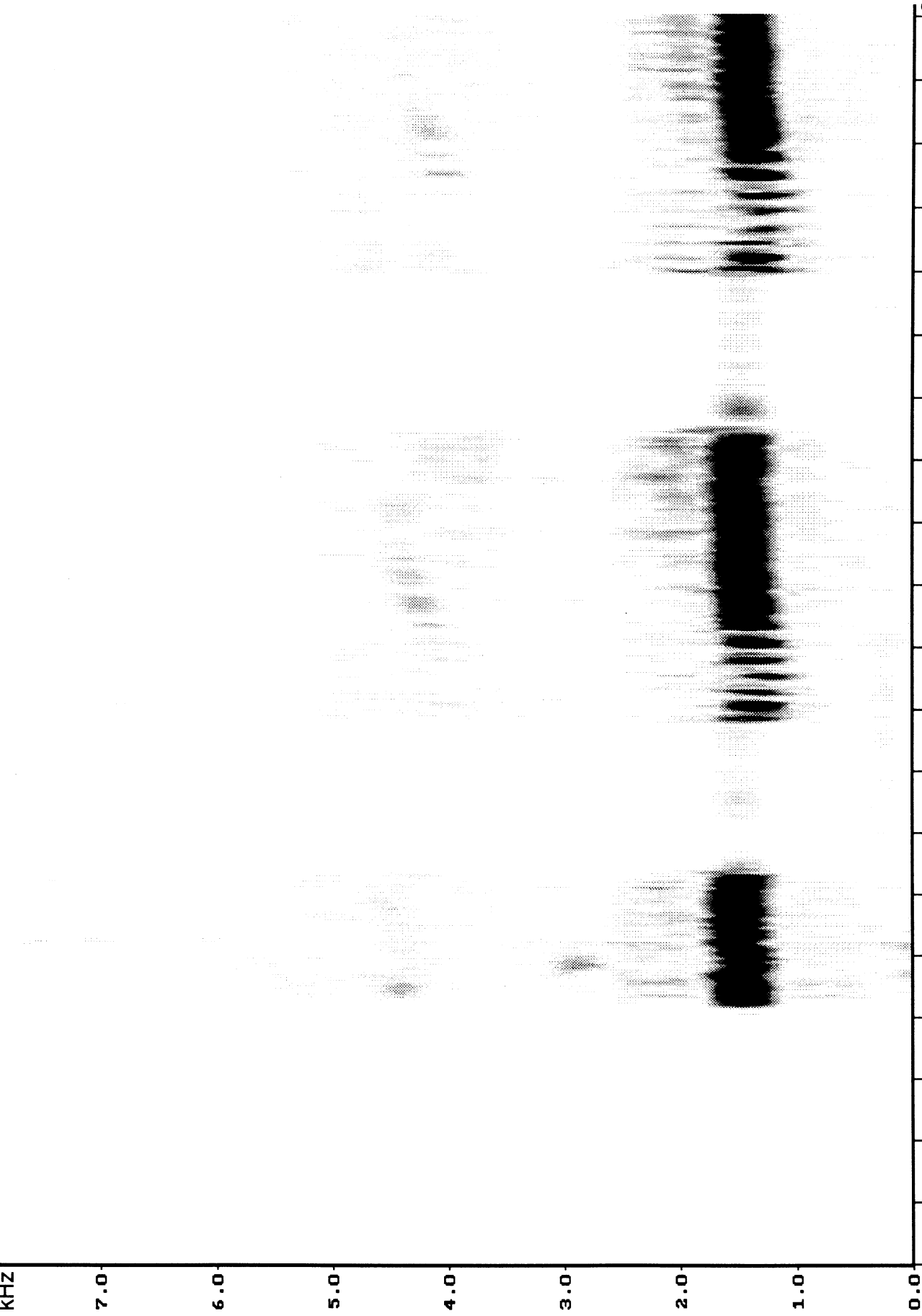
2.0

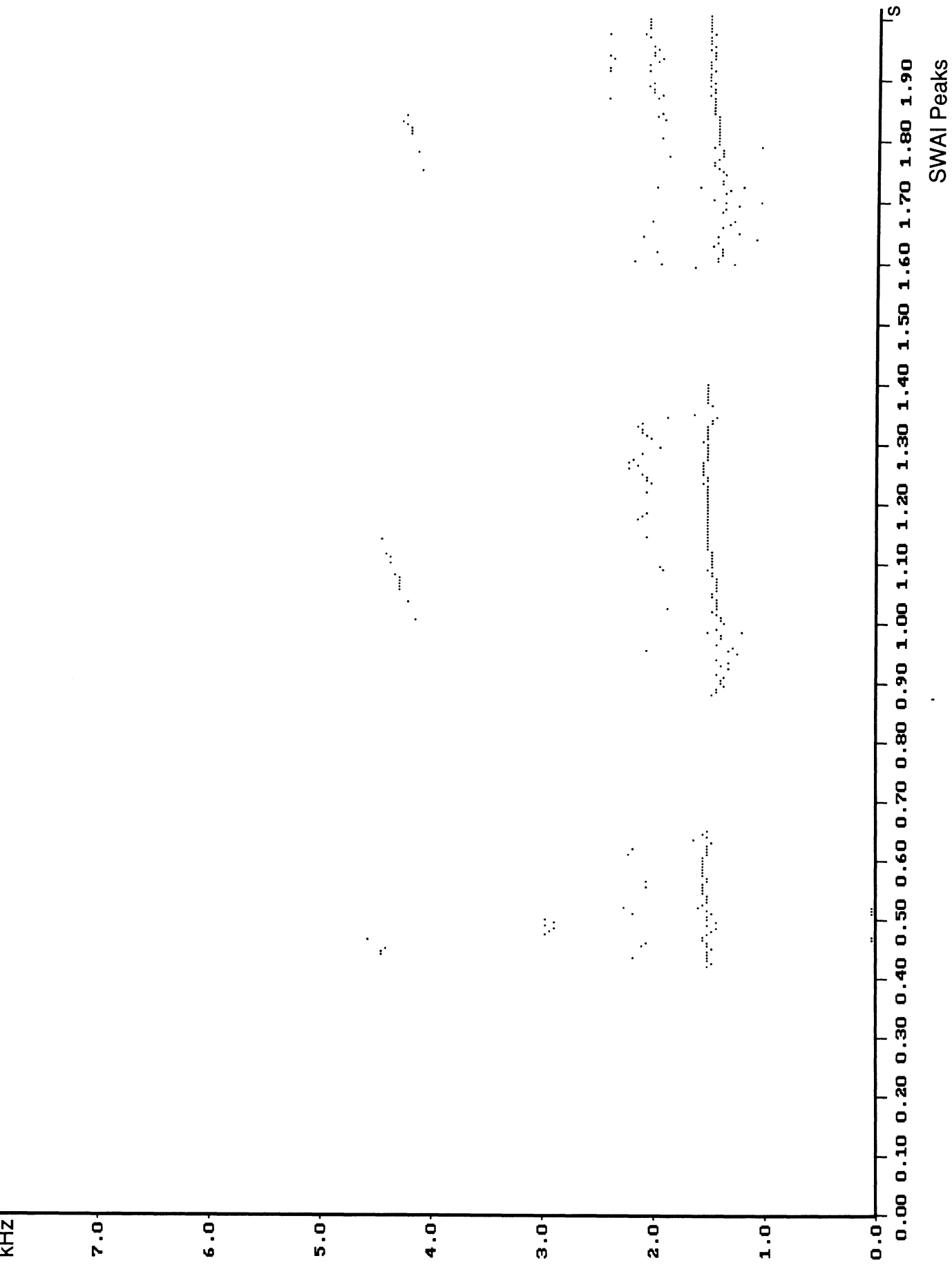
1.0

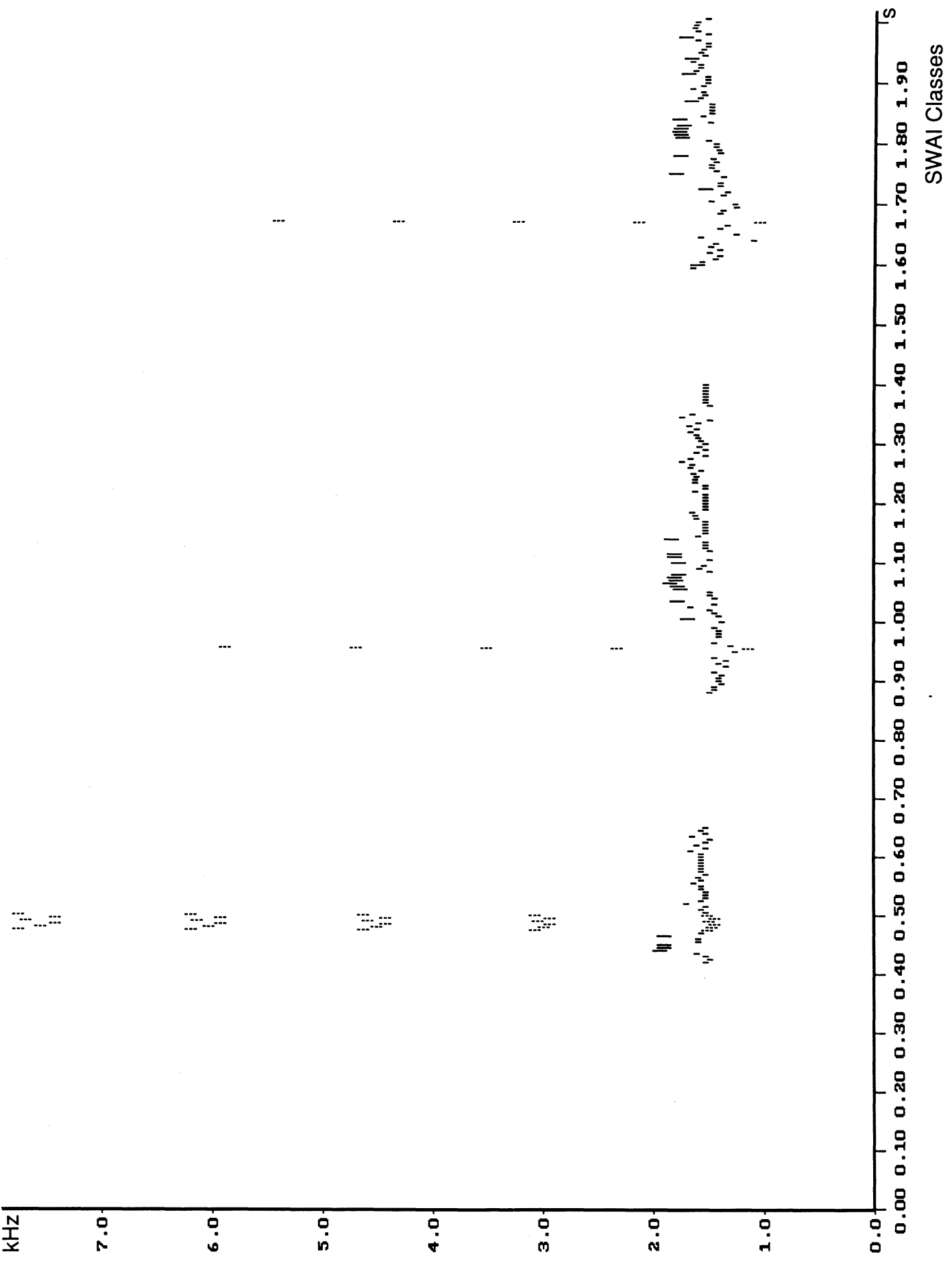
0.0

0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50 1.60 1.70 1.80 1.90 S

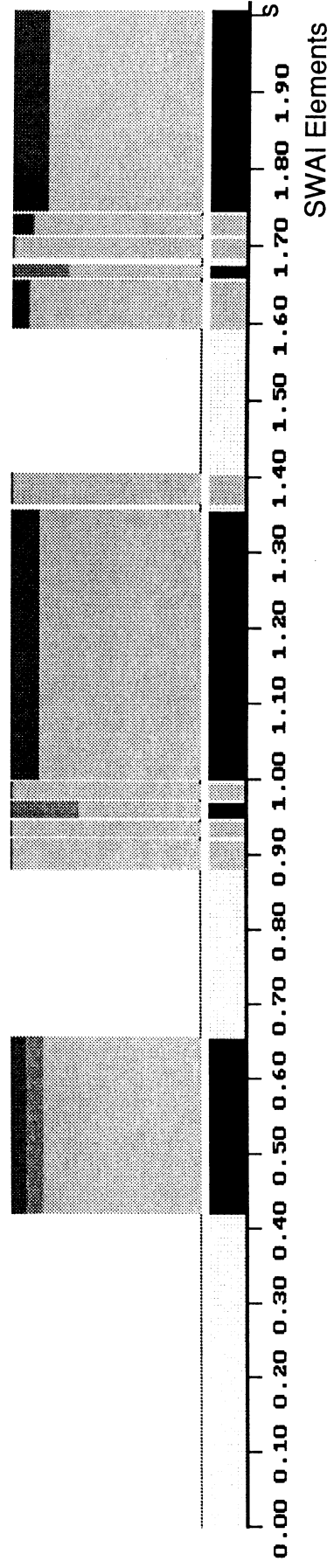
SWAI Sonagram







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.10.3 SWAI Elements

Element .text file

DURN 420.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 235.00	FREQ 1.58	CLASS MIXED		
SINGLE: 0.836	HARMONIC: 0.092	MULTIPLE: 0.072	NOISE: 0.000	
DURN 225.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 40.00	FREQ 1.42	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 1.38	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 1.28	CLASS MIXED		
SINGLE: 0.647	HARMONIC: 0.353	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 20.00	FREQ 1.41	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 355.00	FREQ 1.59	CLASS MIXED		
SINGLE: 0.855	HARMONIC: 0.000	MULTIPLE: 0.145	NOISE: 0.000	
DURN 10.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 40.00	FREQ 1.52	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 190.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 60.00	FREQ 1.45	CLASS SINGLE		
SINGLE: 0.919	HARMONIC: 0.000	MULTIPLE: 0.081	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00	FREQ 1.26	CLASS MIXED		
SINGLE: 0.711	HARMONIC: 0.289	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 25.00	FREQ 1.36	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 25.00	FREQ 1.41	CLASS SINGLE		
SINGLE: 0.901	HARMONIC: 0.000	MULTIPLE: 0.099	NOISE: 0.000	
DURN 5.00	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 265.00	FREQ 1.58	CLASS MIXED		
SINGLE: 0.818	HARMONIC: 0.000	MULTIPLE: 0.182	NOISE: 0.000	

F1.10.4 SWAI Syntax Specification

SYNTAX SPECIFICATION

BIRD: Swainson's Francolin

The thresholds for the sample from which this is derived were set so that the element and classes best matched the sonagram in Roberts, and the sound on the tape. With lower thresholds, there would have been fewer elements (the small pieces would have joined up into longer ones) and the class profile would be dominated by noise rather than single classes.

The syntax is basically a few small "kr"s preceding a long "aaaak". Roberts says to repeat this 6-7 times, but that makes a big cumbersome spec, so this one just repeats indefinitely.

ELEMENTS:

Aaak: Essential

frequency 1.56 to 1.60 kHz (1.58, 1.59, 1.58)
duration 220 to 370 ms (235, 355, 265)
single 85 harmonic 5 multiple 10 noise 0
occurrence_distance 20 %

KrUnit1:

frequency 1.35 to 1.55 kHz (1.42, 1.38, 1.41, 1.52, 1.45, 1.41)
duration 20 to 60 ms
single 100 harmonic 0 multiple 0 noise 0
occurrence_distance 10 %

KrUnit2:

frequency 1.25 to 1.3 (1.28, 1.26)
duration 15 to 20 ms
single 70 harmonic 30 multiple 0 noise 0
occurrence_distance 10 %

InterKraak:

silence 180 to 235 ms (225, 190)

KrGap:

silence 4 to 12 ms

GeneralSilence:

silence 0 to 0 ms

SYNTAX:

Start:

Aaak First_silence

First_silence:

InterKraak Kr_1L Kr_1R

Kr_1L:

KrUnit1 Kr_1S

Kr_1R:

KrUnit2 Kr_1S

Kr_1S:

KrGap Kr_2L Kr_2R

Kr_2L:

KrUnit1 Kr_2S

Kr_2R:

KrUnit2 Kr_2S

Kr_2S:

KrGap Kr_3L Kr_3R

Kr_3L:

KrUnit1 Kr_3S

Kr_3R:

KrUnit2 Kr_3S

Kr_3S:

KrGap Kr_4L Kr_4R Aaak_node_1

Kr_4L:
 KrUnit1 Kr_4S

Kr_4R:
 KrUnit2 Kr_4S

Kr_4S:
 KrGap Kr_5L Kr_5R Aaak_node_1

Kr_5L:
 KrUnit1 Kr_5S

Kr_5R:
 KrUnit2 Kr_5S

Kr_5S:
 KrGap Kr_6L Kr_6R Aaak_node_1

Kr_6L:
 KrUnit1 Kr_6S

Kr_6R:
 KrUnit2 Kr_6S

Kr_6S:
 KrGap Aaak_node_1

Aaak_node_1:
 Aaak Aaak_node_2 Loop

Aaak_node_2:
 KrGap Aaak_node_3

Aaak_node_3:
 KrUnit1 Loop

Loop:
 GeneralSilence Kr_1L Kr_1R

F1.10.5 SWAI Track

Track/s of call in SWAI1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

| Essentials not present.

Syntax spec: SOUT.S (Southern Boubou)

| >
| SILENT 420.0 --- C_WHEEP-WHEEO_3: 1
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- C_WHEEP-WHEEO_3: 1
| >
| SINGLE 40.00 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 40.00 --- no match
| >
| SILENT 190.0 --- C_WHEEP-WHEEO_3: 1
| >
| SINGLE 60.00 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| MIXED 15.0 --- C_KEEU-KO-KO_2.2: 2
| SILENT 10.0 --- C_KEEU-KO-KO_3: 1
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 265.00 --- no match
