



# Scientific Experiments



Passive Acoustic Monitoring



## Return of a Wood Thrush in my Home ‘Patch’?

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Listen to a [Wood Thrush singing in the years 2021, 2022 and 2023](#)

Listen and compare [songs of Two Wood Thrushes heard in 2022 and 2023](#)



I often hear the melodic song of a Wood Thrush in the woods in this area but rarely get a chance to see one. In May 2021, my friend David and I saw and recorded a Wood Thrush singing in the woods in my Home ‘patch’. The following year, in June of 2022, a Wood Thrush was singing all month in my ‘patch’, but I could not locate it. Was it the same Wood Thrush that visited the previous year? Perhaps his voice would give a clue.

Our team member Hemant and I studied the songs of several Wood Thrushes in 2022 and developed a methodology to identify an individual from the vocal ‘fingerprint’ of ‘*ee-oh-lay*’ parts of his songs (<https://www.avianacts.com/Experiments/WoodthrushSongs.pdf>). One or more songs of an individual was distinctly different from the others which could be picked up by carefully listening to the audio recordings.

We learned that the Wood Thrush that sang in my Home ‘patch’ for a few days in May 2021 had a significantly different vocal signature than the one that sang in June 2022. We concluded that these were two different individuals. If either of these two birds returned after spending the winter somewhere in Central America over 2000 miles away, would we be able to identify the individual from his songs?

All through May and June of 2023 I eagerly awaited the return of the Wood Thrush. There was no sign of one in my ‘patch’ all spring and early summer. Then on July 28, a Wood Thrush serenaded early in the morning. Excitedly, I listened and recorded his songs. Again, on August 1, a Wood Thrush was singing away in the morning.

We established that the bird on July 28 and August 1 was the same individual. Additionally, all four of the songs in his repertoire were somewhat similar to the Home ‘patch’ Wood Thrush of 2022. Was it the same individual that returned after a year with an altered voice, an offspring of the 2022 bird, or another bird from the area near my ‘patch’? We cannot be sure.

Readers are encouraged to listen to the [Wood Thrushes singing in my ‘patch’ in 2021, 2022 and 2023](#) and render their opinion.

The periods in which a Wood Thrush sang in my ‘patch’ each year were different (Fig. 1). The one in 2021 was singing just after arrival from the south. The individual in 2022 was singing all through June which is the breeding season. The one in 2023 sang past the typical breeding time.

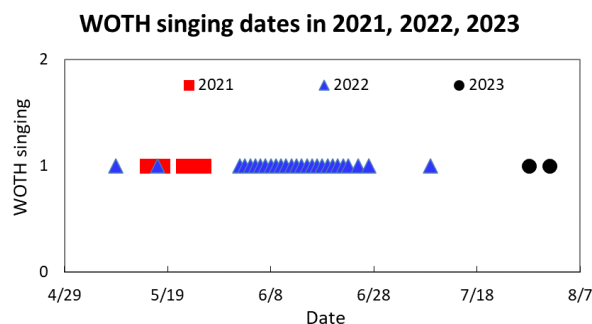


Fig.1. Wood Thrush singing dates in the years 2021, 2022 and 2023.



We remind readers of the three parts,  $p1$ ,  $p2$  and  $p3$  of a Wood Thrush song as shown in the oscillogram and spectrogram in Fig. 2. Our focus is on the characteristic  $p2$  part, the well-known ‘*ee-oh-lay*’ birders associate with a Wood Thrush.