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 18
| Match total 35

Syntax spec: GREY.S (Grey Lourie)

| Essentials not present.

Syntax spec: FISC.S (Fiscal Shrike)

| >
| SILENT 420.0 --- LOOP: 4
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- THIRD SILENCE: 1
| SINGLE 40.0 --- CHINK NODE: 2
| SILENT 5.0 --- LOOP: 4

```

| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- THIRD_SILENCE: 1
| SINGLE 40.0 --- CHINK_NODE: 2
| SILENT 190.0 --- LOOP: 4
| >
| SINGLE 60.0 --- CHINK_NODE: 2
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 15.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- FIRST_SILENCE: 1
| MIXED 265.0 --- SCRAPE_NODE: 2
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 17
| Match total 47

```

Syntax spec: HOOP.S (African Hoopoe)

```

| Essentials not present.

```

Syntax spec: MOUR.S (Mourning Dove)

```

| >
| SILENT 420.0 --- LOOP: 4
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- R_12S: 1
| SINGLE 40.0 --- ENDR_1: 2
| SILENT 5.0 --- ENDR_1S: 1
| >
| SINGLE 20.0 --- R_1: 2
| SILENT 5.0 --- R_1S: 1
| MIXED 20.0 --- R_2: 2
| SILENT 5.0 --- R_2S: 1
| SINGLE 20.0 --- R_3: 2
| SILENT 5.0 --- R_3S: 1
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- R_12S: 1
| SINGLE 40.0 --- ENDR_1: 2
| SILENT 190.0 --- ENDR_1S: 1
| >
| SINGLE 60.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| MIXED 15.0 --- KREOW_1: 2
| SILENT 10.0 --- KREOW_1S: 1
| >
| SINGLE 25.0 --- R_1: 2
| SILENT 5.0 --- R_1S: 1
| SINGLE 25.0 --- R_2: 2
| SILENT 5.0 --- R_2S: 1
| >
| MIXED 265.00 --- no match
|

```

| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 10
| Match total 34

Syntax spec: OLIV.S (Olivetree Warbler)

| >
| SILENT 420.0 --- KRRR_TO_LAST: 1
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- KRRR_31: 1
| SINGLE 40.0 --- KRRR_32: 2
| SILENT 5.0 --- KRRR_33: 4
| >
| SINGLE 20.0 --- KRRREK_2: 2
| SILENT 5.0 --- KRRREK_3: 1
| MIXED 20.0 --- KRRREK_4: 2
| SILENT 5.0 --- KRRREK_5: 1
| SINGLE 20.0 --- KRRREK_6: 2
| SILENT 5.0 --- KRRREK_7: 1
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- KRRR_31: 1
| SINGLE 40.0 --- KRRR_32: 2
| SILENT 190.0 --- KRRR_33: 1
| >
| SINGLE 60.0 --- KRIK_16: 2
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 15.0 --- T NODE: 2
| SILENT 10.0 --- T TO KRR: 1
| SINGLE 25.0 --- KRR_24: 2
| SILENT 5.0 --- KRR_25: 1
| SINGLE 25.0 --- KRR_26: 2
| SILENT 5.0 --- KRR_27: 1
| >
| MIXED 265.00 --- no match
| >
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 9
| Match total 36

Syntax spec: JACO.S (Jacobin Cuckoo)

| Essentials not present.

Syntax spec: CROW.S (Pied Crow)

| Essentials not present.

Syntax spec: SWAI.S (Swainson's Francolin)

| >
| SILENT 420.0 --- KR_3S: 1
| MIXED 235.0 --- AAAK_NODE_1: 4
| SILENT 225.0 --- LOOP: 4
| SINGLE 40.0 --- KR_1L: 4
| SILENT 5.0 --- KR_1S: 4
| SINGLE 20.0 --- KR_2L: 4
| SILENT 5.0 --- KR_2S: 4
| MIXED 20.0 --- KR_3R: 4
| SILENT 5.0 --- KR_3S: 4
| SINGLE 20.0 --- KR_4L: 4
| SILENT 5.0 --- KR_4S: 4
| MIXED 355.0 --- AAAK_NODE_1: 4
| SILENT 10.0 --- AAAK_NODE_2: 4
| SINGLE 40.0 --- AAAK_NODE_3: 4
| SILENT 190.0 --- LOOP: 4
| SINGLE 60.0 --- KR_1L: 3
| SILENT 5.0 --- KR_1S: 4
| MIXED 15.0 --- KR_2R: 4
| SILENT 10.0 --- KR_2S: 4

```
| SINGLE 25.0 --- KR_3L: 4
| SILENT 5.0 --- KR_3S: 4
| SINGLE 25.0 --- KR_4L: 3
| SILENT 5.0 --- KR_4S: 4
| MIXED 265.0 --- AAÄK_NODE_1: 4
|
| Score for C:\BCR\BIRDS\SWAI\SWAI.S:
| Failures 0
| Match total 91
-----
```

Syntax spec: WILL.S (Willow Warbler)

```
-----
| >
| SILENT 420.0 --- NODE_40: 4
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- NODE_38: 1
| SINGLE 40.0 --- NODE_39: 2
| SILENT 5.0 --- NODE_40: 4
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 5.0 --- NODE_30: 4
| >
| MIXED 20.0 --- NODE_29: 2
| SILENT 5.0 --- NODE_30: 4
| >
| SINGLE 20.0 --- NODE_29: 2
| SILENT 5.0 --- NODE_30: 4
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- NODE_38: 1
| SINGLE 40.0 --- NODE_39: 2
| SILENT 190.0 --- NODE_40: 4
| >
| SINGLE 60.0 --- NODE_21: 2
| SILENT 5.0 --- NODE_22: 1
| MIXED 15.0 --- NODE_23: 2
| SILENT 10.0 --- NODE_24: 4
| >
| SINGLE 25.0 --- NODE_23: 2
| SILENT 5.0 --- NODE_24: 4
| >
| SINGLE 25.0 --- NODE_23: 2
| SILENT 5.0 --- NODE_24: 4
| >
| MIXED 265.00 --- no match
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 12
| Match total 57
-----
```

Syntax spec: MONO.S (Monotonous Lark)

```
-----
| >
| SILENT 420.0 --- LOOP: 4
| >
| MIXED 235.00 --- no match
| >
| SILENT 225.0 --- SYRTOUP_SILENCE: 1
| SINGLE 40.0 --- UP: 2
| SILENT 5.0 --- UTOP_SILENCE: 1
| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 355.00 --- no match
| >
| SILENT 10.0 --- SYRTOUP_SILENCE: 1
| SINGLE 40.0 --- UP: 2
|
```

```
| SILENT 190.0 --- UTOP_SILENCE: 1
| >
| SINGLE 60.0 --- FOR NODE: 2
| SILENT 5.0 --- FORTOSYRUP_SILENCE: 1
| >
| MIXED 15.0 --- S_1: 2
| SILENT 10.0 --- S_1s: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 25.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 265.00 --- no match
|
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 18
| Match total 41
|-----
```

F1.10.6 SWAI Trial results

Recognition scores for call SWAI1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	==	=====	=====	=====
Redbilled Hornbill	N	1.67		
Southern Boubou	Y	1.69	18	35
Grey Lourie	N	1.63		
Fiscal Shrike	Y	1.38	17	47
African Hoopoe	N	1.25		
Mourning Dove	Y	1.71	10	34
Olivetree Warbler	Y	1.81	9	36
Jacobin Cuckoo	N	1.50		
Pied Crow	N	2.67		
Swainson's Francolin	Y	4.00	0	91
Willow Warbler	Y	1.63	12	57
Monotonous Lark	Y	1.88	18	41

F1.11 WILL
Willow Warbler
Phylloscopus trochilus
643 (599)

F1.11.1 WILL Bird Call Descriptor

WILL1.ADS Willow Warbler 643 (599)

Sampling_frequency: 20 kHz

WILL1A.SF

Window_duration: 5.000000000000000E+0000 ms

Frequency_resolution: 3.906250000000000E-0002 kHz (filled in by SPECTRA)

FFT_Length: 512 points

Window_length: 100 samples (filled in by SPECTRA)

Window_type: Hamming

Start_time: 0 ms

Finish_time: -1 (to end of data)