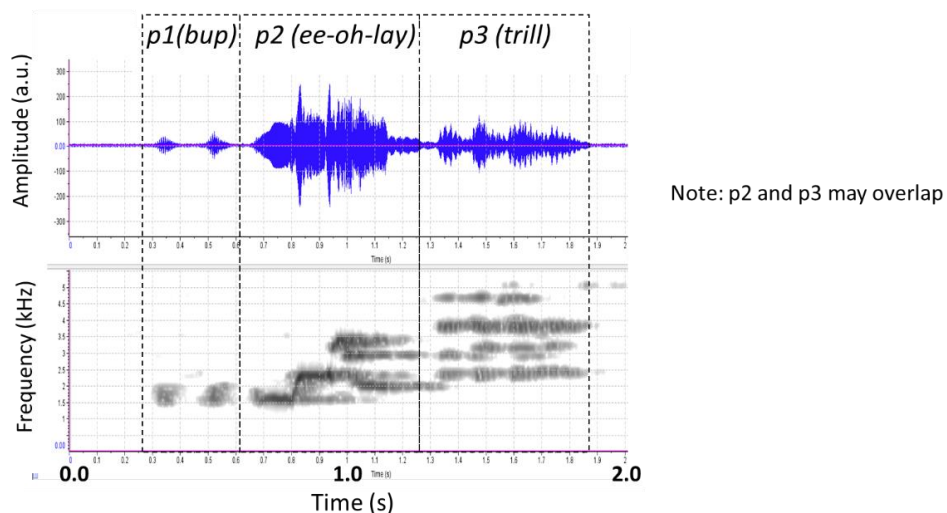


Fig. 2. The  $p1$ ,  $p2$  and  $p3$  elements of the Wood Thrush song.

In the northeastern USA, we found that each Wood Thrush typically has four  $p2$  song types, labeled song A, song B, song C and song D, and a preferred sequence in which the songs are delivered. In Fig. 3, the spectrogram of an audio recording of the 2022 Wood Thrush shows the song sequence A, B, C, D repeated three times. In no case was one song type followed by the same song type. For example, song A may be followed by song B, song C or song D but never by song A.

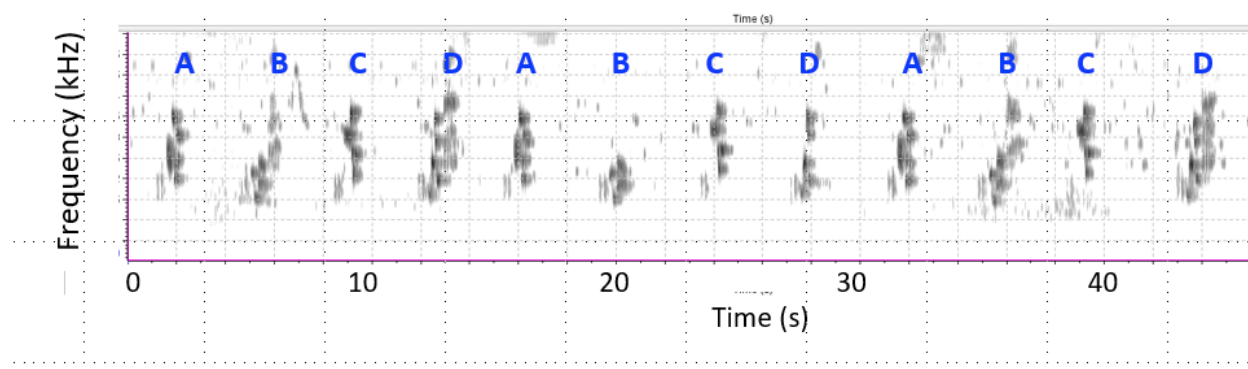


Fig. 3. Spectrogram of an audio recording of a Wood Thrush with song types A, B, C, D.

We compared the ‘ $p2$ ’ spectrograms of the songs of the Wood Thrush heard in 2022 (*WOTH-2*) with the one heard in 2023 (*WOTH-3*). Fig. 4 compares the A, B, C and D song types of *WOTH-2* with the ones that closely match the songs of *WOTH-3*.