Number_of_frames: 402

Max_magnitude: 1.85343769268990E+0004

Background_mag: 1.4753369018E+02

WILL1A.SS

Frequency_scale: 8 kHz full scale screen width

Time_scale: 500 ms full scale screen length

Min_factor: 0.0 of max magnitude

Max_factor: 0.5 of max magnitude

PixelsPerkHz: 7.500000000000000E+0001

LinesPerMsec: 4.000000000000091E-0001

END WILL1A.SS

WILL1A.LPF Linked peak frame file

snr: 10

WILL1A.CF

High_pass_freq: 0.5 kHz

Distance_thresh: 0.3 kHz

Class_mag_thresh: 10 times background

WILL1A.E

Dominance_ratio: 0.9

END WILL1A.E

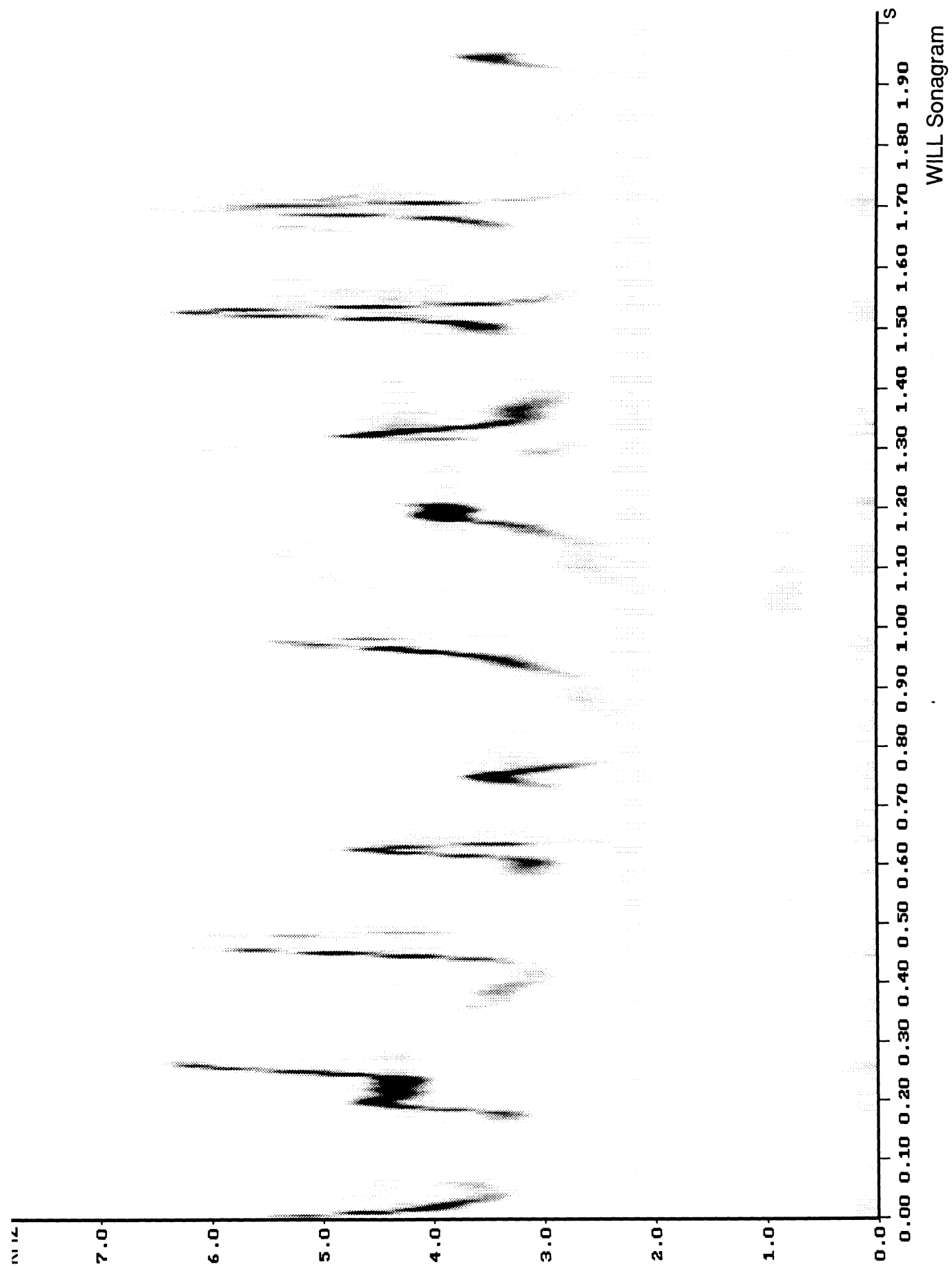
END WILL1A.CF

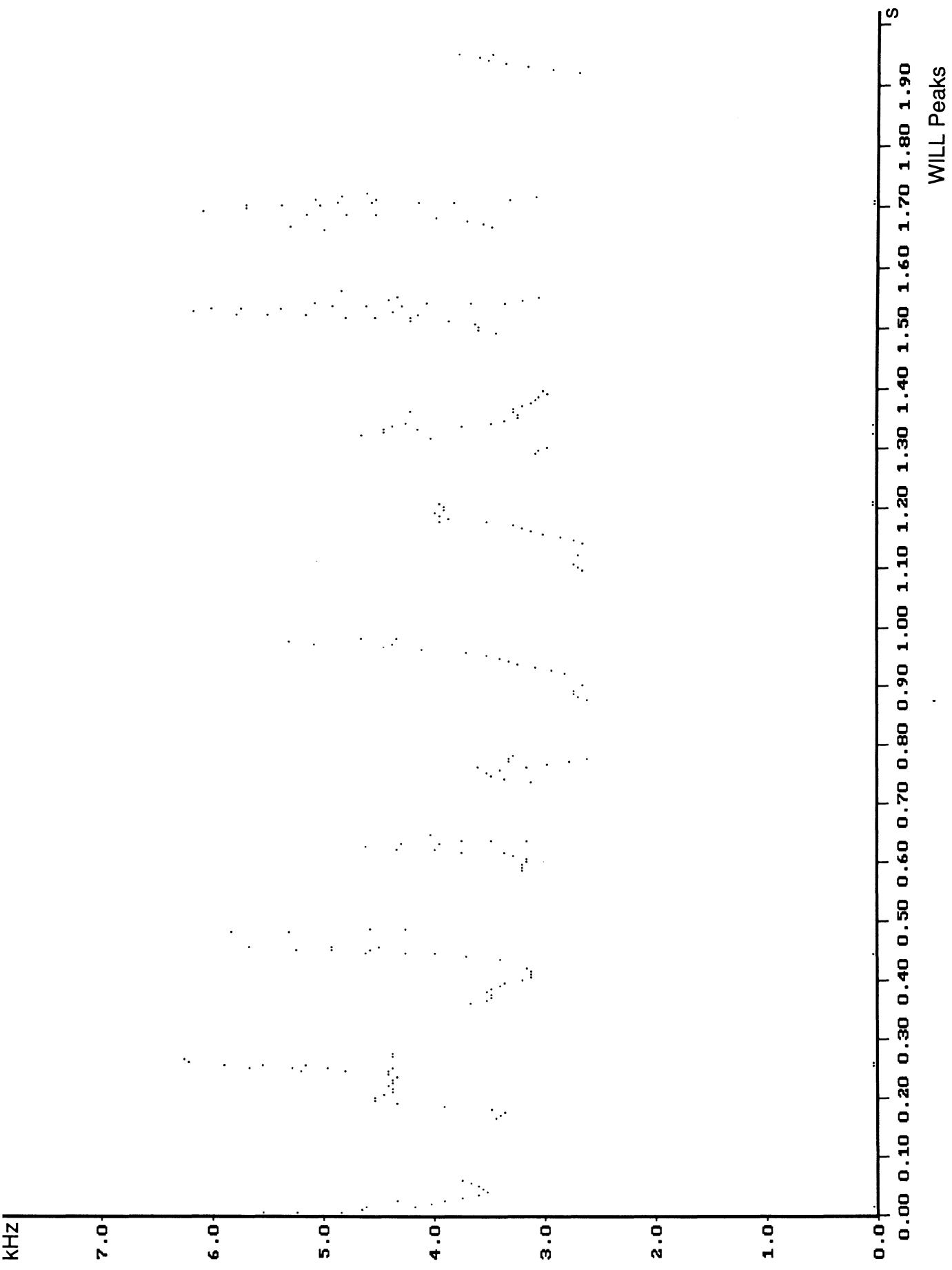
END WILL1A.LPF

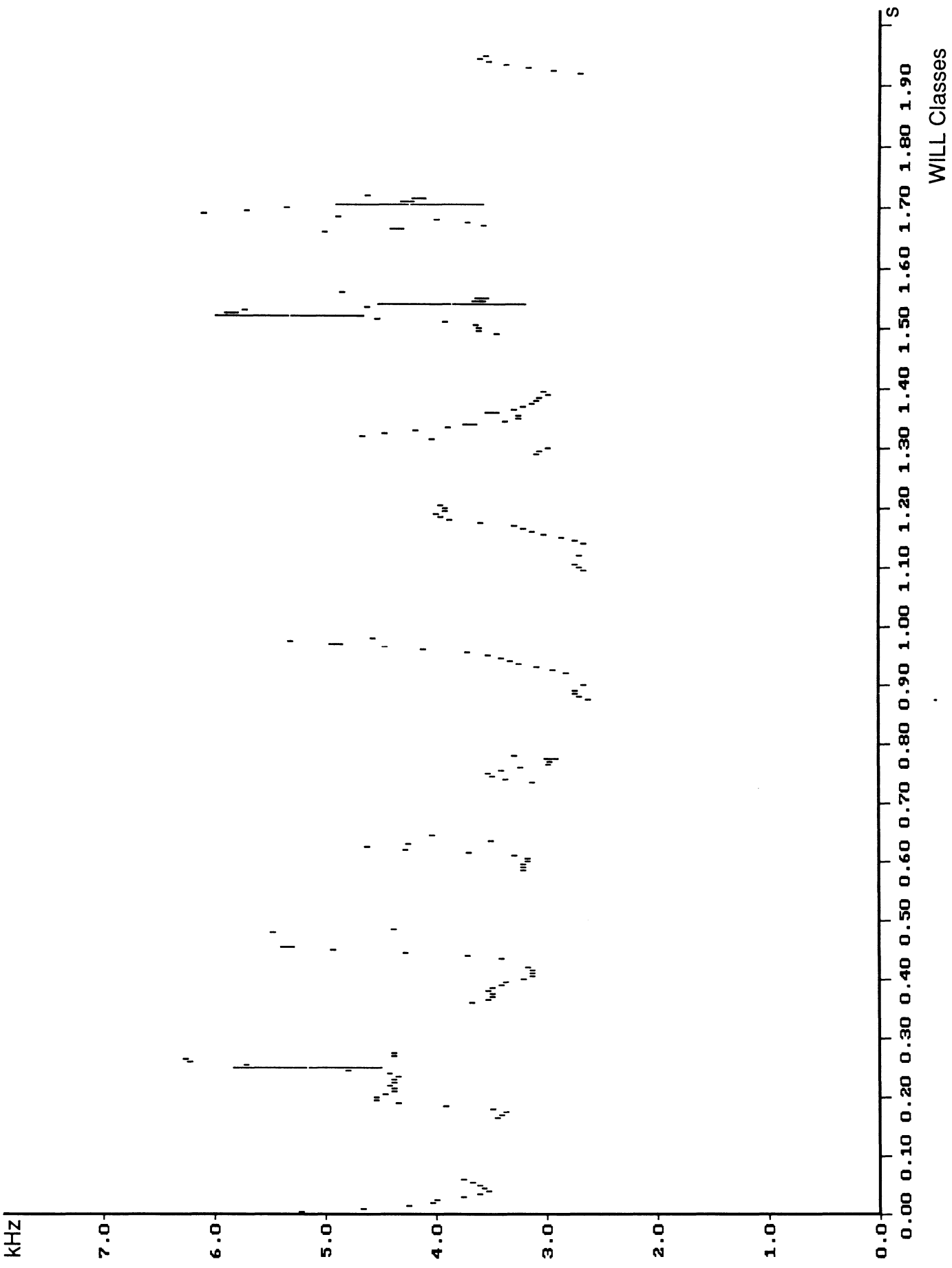
END WILL1A.SF

END WILL1A.ADS

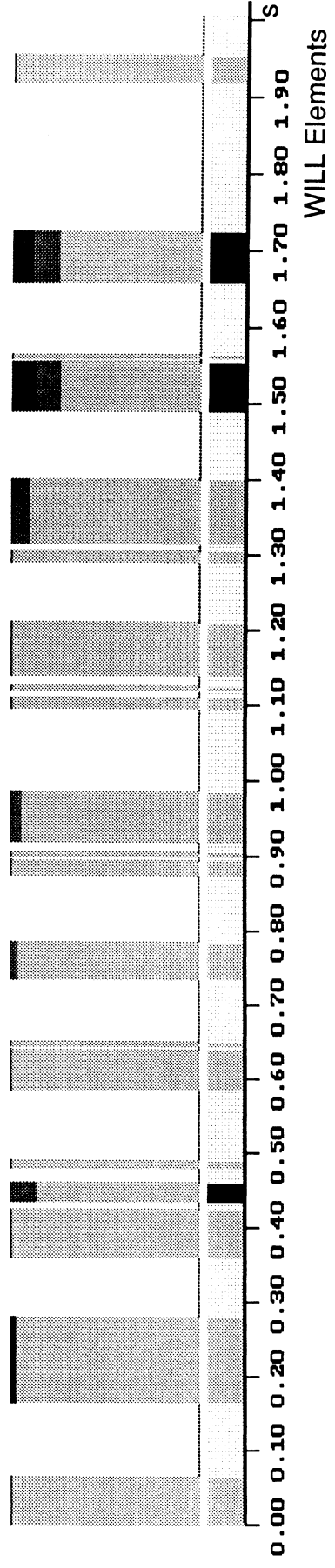
F1.11.2 WILL Plots







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.11.3 WILL Elements

Element text file

DURN 65.00 FREQ 4.11 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 100.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 115.00 FREQ 4.48 CLASS SINGLE			
SINGLE: 0.977	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.023
DURN 80.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 65.00 FREQ 3.36 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 10.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 25.00 FREQ 4.33 CLASS MIXED			
SINGLE: 0.870	HARMONIC: 0.000	MULTIPLE: 0.130	NOISE: 0.000
DURN 20.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 10.00 FREQ 4.92 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 95.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 55.00 FREQ 3.59 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 4.02 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 85.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 50.00 FREQ 3.23 CLASS SINGLE			
SINGLE: 0.972	HARMONIC: 0.000	MULTIPLE: 0.028	NOISE: 0.000
DURN 90.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 20.00 FREQ 2.70 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 2.66 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 15.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 65.00 FREQ 3.79 CLASS SINGLE			
SINGLE: 0.950	HARMONIC: 0.000	MULTIPLE: 0.050	NOISE: 0.000
DURN 110.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 15.00 FREQ 2.70 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 10.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 5.00 FREQ 2.70 CLASS SINGLE			
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000
DURN 15.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000

DURN 70.00 FREQ 3.43 CLASS SINGLE			
SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 80.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 15.00 FREQ 3.03 CLASS SINGLE			
SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 10.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 85.00 FREQ 3.52 CLASS SINGLE			
SINGLE: 0.910 HARMONIC: 0.000	MULTIPLE: 0.090	NOISE: 0.000	
DURN 90.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 65.00 FREQ 4.25 CLASS MIXED			
SINGLE: 0.748 HARMONIC: 0.000	MULTIPLE: 0.135	NOISE: 0.117	
DURN 5.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 5.00 FREQ 4.84 CLASS SINGLE			
SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 95.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 65.00 FREQ 4.60 CLASS MIXED			
SINGLE: 0.761 HARMONIC: 0.000	MULTIPLE: 0.143	NOISE: 0.096	
DURN 195.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 35.00 FREQ 3.26 CLASS SINGLE			
SINGLE: 1.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 55.00 FREQ 0.00 CLASS SILENT			
SINGLE: 0.000 HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

F1.11.4 WILL Syntax Specification

SYNTAX SPECIFICATION

BIRD: Willow Warbler

In the absence of general information, or multiple samples of this call, it is very difficult to formulate a syntax spec for this call that might work for anything other than the sample upon which it is based. So the one below is an almost one-for-one translation of the call. Only when syntactic patterns, or element variations are known could a more realistic spec be written.

ELEMENTS:

E1:
frequency 4.0 to 4.2
duration 62 to 78
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 5 %

InterElement: (S2-4-10-14-16-22-28-32-36)
silence 78 to 112 ms

E3:
frequency 4.3 to 4.6
duration 110 to 120
SINGLE 98 HARMONIC 0 MULTIPLE 0 NOISE 2
occurrence_distance 5 %

E5:
frequency 3.3 to 3.4
duration 60 to 70
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 5 %

S6-24-30:
silence 5 to 15

E7:
frequency 4.28 to 4.38
duration 20 to 30
SINGLE 87 HARMONIC 0 MULTIPLE 13 NOISE 0
occurrence_distance 10 %

S8:
silence 15 to 25

E9:
frequency 4.87 to 4.97
duration 5 to 15
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 10 %

E11:
frequency 3.55 to 3.65
duration 50 to 60
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 5 %

S12-18-34:
silence 2 to 8

E13:
frequency 3.95 to 4.05
duration 2 to 8
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 20 %

E15:
frequency 3.18 to 3.28
duration 45 to 55
SINGLE 97 HARMONIC 0 MULTIPLE 3 NOISE 0
occurrence_distance 5 %

E17:
frequency 2.65 to 2.75
duration 15 to 25
SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
occurrence_distance 10 %

```

E19:
    frequency 2.6 to 2.7
    duration 2 to 8
    single 100 harmonic 0 multiple 0 noise 0
    occurrence_distance 20 %

S20-26:
    silence 10 to 20

E21:
    frequency 3.75 to 3.85
    duration 60 to 70
    SINGLE 95 HARMONIC 0 MULTIPLE 5 NOISE 0
    occurrence_distance 10 %

E23:
    frequency 2.65 to 2.75
    duration 10 to 25
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 20 %

E25:
    frequency 2.65 to 2.75
    duration 2 to 8
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 20 %

E27:
    frequency 3.38 to 3.48
    duration 65 to 75
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 5 %

E29:
    frequency 2.98 to 3.08
    duration 10 to 20
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 20 %

E31:
    frequency 3.47 to 3.57
    duration 80 to 90
    SINGLE 91 HARMONIC 0 MULTIPLE 9 NOISE 0
    occurrence_distance 5 %

E33:
    frequency 4.2 to 4.3
    duration 60 to 70
    SINGLE 75 HARMONIC 0 MULTIPLE 13 NOISE 12
    occurrence_distance 5 %

E35:
    frequency 4.8 to 4.9
    duration 2 to 8
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 20 %

E37:
    frequency 4.55 to 4.65
    duration 60 to 70
    SINGLE 76 HARMONIC 0 MULTIPLE 14 NOISE 10
    occurrence_distance 5 %

S38:
    silence 190 to 200

E39:
    frequency 3.2 to 3.3
    duration 30 to 40
    SINGLE 100 HARMONIC 0 MULTIPLE 0 NOISE 0
    occurrence_distance 10 %

GeneralSilence:
    silence 0 to 0 ms

SYNTAX:

node_1:
    E1_node_2
node_2:
    InterElement node_3
node_3:
    E3_node_4
node_4:
    InterElement node_5
node_5:

```

```

E5 node_6
node_6:
  S6-24-30 node_7
node_7:
  E7 node_8
node_8:
  S8 node_9
node_9:
  E9 node_10
node_10:
  InterElement node_11
node_11:
  E11 node_12
node_12:
  S12-18-34 node_13
node_13:
  E13 node_14
node_14:
  InterElement node_15
node_15:
  E15 node_16
node_16:
  InterElement node_17
node_17:
  E17 node_18
node_18:
  S12-18-34 node_19
node_19:
  E19 node_20
node_20:
  S20-26 node_21
node_21:
  E21 node_22
node_22:
  InterElement node_23
node_23:
  E23 node_24
node_24:
  S6-24-30 node_25
node_25:
  E25 node_26
node_26:
  S20-26 node_27
node_27:
  E27 node_28
node_28:
  InterElement node_29
node_29:
  E29 node_30
node_30:
  S6-24-30 node_31
node_31:
  E31 node_32
node_32:
  InterElement node_33
node_33:
  E33 node_34
node_34:
  S12-18-34 node_35
node_35:
  E35 node_36
node_36:
  InterElement node_37
node_37:
  E37 node_38
node_38:
  S38 node_39
node_39:
  E39 node_40
node_40:
  GeneralSilence

```

F1.11.5 WILL Track

Track/s of call in WILL1A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
-----
| >
| SINGLE 65.00 --- no match
| >
| SILENT 100.0 --- LOOP: 4
| >
| SINGLE 115.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| >
| SINGLE 65.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| >
| MIXED 25.00 --- no match
| >
| SILENT 20.0 --- INTER_HONK_1: 1
| SINGLE 10.0 --- FIRST_PIP_1: 2
| SILENT 95.0 --- INTER_HONK_SILENCE_1: 1
| >
| SINGLE 55.00 --- no match
| >
| SILENT 5.0 --- INTER_HONK_1: 4
| SINGLE 5.0 --- FIRST_PIP_1: 2
| SILENT 85.0 --- INTER_HONK_SILENCE_1: 1
| >
| SINGLE 50.00 --- no match
| >
| SILENT 90.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- INTER_HONK_1: 4
| SINGLE 5.0 --- FIRST_PIP_1: 2
| SILENT 15.0 --- INTER_HONK_SILENCE_1: 1
| >
| SINGLE 65.00 --- no match
| >
| SILENT 110.0 --- LOOP: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 10.0 --- INTER_HONK_1: 4
| SINGLE 5.0 --- FIRST_PIP_1: 2
| SILENT 15.0 --- INTER_HONK_SILENCE_1: 1
| SINGLE 70.0 --- SECOND_HONK_1: 2
| SILENT 80.0 --- INTER_DOUBLE_1: 4
| >
| SINGLE 15.00 --- no match
| >
| SILENT 10.0 --- LOOP: 4
| SINGLE 85.0 --- DOUBLE_HONK_1: 2
| SILENT 90.0 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 65.00 --- no match
| >
| SILENT 5.0 --- INTER_HONK_1: 4
| SINGLE 5.0 --- FIRST_PIP_1: 2
| SILENT 95.0 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 65.00 --- no match
| >
| SILENT 195.0 --- LOOP: 4
| >
| SINGLE 35.00 --- no match
| >
| SILENT 55.0 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 25
| Match total 73
|-----
```

Syntax spec: SOUT.S (Southern Boubou)

```
>
SINGLE 65.00 --- no match
>
SILENT 100.0 --- C_KEEU-KO-KO_1: 4
SINGLE 115.0 --- C_KEEU-KO-KO_2: 2
SILENT 80.0 --- C_KEEU-KO-KO_2.1: 1
>
SINGLE 65.00 --- no match
>
SILENT 10.0 --- C_WHEEP-WHEEO_3: 4
>
MIXED 25.00 --- no match
>
SILENT 20.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 10.00 --- no match
>
SILENT 95.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 55.00 --- no match
>
SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 5.00 --- no match
>
SILENT 85.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 50.00 --- no match
>
SILENT 90.0 --- C_KEEU-KO-KO_2.1: 1
SINGLE 20.0 --- C_KEEU-KO-KO_2.2: 2
SILENT 5.0 --- C_KEEU-KO-KO_3: 1
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 65.00 --- no match
>
SILENT 110.0 --- C_KEEU-KO-KO_2.1: 1
SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
SILENT 10.0 --- C_KEEU-KO-KO_3: 1
>
SINGLE 5.00 --- no match
>
SILENT 15.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 70.00 --- no match
>
SILENT 80.0 --- C_KEEU-KO-KO_2.1: 1
SINGLE 15.0 --- C_KEEU-KO-KO_2.2: 2
SILENT 10.0 --- C_KEEU-KO-KO_3: 1
>
SINGLE 85.00 --- no match
>
SILENT 90.0 --- C_WHEEP-WHEEO_3: 4
>
MIXED 65.00 --- no match
>
SILENT 5.0 --- C_WHEEP-WHEEO_3: 4
>
SINGLE 5.00 --- no match
>
SILENT 95.0 --- C_WHEEP-WHEEO_3: 4
>
MIXED 65.00 --- no match
>
SILENT 195.0 --- C_WHEEP-WHEEO_3: 1
>
SINGLE 35.00 --- no match
>
SILENT 55.0 --- C_WHEEP-WHEEO_3: 4

Score for C:\BCR\BIRDS\SOUT\SOUT.S:
Failures 31
Match total 64
```

Syntax spec: GREY.S (Grey Lourie)

```
| Essentials not present.
```

WILL Track F142

Syntax spec: FISC.S (Fiscal Shrike)

```
|>
|SINGLE 65.00 --- no match
|>
|SILENT 100.0 --- LOOP: 4
|>
|SINGLE 115.00 --- no match
|>
|SILENT 80.0 --- LOOP: 4
|>
|SINGLE 65.00 --- no match
|>
|SILENT 10.0 --- LOOP: 4
|>
|MIXED 25.00 --- no match
|>
|SILENT 20.0 --- LOOP: 4
|>
|SINGLE 10.00 --- no match
|>
|SILENT 95.0 --- THIRD_SILENCE: 1
|SINGLE 55.0 --- CHINK_NODE: 3
|SILENT 5.0 --- LOOP: 4
|>
|SINGLE 5.00 --- no match
|>
|SILENT 85.0 --- THIRD_SILENCE: 4
|SINGLE 50.0 --- CHINK_NODE: 2
|SILENT 90.0 --- LOOP: 4
|>
|SINGLE 20.00 --- no match
|>
|SILENT 5.0 --- LOOP: 4
|>
|SINGLE 5.00 --- no match
|>
|SILENT 15.0 --- LOOP: 4
|>
|SINGLE 65.00 --- no match
|>
|SILENT 110.0 --- LOOP: 4
|>
|SINGLE 15.00 --- no match
|>
|SILENT 10.0 --- LOOP: 4
|>
|SINGLE 5.00 --- no match
|>
|SILENT 15.0 --- SECOND_SILENCE: 1
|SINGLE 70.0 --- WHISTLE_NODE: 2
|SILENT 80.0 --- THIRD_SILENCE: 4
|>
|SINGLE 15.00 --- no match
|>
|SILENT 10.0 --- LOOP: 4
|>
|SINGLE 85.00 --- no match
|>
|SILENT 90.0 --- LOOP: 4
|>
|MIXED 65.00 --- no match
|>
|SILENT 5.0 --- LOOP: 4
|>
|SINGLE 5.00 --- no match
|>
|SILENT 95.0 --- LOOP: 4
|>
|MIXED 65.00 --- no match
|>
|SILENT 195.0 --- THIRD_SILENCE: 1
|SINGLE 35.0 --- CHINK_NODE: 2
|SILENT 55.0 --- LOOP: 4
|
|Score for C:\BCR\BIRDS\FISC\FISC.S:
|Failures 31
|Match total 80
```

Syntax spec: HOOP.S (African Hoopoe)

| Essentials not present.

Syntax spec: MOUR.S (Mourning Dove)

```
| >
| SINGLE 65.00 --- no match
| >
| SILENT 100.0 --- LOOP: 4
| >
| SINGLE 115.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| >
| SINGLE 65.00 --- no match
| >
| SILENT 10.0 --- ENDR_4S: 1
| MIXED 25.0 --- ENDR_5: 2
| SILENT 20.0 --- LOOP: 4
| SINGLE 10.0 --- KREOW_1: 2
| SILENT 95.0 --- KREOW_1S: 1
| >
| SINGLE 55.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 85.0 --- R_12S: 1
| SINGLE 50.0 --- ENDR_1: 2
| SILENT 90.0 --- ENDR_1S: 1
| >
| SINGLE 20.0 --- R_1: 2
| SILENT 5.0 --- R_1S: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 65.00 --- no match
| >
| SILENT 110.0 --- LOOP: 4
| SINGLE 15.0 --- KREOW_1: 2
| SILENT 10.0 --- KREOW_1S: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 70.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| SINGLE 15.0 --- KREOW_1: 2
| SILENT 10.0 --- KREOW_1S: 1
| >
| SINGLE 85.00 --- no match
| >
| SILENT 90.0 --- LOOP: 4
| >
| MIXED 65.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 95.0 --- LOOP: 4
| >
| MIXED 65.00 --- no match
| >
| SILENT 195.0 --- R_12S: 1
| SINGLE 35.0 --- ENDR_1: 2
| SILENT 55.0 --- ENDR_1S: 1
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 26
| Match total 67
```

Syntax spec: OLIV.S (Olivetree Warbler)

```
| >
| SINGLE 65.0 --- KRIK_16: 2
| SILENT 100.0 --- LOOP: 4
| >
| SINGLE 115.00 --- no match
| >
| SILENT 80.0 --- KRIK_15: 1
```

```

| SINGLE 65.0 --- KRIK_16: 2
| SILENT 10.0 --- LOOP: 4
| >
| MIXED 25.0 --- KRR 28: 2
| SILENT 20.0 --- LOOP: 4
| >
| SINGLE 10.0 --- T_NODE: 2
| SILENT 95.0 --- T_TO_KRR: 1
| >
| SINGLE 55.0 --- KRRREK_0: 2
| SILENT 5.0 --- KRRREK_1: 1
| >
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 85.0 --- LOOP: 4
| >
| SINGLE 50.0 --- KRRREK_0: 2
| SILENT 90.0 --- KRRREK_1: 1
| SINGLE 20.0 --- KRRREK_2: 2
| SILENT 5.0 --- KRRREK_3: 1
| >
| SINGLE 5.0 --- KRIK_14: 2
| SILENT 15.0 --- KRIK_15: 1
| SINGLE 65.0 --- KRIK_16: 2
| SILENT 110.0 --- LOOP: 4
| >
| SINGLE 15.0 --- KRRR_36: 2
| SILENT 10.0 --- KRRR_37: 4
| SINGLE 5.0 --- KRRR_38: 2
| SILENT 15.0 --- LOOP: 4
| >
| SINGLE 70.0 --- KRIK_16: 2
| SILENT 80.0 --- KRIK_TO_KREEUP: 4
| >
| SINGLE 15.0 --- KRRR_36: 2
| SILENT 10.0 --- KRRR_37: 4
| >
| SINGLE 85.0 --- KREEUP_18: 2
| SILENT 90.0 --- KREEUP_19: 1
| >
| MIXED 65.0 --- KRIK_16: 2
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.0 --- KRIK_14: 2
| SILENT 95.0 --- KRIK_15: 1
| MIXED 65.0 --- KRIK_16: 2
| SILENT 195.0 --- LOOP: 4
| >
| SINGLE 35.0 --- KRR 24: 2
| SILENT 55.0 --- KRR_25: 1
|
| Score for C:\BCR\BIRDS\OLIV\OLIV.S:
| Failures 15
| Match total 91

```

Syntax spec: JACO.S (Jacobin Cuckoo)

```

| Essentials not present.

```

Syntax spec: CROW.S (Pied Crow)

```

| Essentials not present.

```

Syntax spec: SWAI.S (Swainson's Francolin)

```

| Essentials not present.

```

Syntax spec: WILL.S (Willow Warbler)

```

| >
| SINGLE 65.0 --- NODE_1: 4
| SILENT 100.0 --- NODE_2: 4
| SINGLE 115.0 --- NODE_3: 4
| SILENT 80.0 --- NODE_4: 4
| SINGLE 65.0 --- NODE_5: 4

```

```

| SILENT 10.0 --- NODE_6: 4
| MIXED 25.0 --- NODE_7: 4
| SILENT 20.0 --- NODE_8: 4
| SINGLE 10.0 --- NODE_9: 4
| SILENT 95.0 --- NODE_10: 4
| SINGLE 55.0 --- NODE_11: 4
| SILENT 5.0 --- NODE_12: 4
| SINGLE 5.0 --- NODE_13: 4
| SILENT 85.0 --- NODE_14: 4
| SINGLE 50.0 --- NODE_15: 4
| SILENT 90.0 --- NODE_16: 4
| SINGLE 20.0 --- NODE_17: 4
| SILENT 5.0 --- NODE_18: 4
| SINGLE 5.0 --- NODE_19: 4
| SILENT 15.0 --- NODE_20: 4
| SINGLE 65.0 --- NODE_21: 4
| SILENT 110.0 --- NODE_22: 4
| SINGLE 15.0 --- NODE_23: 4
| SILENT 10.0 --- NODE_24: 4
| SINGLE 5.0 --- NODE_25: 4
| SILENT 15.0 --- NODE_26: 4
| SINGLE 70.0 --- NODE_27: 4
| SILENT 80.0 --- NODE_28: 4
| SINGLE 15.0 --- NODE_29: 4
| SILENT 10.0 --- NODE_30: 4
| SINGLE 85.0 --- NODE_31: 4
| SILENT 90.0 --- NODE_32: 4
| MIXED 65.0 --- NODE_33: 4
| SILENT 5.0 --- NODE_34: 4
| SINGLE 5.0 --- NODE_35: 4
| SILENT 95.0 --- NODE_36: 4
| MIXED 65.0 --- NODE_37: 4
| SILENT 195.0 --- NODE_38: 4
| SINGLE 35.0 --- NODE_39: 4
| SILENT 55.0 --- NODE_40: 4
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 0
| Match total 160
|
-----

```

Syntax spec: MONO.S (Monotonous Lark)