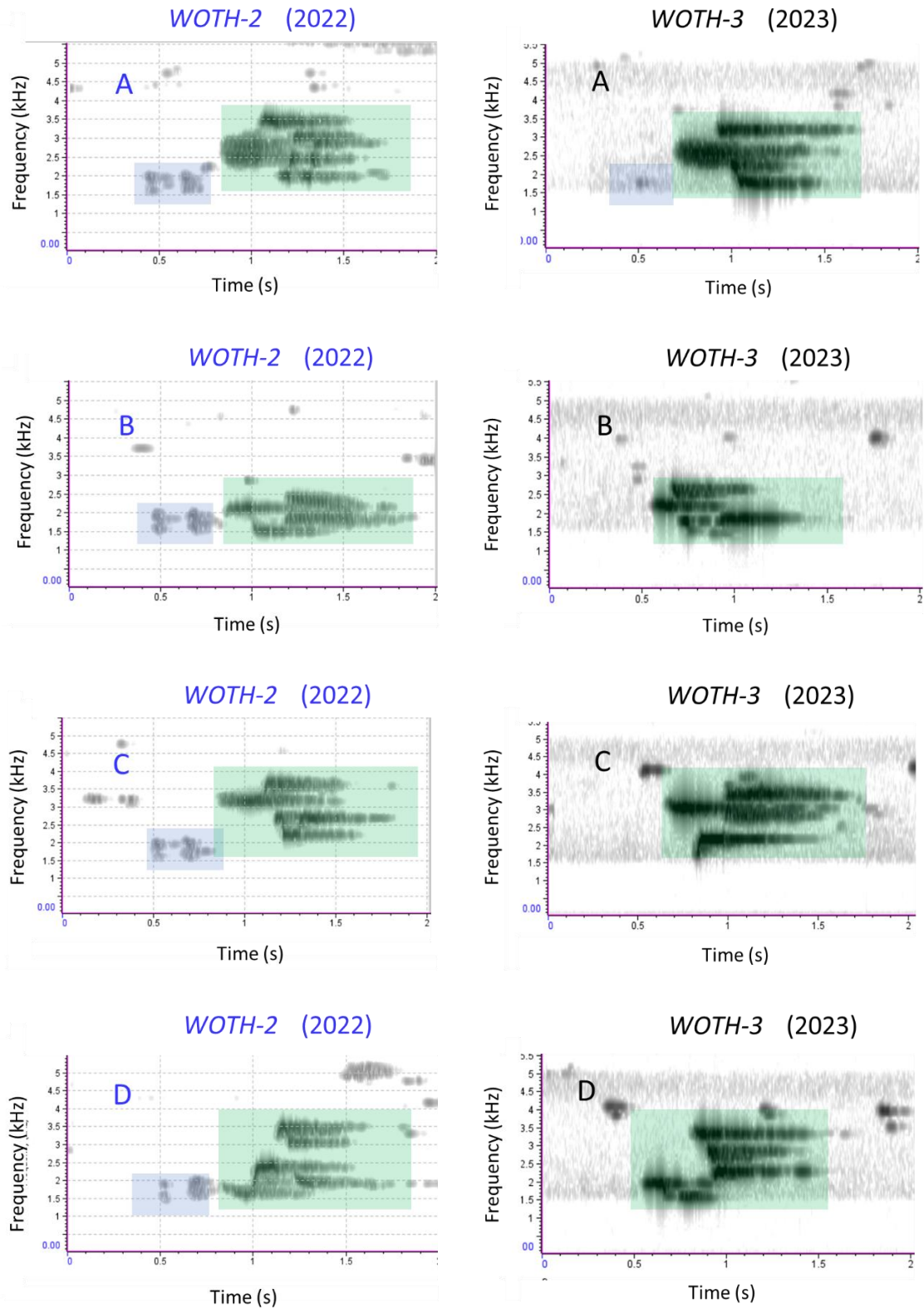


Fig. 4. Spectrograms of song A, song B, song C and song D of *WOTH-2* with the ones that most closely match song types of *WOTH-3*.



Fig. 5 shows  $2 \times 2$  matrices indicating how often one song type is followed by another song type. *WOTH-2* had a clear preference to singing in the order A, B, C, D. *WOTH-3* preferred A, D, B, C and even this preference was weaker than *WOTH-2*.