```

| >
| SINGLE 65.0 --- FOR_NODE: 2
| SILENT 100.0 --- FORTOSYRUP_SILENCE: 1
| >
| SINGLE 115.00 --- no match
| >
| SILENT 80.0 --- LOOP: 4
| SINGLE 65.0 --- FOR_NODE: 2
| SILENT 10.0 --- FORTOSYRUP_SILENCE: 1
| >
| MIXED 25.00 --- no match
| >
| SILENT 20.0 --- IS_1s: 1
| SINGLE 10.0 --- IS_2: 2
| SILENT 95.0 --- IS_2s: 1
| >
| SINGLE 55.0 --- FOR_NODE: 2
| SILENT 5.0 --- FORTOSYRUP_SILENCE: 1
| >
| SINGLE 5.00 --- no match
| >
| SILENT 85.0 --- LOOP: 4
| >
| SINGLE 50.00 --- no match
| >
| SILENT 90.0 --- LOOP: 4
| >
| SINGLE 20.00 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| SINGLE 5.00 --- no match
| >
| SILENT 15.0 --- LOOP: 4
| SINGLE 65.0 --- FOR_NODE: 2
| SILENT 110.0 --- FORTOSYRUP_SILENCE: 1
| >
| SINGLE 15.0 --- S_1: 2
| SILENT 10.0 --- S_1s: 4
| >
| SINGLE 5.00 --- no match

```

```
| >  
| SILENT 15.0 --- LOOP: 4  
| >  
| SINGLE 70.00 --- no match  
| >  
| SILENT 80.0 --- S_1S: 1  
| SINGLE 15.0 --- S_2: 2  
| SILENT 10.0 --- STOWEET_SILENCE: 1  
| >  
| SINGLE 85.00 --- no match  
| >  
| SILENT 90.0 --- LOOP: 4  
| MIXED 65.0 --- FOR NODE: 2  
| SILENT 5.0 --- FORTOSYRUP_SILENCE: 1  
| >  
| SINGLE 5.00 --- no match  
| >  
| SILENT 95.0 --- LOOP: 4  
| MIXED 65.0 --- FOR NODE: 2  
| SILENT 195.0 --- FORTOSYRUP_SILENCE: 1  
| SINGLE 35.0 --- SYRUP: 2  
| SILENT 55.0 --- SYRTOUP_SILENCE: 1  
|  
| Score for C:\BCR\BIRDS\MONO\MONO.S:  
| Failures 22  
| Match total 67  
|-----
```

F1.11.6 WILL Trial results

Recognition scores for call WILL1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	Y	3.33	25	73
Southern Boubou	Y	2.31	31	64
Grey Lourie	N	2.13		
Fiscal Shrike	Y	2.25	31	80
African Hoopoe	N	1.25		
Mourning Dove	Y	2.14	26	67
Olivetree Warbler	Y	2.00	15	91
Jacobin Cuckoo	N	1.75		
Pied Crow	N	1.67		
Swainson's Francolin	N	2.67		
Willow Warbler	Y	4.00	0	160
Monotonous Lark	Y	2.88	22	67

F1.12 MONO
Monotonous Lark
Mirafra passerina
493 (457)

F1.12.1 MONO Bird Call Descriptor

```
MONO1.ADS Monotonous Lark 493 (457)
  Sampling_frequency: 2.7586000000E+01 kHz

MONO1A.SF
  Window_duration: 4.96628724715265E+0000 ms
  Frequency_resolution: 5.38789062500200E-0002 kHz (filled in by SPECTRA)
  FFT_Length: 512 points
  Window_length: 137 samples (filled in by SPECTRA)
  Window_type: Hamming
  Start_time: 0 ms
  Finish_time: -1 (to end of data)
  Number_of_frames: 467
  Max_magnitude: 3.35118244858384E+0004
  Background_mag: 1.2418649556E+02

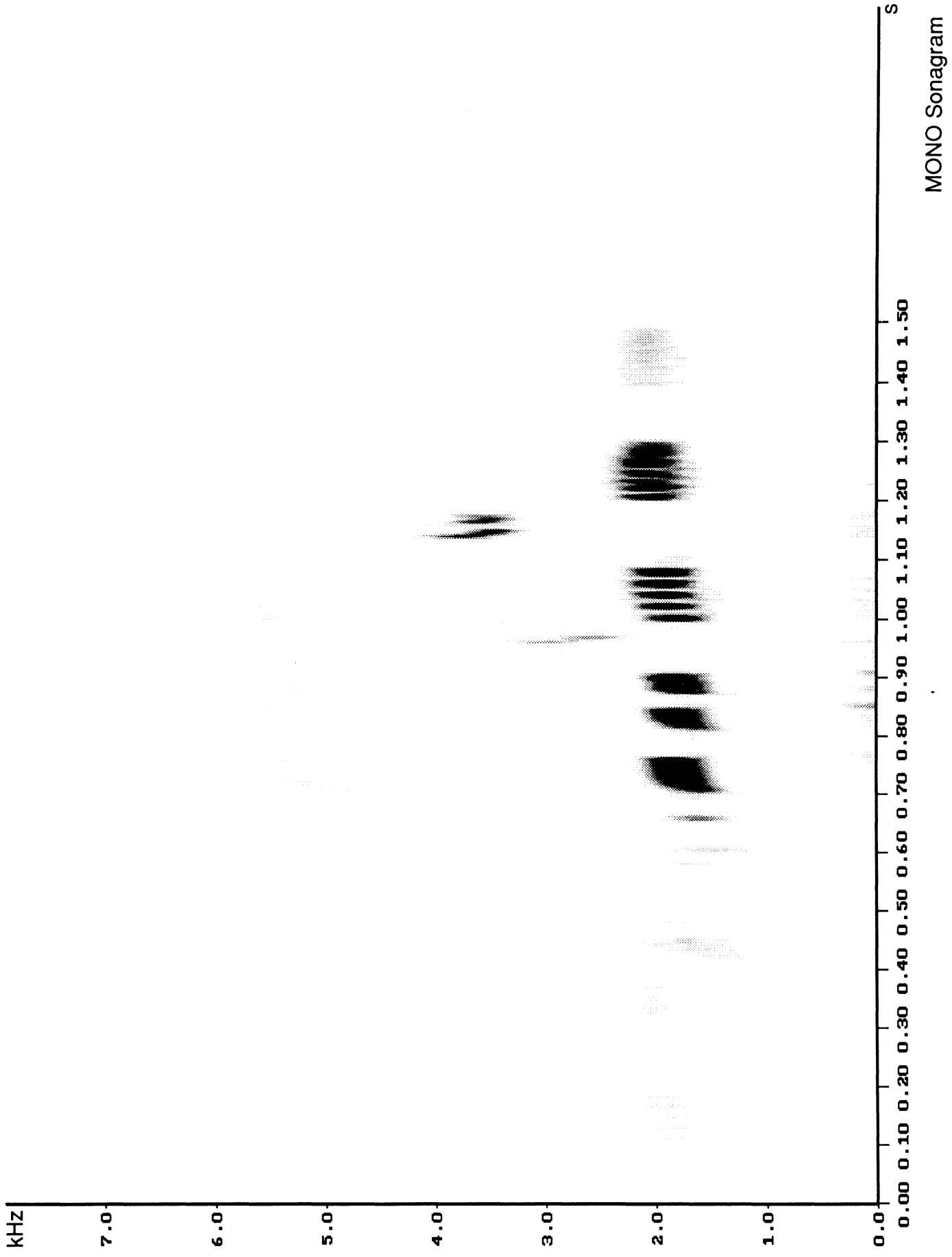
MONO1A.SS
  Frequency_scale: 8 kHz full scale screen width
  Time_scale: 500 ms full scale screen length
  Min_factor: 0.0 of max magnitude
  Max_factor: 0.5 of max magnitude
  PixelsPerkHz: 7.50000000000000E+0001
  LinesPerMsec: 4.00000000000091E-0001
END MONO1A.SS

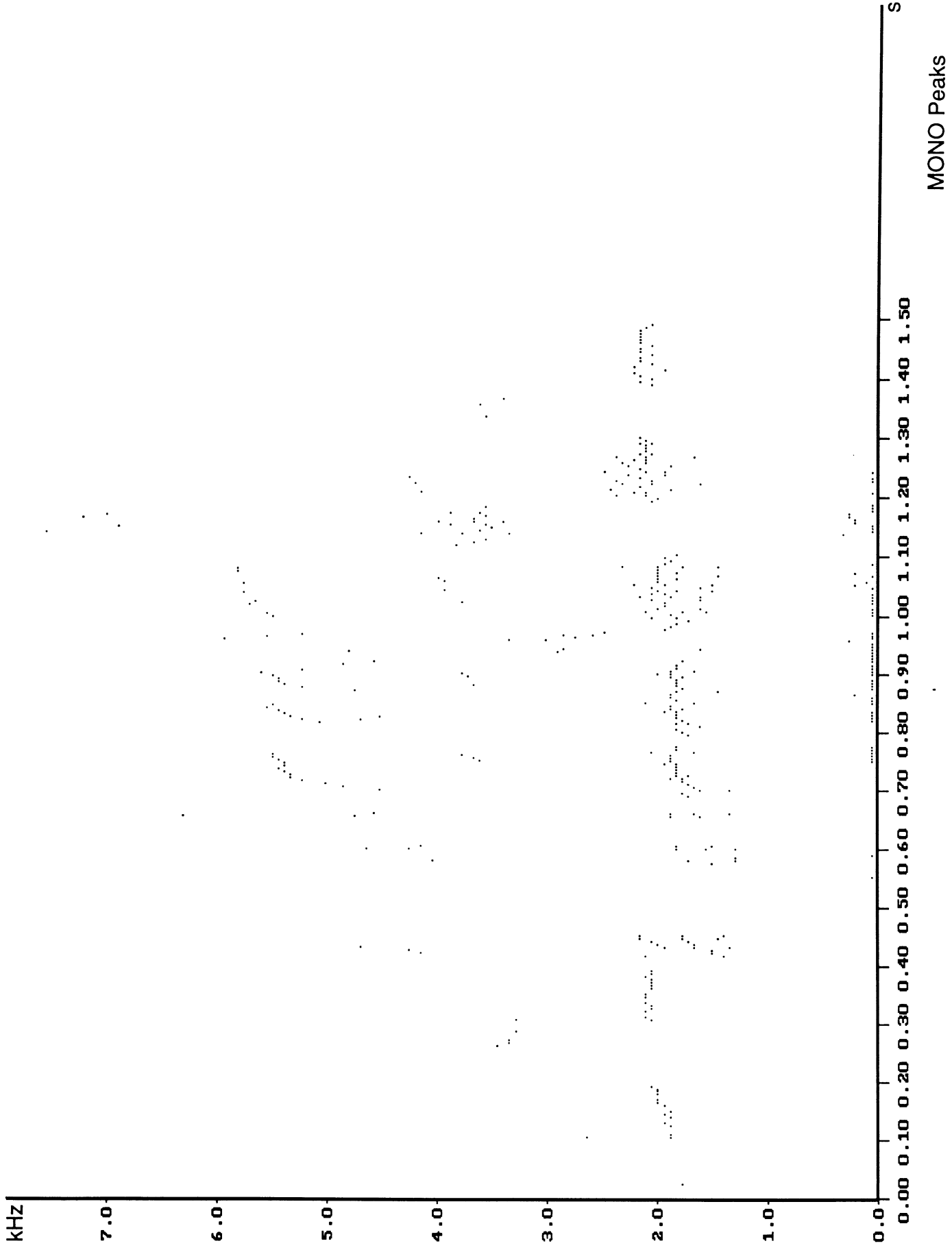
MONO1A.LPF Linked peak frame file
  snr: 5