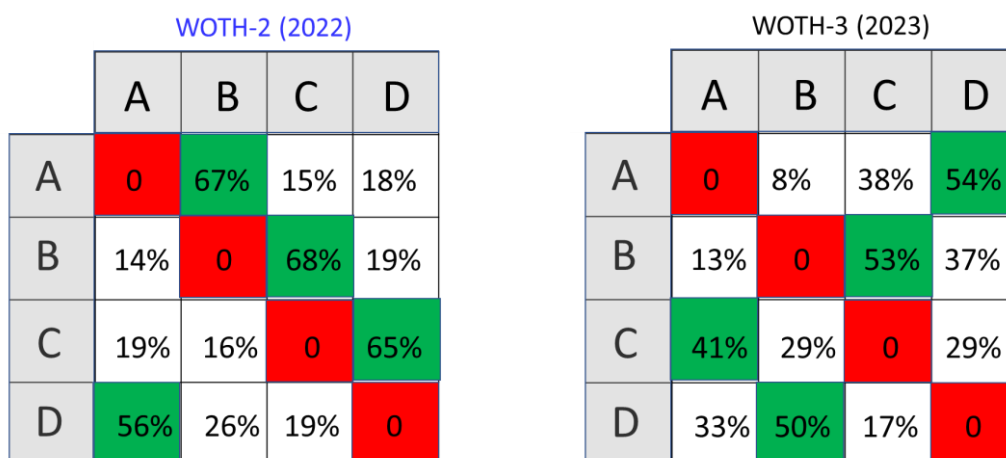
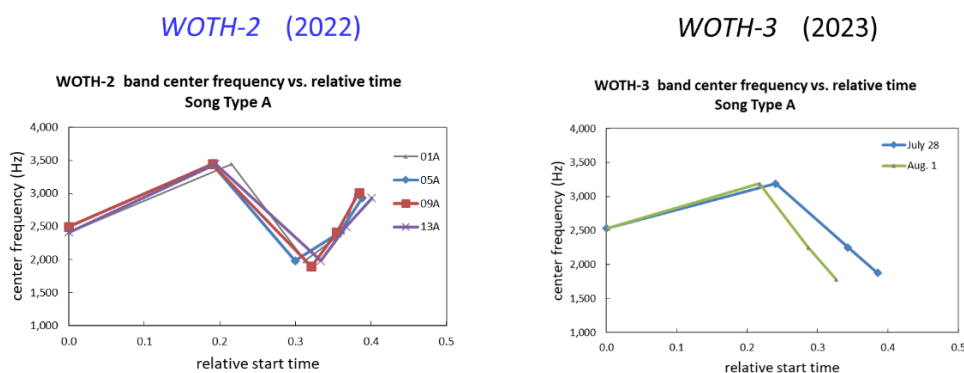


Fig. 5.  $2 \times 2$  matrices showing how often a song type was followed by same or another song type. Number of songs for *WOTH-2* = 225 and for *WOTH-3* = 65.

For a more precise comparison of how well a song is repeated by a Wood Thrush or matches another individual, we compare the center frequency vs. relative start time of each song type. See link for a more detailed description of our comparison methodology.

<https://www.avianacts.com/Experiments/WoodthrusSongs.pdf>

When we compared the four song types of *WOTH-2* and *WOTH-3*, the signatures were clearly different for all songs. Song C of the two birds, which sounds more similar to our ears than the other three songs, has distinctly different patterns.



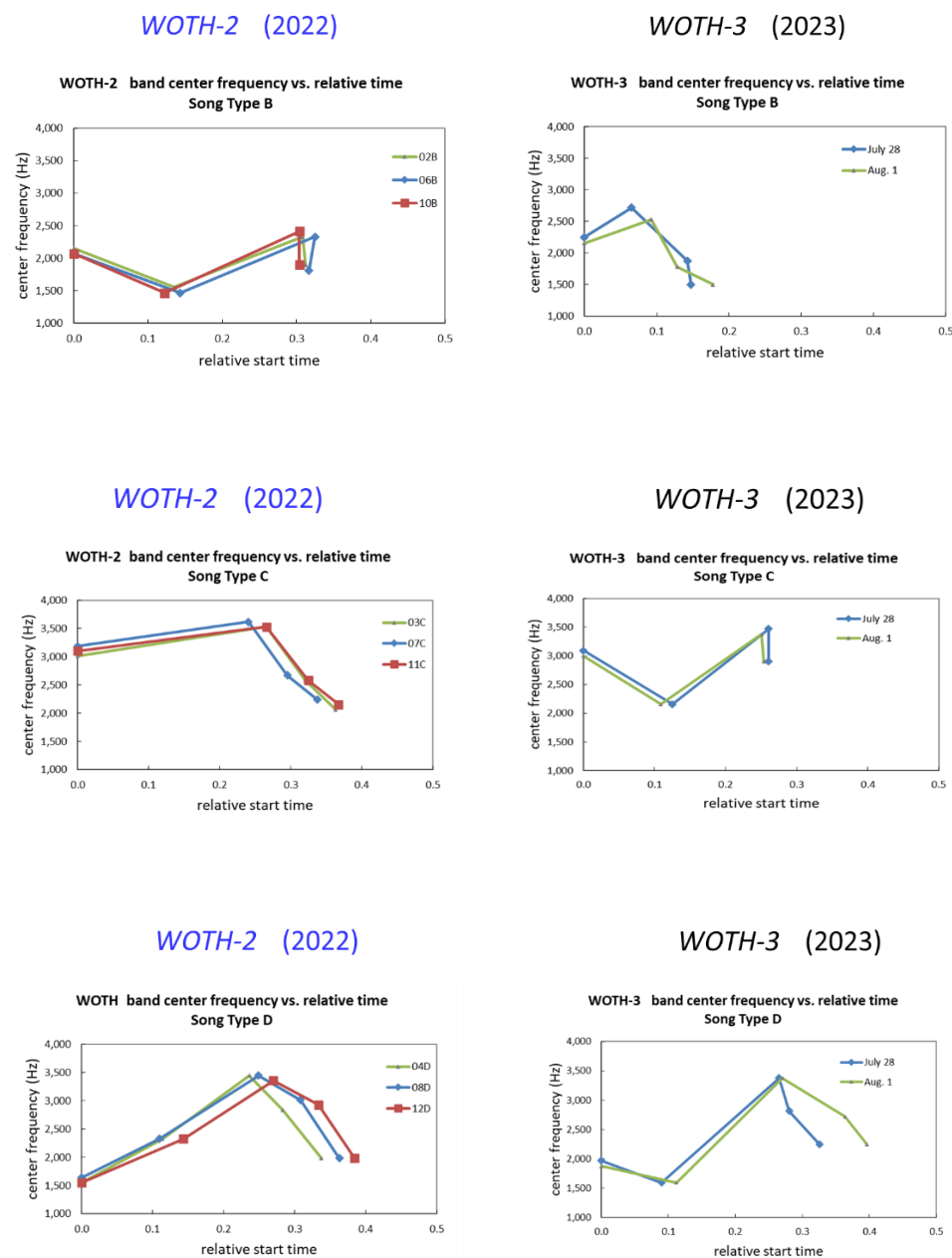


Fig. 6. Central frequency vs. relative start time of representative four songs of *WOTH-2* and the two *WOTH-3*.

We understand that spectrograms views and interpretations of audio sounds by human brains may differ. To facilitate song comparison, we created a video in which the ‘*ee-oh-lay*’ or *p2* parts of each song type extracted from 2022 and 2023 recordings are repeated four times. Readers may listen and render their opinion: <https://youtu.be/Xy50N1oH4NY>

**Earlier studies** indicated that variations of the ‘*p2*’ phrase might identify individuals [1, 2]. The first of these studies by Borror and Reese was conducted on 25 Wood Thrushes in Ohio and published in 1959. The second study by Lanyon on hand raised Wood Thrushes and published in 1979 included recordings of seven wild Wood Thrushes, each having a unique repertoire.



**In our study**, we compared the songs of three Wood Thrushes in the same small ‘patch’ in the years 2021, 2022 and 2023. We wanted to learn if an individual bird returns to the same area without capturing and banding the birds. So far, we found that it is easier to differentiate individuals on the basis of their repertoire when at least one song is distinctly different as was the case of the Wood Thrushes heard in 2021 and 2022. The situation became more complex when comparing the 2022 bird with the one in 2023. All four of their song types were similar but not identical. Is the repertoire of an individual bird modified over time? Is the repertoire of an offspring nearly similar to the parent? There is much to learn.

We hope that a Wood Thrush will sing in the Home ‘patch’ in future years and give us an opportunity to learn more of their behavior.

#### References:

1. Donald J. Borror, Carl R. Reese “Vocal gymnastics in Wood Thrush songs”, Ohio Journal of Science vol 56, pp 77-182, 1956.
2. Wesley E. Lanyon, “Development of Song in the Wood Thrush (*Hyllocichla mustelina*), With Notes on a Technique for Hand-Rearing Passerines from the Egg”. American Museum Novitats, vol.2666, pp 1-27, 1979.