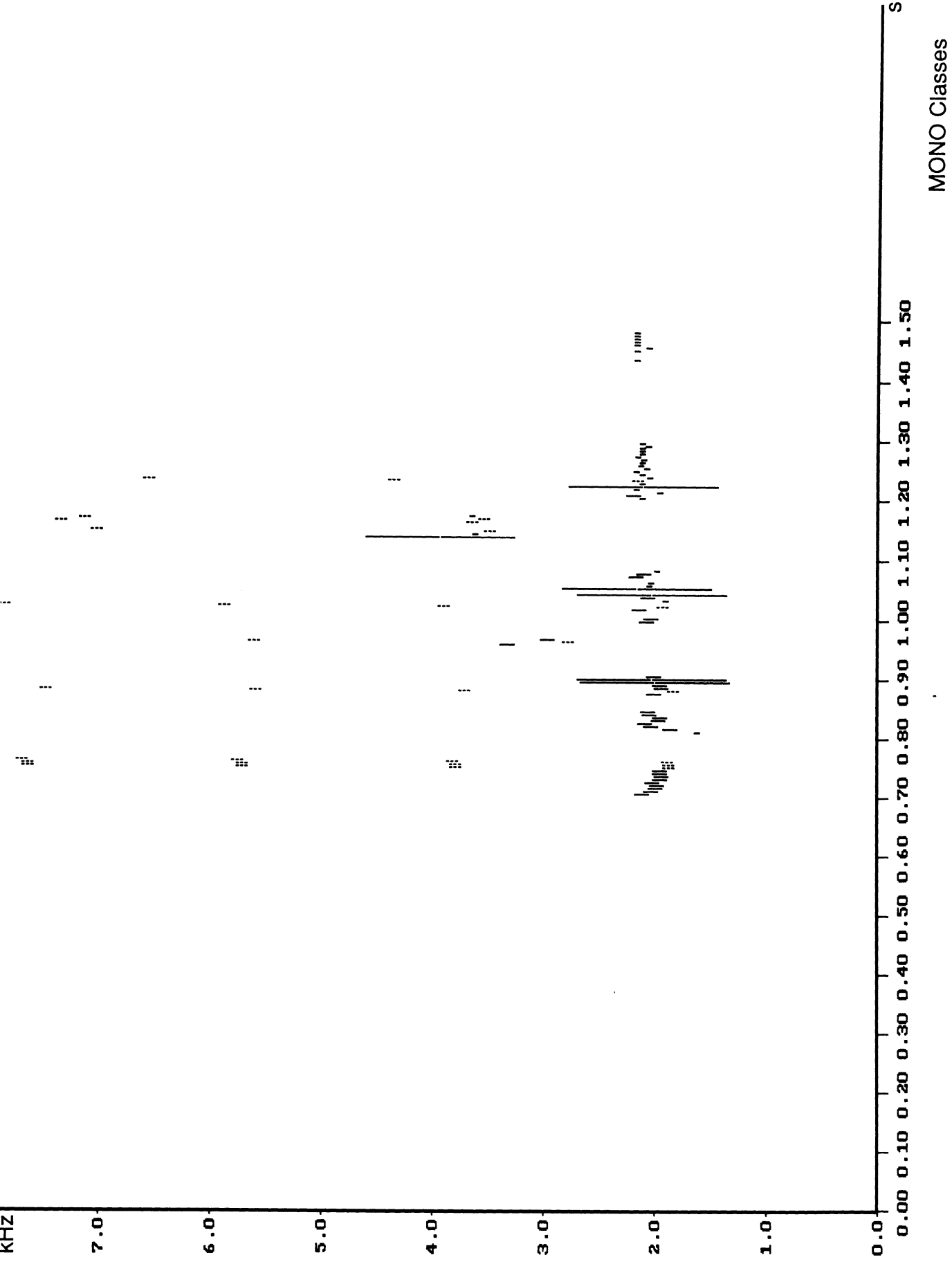
MONO1A.CF
  High_pass_freq: 1 kHz
  Distance_thresh: 0.3 kHz
  Class_mag_thresh: 25 times background

  MONO1A.E
    Dominance_ratio: 0.9
  END MONO1A.E
END MONO1A.CF
END MONO1A.LPF
END MONO1A.SF
END MONO1A.ADS
```

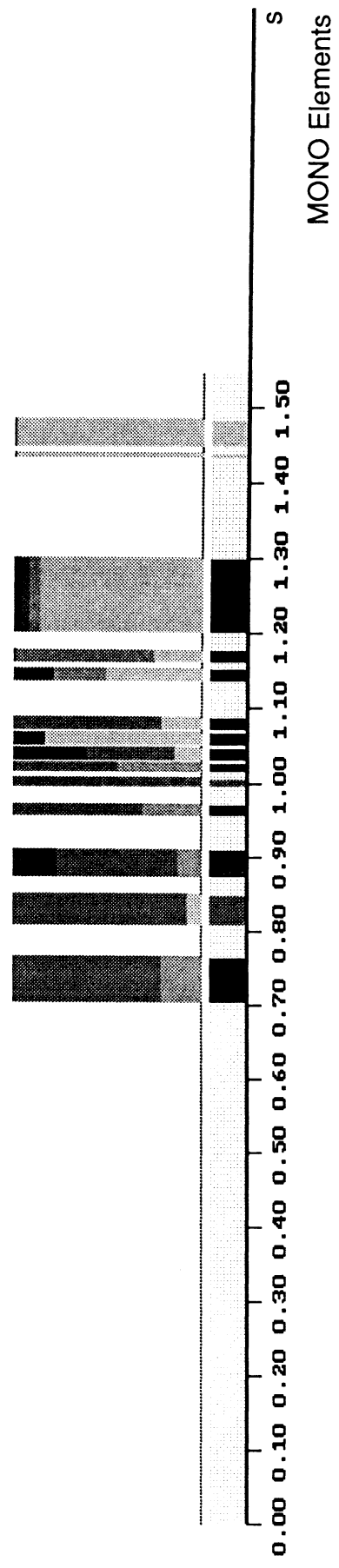
F1.12.2 MONO Plots







■ MIXED
 ■ NOISE
 ■ MULTIPLE
 ■ HARMONIC
 ■ SINGLE
 ■ SILENT



F1.12.3 MONO Elements

Element text file

DURN 705.21	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 59.60	FREQ 1.96	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.218	MULTIPLE: 0.782	NOISE: 0.000	
DURN 44.70	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 39.73	FREQ 1.95	CLASS MULTIPLE		
SINGLE: 0.082	HARMONIC: 0.000	MULTIPLE: 0.918	NOISE: 0.000	
DURN 24.83	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 34.76	FREQ 1.97	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.132	MULTIPLE: 0.652	NOISE: 0.216	
DURN 49.66	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 3.01	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.318	MULTIPLE: 0.682	NOISE: 0.000	
DURN 24.83	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 9.93	FREQ 2.05	CLASS MULTIPLE		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 1.000	NOISE: 0.000	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 9.93	FREQ 2.03	CLASS MIXED		
SINGLE: 0.000	HARMONIC: 0.451	MULTIPLE: 0.549	NOISE: 0.000	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 1.99	CLASS MIXED		
SINGLE: 0.150	HARMONIC: 0.000	MULTIPLE: 0.465	NOISE: 0.384	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.07	CLASS MIXED		
SINGLE: 0.840	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.160	
DURN 4.97	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 2.08	CLASS MIXED		
SINGLE: 0.217	HARMONIC: 0.000	MULTIPLE: 0.783	NOISE: 0.000	
DURN 49.66	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 3.67	CLASS MIXED		
SINGLE: 0.520	HARMONIC: 0.279	MULTIPLE: 0.000	NOISE: 0.201	
DURN 9.93	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 14.90	FREQ 3.61	CLASS MIXED		
SINGLE: 0.260	HARMONIC: 0.740	MULTIPLE: 0.000	NOISE: 0.000	
DURN 24.83	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 99.33	FREQ 2.10	CLASS MIXED		
SINGLE: 0.866	HARMONIC: 0.061	MULTIPLE: 0.039	NOISE: 0.033	
DURN 134.09	FREQ 0.00	CLASS SILENT		
SINGLE: 0.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	
DURN 4.97	FREQ 2.16	CLASS SINGLE		
SINGLE: 1.000	HARMONIC: 0.000	MULTIPLE: 0.000	NOISE: 0.000	

DURN 9.93 FREQ 0.00 CLASS SILENT
SINGLE: 0.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

DURN 34.76 FREQ 2.14 CLASS SINGLE
SINGLE: 1.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

DURN 839.30 FREQ 0.00 CLASS SILENT
SINGLE: 0.000 HARMONIC: 0.000 MULTIPLE: 0.000 NOISE: 0.000

F1.12.4 MONO Syntax Specification

SYNTAX SPECIFICATION

BIRD: Monotonous Lark

The problem of another lark calling at the same time is not dealt with here. This spec is for a call whose thresholds have been set to reject as much other noise as possible, while retaining as much of the primary call's frequency content as possible. The few stray background sounds might match the spec by "jumping into it" after a failure. One way to cater for these extra sounds (since the lark consistently calls in the presence of others, is to let the last node in the main sequence lead almost all the other nodes in the sequence.

ELEMENTS:

For:

frequency 1.93 to 1.98 kHz (1.96)
duration 55 to 65 ms (59.6)
single 0 harmonic 22 multiple 78 noise 10
occurrence_distance 10 %

ForToSyrup:

silence 40 to 50 ms (44.7)

Syr:

frequency 1.93 to 1.98 kHz (1.96)
duration 35 to 45 ms (39.73)
single 8 harmonic 0 multiple 92 noise 0
occurrence_distance 10 %

SyrToUp:

silence 20 to 30 ms (24.83)

U:

frequency 1.93 to 1.98 kHz (1.96)
duration 30 to 40 ms (34.76)
single 0 harmonic 13 multiple 65 noise 22
occurrence_distance 10 %

UToP:

silence 45 to 55 ms (49.66)

P:

frequency 2.9 to 3.1 kHz (3.01)
duration 12 to 17 ms (14.9)
single 0 harmonic 32 multiple 68 noise 0 %
occurrence_distance 10 %

SyrupToIs:

silence 20 to 30 (24.83)

Is-unit:

frequency 2.0 to 2.1 kHz (2.05, 2.03, 1.99, 2.07, 2.08)
duration 7 to 17 ms (9.93, 9.93, 14.9, 14.9, 14.9)
single 25 harmonic 25 multiple 25 noise 25 %
occurrence_distance 80 %

InterIs:

silence 3 to 10 ms (9.93, 4.97, 4.97, 4.97, 4.97)

IsToSweet:

silence 45 to 55 (49.66)

S-unit:

frequency 3.5 to 3.8 kHz (3.67, 3.61)
duration 12 to 17 ms (14.9, 14.9)
single 40 harmonic 40 multiple 0 noise 20
occurrence_distance 50 %

InterS:

silence 7 to 14 ms (9.93)

SToWeet:

silence 20 to 30 ms (24.83)

```

Weet:
  frequency 2.0 to 2.2 kHz (2.1)
  duration 90 to 110 ms (99.33)
  single 87 harmonic 6 multiple 4 noise 3
  occurrence_distance 15 %

GeneralSilence:
  silence 0 to 0 ms

SYNTAX:

For_node:
  For ForToSyrup_silence

ForToSyrup_silence:
  ForToSyrup Syrup

Syrup:
  Syr SyrToUp_silence

SyrToUp_silence:
  SyrToUp Up

Up:
  U UToP_silence

UToP_silence:
  UtoP P_node

P_node:
  P SyrupToIs_silence

SyrupToIs_silence:
  SyrupToIs Is_1

Is_1:
  Is-unit Is_1S

Is_1S:
  InterIs Is_2

Is_2:
  Is-unit Is_2S

Is_2S:
  InterIs Is_3

Is_3:
  Is-unit Is_3S

Is_3S:
  InterIs Is_4

Is_4:
  Is-unit Is_4S

Is_4S:
  InterIs Is_5

Is_5:
  Is-unit IsToSweet_silence

IsToSweet_silence:
  IsToSweet S_1

S_1:
  S-unit S_1S

S_1S:
  InterS S_2

S_2:
  S-unit SToWeet_silence

SToWeet_silence:
  SToWeet Weet_node

Weet_node:
  Weet Loop

Loop:
  GeneralSilence For_node

```

F1.12.5 MONO Track

Track/s of call in MON01A.E compared with syntax specifications in CANDIDAT:

Syntax spec: REDB.S (Redbilled Hornbill)

```
-----
| >
| SILENT 705.2 --- LOOP: 4
| >
| MIXED 59.60 --- no match
| >
| SILENT 44.7 --- LOOP: 4
| >
| MULTIPLE 39.73 --- no match
| >
| SILENT 24.8 --- LOOP: 4
| >
| MIXED 34.76 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 24.8 --- INTER_HONK_1: 1
| MULTIPLE 9.9 --- FIRST_PIP_1: 2
| SILENT 9.9 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 9.9 --- FIRST_PIP_1: 2
| SILENT 5.0 --- INTER_HONK_SILENCE_1: 1
| >
| MIXED 14.90 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 49.7 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 9.9 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 24.8 --- INTER_HONK_SILENCE_1: 4
| MIXED 99.3 --- SECOND_HONK_1: 2
| SILENT 134.1 --- AFTER_HONK_1: 1
| SINGLE 5.0 --- SECOND_PIP_1: 2
| SILENT 9.9 --- INTER_DOUBLE_1: 1
| >
| SINGLE 34.76 --- no match
| >
| SILENT 839.3 --- LOOP: 4
| >
| Score for C:\BCR\BIRDS\REDB\REDB.S:
| Failures 21
| Match total 53
|
|-----
```

Syntax spec: SOUT.S (Southern Boubou)

```
-----
| >
| SILENT 705.2 --- C_WHEEP-WHEEO_3: 1
| >
| MIXED 59.60 --- no match
| >
| SILENT 44.7 --- C_WHEEP-WHEEO_3: 4
| >
| MULTIPLE 39.73 --- no match
| >
| SILENT 24.8 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 34.76 --- no match
| >
| >
```

```

| SILENT 49.7 --- C_KEEU-KO-KO_2.1: 1
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 24.8 --- C_KEEU-KO-KO_3: 1
| >
| MULTIPLE 9.93 --- no match
| >
| SILENT 9.9 --- C_WHEEP-WHEEO_3: 4
| >
| MIXED 9.93 --- no match
| >
| SILENT 5.0 --- C_KEEU-KO-KO_2.1: 4
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 5.0 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 49.7 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 9.9 --- C_KEEU-KO-KO_3: 1
| >
| MIXED 14.9 --- C_KEEU-KO-KO_2.2: 2
| SILENT 24.8 --- C_KEEU-KO-KO_3: 1
| MIXED 99.3 --- C_KEEU-KO-KO_4: 2
| SILENT 134.1 --- C_KEEU-KO-KO_4.1: 1
| >
| SINGLE 4.97 --- no match
| >
| SILENT 9.9 --- C_WHEEP-WHEEO_3: 4
| >
| SINGLE 34.76 --- no match
| >
| SILENT 839.3 --- C_WHEEP-WHEEO_3: 1
|
| Score for C:\BCR\BIRDS\SOUT\SOUT.S:
| Failures 18
| Match total 44

```

Syntax spec: GREY.S (Grey Lourie)

```

| Essentials not present.

```

Syntax spec: FISC.S (Fiscal Shrike)

```

| >
| SILENT 705.2 --- THIRD_SILENCE: 1
| MIXED 59.6 --- CHINK_NODE: 2
| SILENT 44.7 --- LOOP: 4
| >
| MULTIPLE 39.7 --- CHINK_NODE: 2
| SILENT 24.8 --- LOOP: 4
| >
| MIXED 34.8 --- CHINK_NODE: 2
| SILENT 49.7 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 24.8 --- LOOP: 4
| >
| MULTIPLE 9.93 --- no match
| >
| SILENT 9.9 --- LOOP: 4
| >
| MIXED 9.93 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 5.0 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 49.7 --- LOOP: 4

```

```

| >
| MIXED 14.90 --- no match
| >
| SILENT 9.9 --- LOOP: 4
| >
| MIXED 14.90 --- no match
| >
| SILENT 24.8 --- LOOP: 4
| >
| MIXED 99.33 --- no match
| >
| SILENT 134.1 --- LOOP: 4
| >
| SINGLE 4.97 --- no match
| >
| SILENT 9.9 --- THIRD_SILENCE: 1
| SINGLE 34.8 --- CHINK_NODE: 2
| SILENT 839.3 --- LOOP: 4
|
| Score for C:\BCR\BIRDS\FISC\FISC.S:
| Failures 22
| Match total 62

```

Syntax spec: HOOP.S (African Hoopoe)

```

| Essentials not present.

```

Syntax spec: MOUR.S (Mourning Dove)

```

| >
| SILENT 705.2 --- LOOP: 4
| >
| MIXED 59.60 --- no match
| >
| SILENT 44.7 --- R_12S: 1
| MULTIPLE 39.7 --- ENDR_1: 2
| SILENT 24.8 --- ENDR_1S: 4
| MIXED 34.8 --- ENDR_2: 2
| SILENT 49.7 --- ENDR_2S: 1
| >
| MIXED 14.9 --- KREOW_1: 2
| SILENT 24.8 --- KREOW_1S: 1
| MULTIPLE 9.9 --- KREOW_2: 2
| SILENT 9.9 --- KREOW_2S: 1
| MIXED 9.9 --- KREOW_3: 2
| SILENT 5.0 --- KREOW_3S: 1
| MIXED 14.9 --- KREOW_4: 2
| SILENT 5.0 --- KREOW_4S: 1
| MIXED 14.9 --- KREOW_5: 2
| SILENT 5.0 --- KREOW_5S: 1
| MIXED 14.9 --- KREOW_6: 2
| SILENT 49.7 --- KREOW_6S: 1
| MIXED 14.9 --- KREOW_7: 2
| SILENT 9.9 --- KREOW_7S: 1
| MIXED 14.9 --- KREOW_8: 2
| SILENT 24.8 --- KREOW_8S: 1
| >
| MIXED 99.33 --- no match
| >
| SILENT 134.1 --- LOOP: 4
| >
| SINGLE 4.97 --- no match
| >
| SILENT 9.9 --- R_12S: 1
| SINGLE 34.8 --- ENDR_1: 2
| SILENT 839.3 --- ENDR_1S: 1
|
| Score for C:\BCR\BIRDS\MOUR\MOUR.S:
| Failures 7
| Match total 46

```

Syntax spec: OLIV.S (Olivetree Warbler)

```

| >
| SILENT 705.2 --- KRRR_TO_LAST: 1
| >
| MIXED 59.60 --- no match

```

```

>
SILENT 44.7 --- KRRR_TO_LAST: 1
>
MULTIPLE 39.7 --- KRRREK 0: 3
SILENT 24.8 --- KRRREK_1: 1
>
MIXED 34.8 --- KRR 24: 2
SILENT 49.7 --- KRR_25: 1
>
MIXED 14.9 --- KRRR 36: 2
SILENT 24.8 --- KRRR_37: 1
>
MULTIPLE 9.9 --- KRIK 14: 2
SILENT 9.9 --- KRIK_15: 4
>
MIXED 9.9 --- KRIK 14: 2
SILENT 5.0 --- KRIK_15: 1
>
MIXED 14.9 --- KRRREK 2: 2
SILENT 5.0 --- KRRREK 3: 1
MIXED 14.9 --- KRRREK 4: 3
SILENT 5.0 --- KRRREK 5: 1
MIXED 14.9 --- KRRREK 6: 3
SILENT 49.7 --- KRRREK_7: 4
>
MIXED 14.9 --- KRRR 34: 2
SILENT 9.9 --- KRRR 35: 4
MIXED 14.9 --- KRRR 36: 2
SILENT 24.8 --- KRRR_37: 1
>
MIXED 99.3 --- KRUP 10: 2
SILENT 134.1 --- KRUP_11: 1
>
SINGLE 5.0 --- KRRR 38: 2
SILENT 9.9 --- LOOP: 4
>
SINGLE 34.8 --- KRR 24: 2
SILENT 839.3 --- KRR_25: 1

Score for C:\BCR\BIRDS\OLIV\OLIV.S:
Failures 12
Match total 56

```

Syntax spec: JACO.S (Jacobin Cuckoo)

| Essentials not present.

Syntax spec: CROW.S (Pied Crow)

| Essentials not present.

Syntax spec: SWAI.S (Swainson's Francolin)

| Essentials not present.

Syntax spec: WILL.S (Willow Warbler)

```

>
SILENT 705.2 --- NODE 10: 1
MIXED 59.6 --- NODE 11: 2
SILENT 44.7 --- NODE_12: 1
>
MULTIPLE 39.7 --- NODE 39: 2
SILENT 24.8 --- NODE_40: 4
>
MIXED 34.8 --- NODE 39: 2
SILENT 49.7 --- NODE_40: 4
>
MIXED 14.9 --- NODE 29: 3
SILENT 24.8 --- NODE_30: 1
>
MULTIPLE 9.9 --- NODE 9: 2
SILENT 9.9 --- NODE_10: 1
>

```

```

| MIXED 9.9 --- NODE 9: 2
| SILENT 5.0 --- NODE_10: 1
| >
| MIXED 14.9 --- NODE 29: 2
| SILENT 5.0 --- NODE_30: 1
| >
| MIXED 14.9 --- NODE 29: 2
| SILENT 5.0 --- NODE_30: 1
| >
| MIXED 14.9 --- NODE 29: 2
| SILENT 49.7 --- NODE_30: 1
| >
| MIXED 14.9 --- NODE 29: 2
| SILENT 9.9 --- NODE_30: 4
| >
| MIXED 14.9 --- NODE 29: 2
| SILENT 24.8 --- NODE_30: 1
| >
| MIXED 99.33 --- no match
| >
| SILENT 134.1 --- NODE 12: 1
| SINGLE 5.0 --- NODE_13: 2
| SILENT 9.9 --- NODE_14: 1
| >
| SINGLE 34.8 --- NODE 39: 2
| SILENT 839.3 --- NODE_40: 4
|
| Score for C:\BCR\BIRDS\WILL\WILL.S:
| Failures 13
| Match total 54

```

Syntax spec: MONO.S (Monotonous Lark)

```

| >
| SILENT 705.2 --- LOOP: 4
| MIXED 59.6 --- FOR NODE: 3
| SILENT 44.7 --- FORTOSYRUP_SILENCE: 4
| MULTIPLE 39.7 --- SYRUP: 4
| SILENT 24.8 --- SYRTOUP_SILENCE: 4
| MIXED 34.8 --- UP: 4
| SILENT 49.7 --- UTOP_SILENCE: 4
| MIXED 14.9 --- P NODE: 4
| SILENT 24.8 --- SYRUPTOIS_SILENCE: 4
| MULTIPLE 9.9 --- IS 1: 3
| SILENT 9.9 --- IS 1S: 4
| MIXED 9.9 --- IS 2: 4
| SILENT 5.0 --- IS 2S: 4
| MIXED 14.9 --- IS 3: 2
| SILENT 5.0 --- IS 3S: 4
| MIXED 14.9 --- IS 4: 4
| SILENT 5.0 --- IS 4S: 4
| MIXED 14.9 --- IS 5: 4
| SILENT 49.7 --- ISTOSWEET_SILENCE: 4
| MIXED 14.9 --- S 1: 4
| SILENT 9.9 --- S 1S: 4
| MIXED 14.9 --- S 2: 4
| SILENT 24.8 --- STOWEET_SILENCE: 4
| MIXED 99.3 --- WEET NODE: 4
| SILENT 134.1 --- LOOP: 4
| >
| SINGLE 4.97 --- no match
| >
| SILENT 9.9 --- SYRTOUP_SILENCE: 1
| SINGLE 34.8 --- UP: 2
| SILENT 839.3 --- UTOP_SILENCE: 1
|
| Score for C:\BCR\BIRDS\MONO\MONO.S:
| Failures 2
| Match total 100

```

F1.12.6 MONO Trial results

Recognition scores for call MONO1A.E

CANDIDATE	ESS	PRELIM	SYN FAILS	SYN SCORE
=====	===	=====	=====	=====
Redbilled Hornbill	Y	2.83	21	53
Southern Boubou	Y	2.15	18	44
Grey Lourie	N	1.75		
Fiscal Shrike	Y	1.13	22	62
African Hoopoe	N	2.00		
Mourning Dove	Y	1.86	7	46
Olivetree Warbler	Y	1.65	12	56
Jacobin Cuckoo	N	2.25		
Pied Crow	N	1.67		
Swainson's Francolin	N	1.83		
Willow Warbler	Y	1.41	13	54
Monotonous Lark	Y	3.94	2	100