Bat and Bird Data Analysis and Results Summary

May 2021 to August 2021

Progress Report #1

US Wind Metocean Buoy Campaign

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January 2022

Executive Summary

This report summarizes bat and bird acoustic data collected between 19 May 2021 and 30 August 2021 at the E14 US Wind buoy. This is the first bat and avian acoustic progress report, and all reports subsequent to this will be presented cumulatively. Bat and bird acoustic sensors were deployed with the E14 US Wind buoy on 19 May 2021 and continue to collect data at the time of this reporting. Data cards were swapped during the first service visit on 30 August 2021. Here we present the bat and bird acoustic results associated with the first data collection period. To date we have recorded two bat and 26 bird occurrences, representing seven unique species identifications from the buoy-based acoustic sensors (**Table 1**). Both bat acoustic detections were identified as eastern red bats and the American herring gull was responsible for most bird acoustic detections (n=20, 77%). Currently we do not have access to wind speed and wind direction data, but when these data become available during later reporting periods, an analysis of detections and associated wind resource will be undertaken.

Table 1. Bat and Bird Species and Species-Groups Identified between 19 May 2021 and 30 August 2021

Taxonomic Group	Species / Species Group	Vocalization Sequences
Bats	Eastern Red Bat	2
Bats Total		**2**
Birds	American Herring Gull	20
	Semipalmated Plover	1
	Spotted Sandpiper	1
	Solitary Sandpiper	2
	Chestnut-sided Warbler	1
	Wood Thrush	1
Birds Total		**26**
TOTAL		**28**

Justification

Bats have been observed offshore for over 100 years (Merriam 1887; Thomas 1921) yet the extent of their presence in the pelagic environment is only recently beginning to be understood. In the Eastern US, most species found offshore are long-distance migratory species, which include eastern red bats (*Lasiurus borealis*), hoary bats (*Lasiurus cinereus*), and silver-haired bats (*Lasionycteris noctivagans*) (Sjollema 2014). Short-distance migratory species from the genus (*Myotis* and *Perimyotis*) have also been detected. Offshore bat activity peaks significantly throughout the autumn migration period of August–early November (Peterson et al. 2014; Lagerveld 2015, 2017, 2020). Bats have experienced significant population declines via turbine collisions as a result of terrestrial wind energy development; whether a similar collision risk will be experienced at offshore facilities is an open question.

Off the coast of Maryland (USA) the offshore environment provides habitat for waterbird species, including sea ducks, loons, gulls, scoters, terns, alcids, gannets, shearwaters, petrels, and shorebirds. Some passerine species may also use the offshore environment during long-distance seasonal migrations (DeLuca et al. 2015). Understanding the prevalence of certain bird species within the US Wind project area is paramount to evaluating relative exposure and potential risks to species when considering adverse effects such as collision and displacement (Garthe and Hüppop 2004; Furness and Wade 2012; Robinson Willmott et al. 2013).

Understanding the prevalence of birds and bats in the offshore environment and under what ambient conditions they occur prior to, during, and after wind farm construction will provide US Wind the capacity to detect changes to species prevalence and support an informed response to any potential species impacts.

Operations and Analysis Summary

During the first data collection period, SM4 Bat and SM4 Bird acoustic detectors were operational for all 103 days spanning 19 May 2021 to 30 August 2021 (**Figure 1**). Data associated with the period spanning 30 August 2021 to January 2022 (data collection period 2) is currently being processed, and data collection continues at the time of this reporting (**Table 2)**.

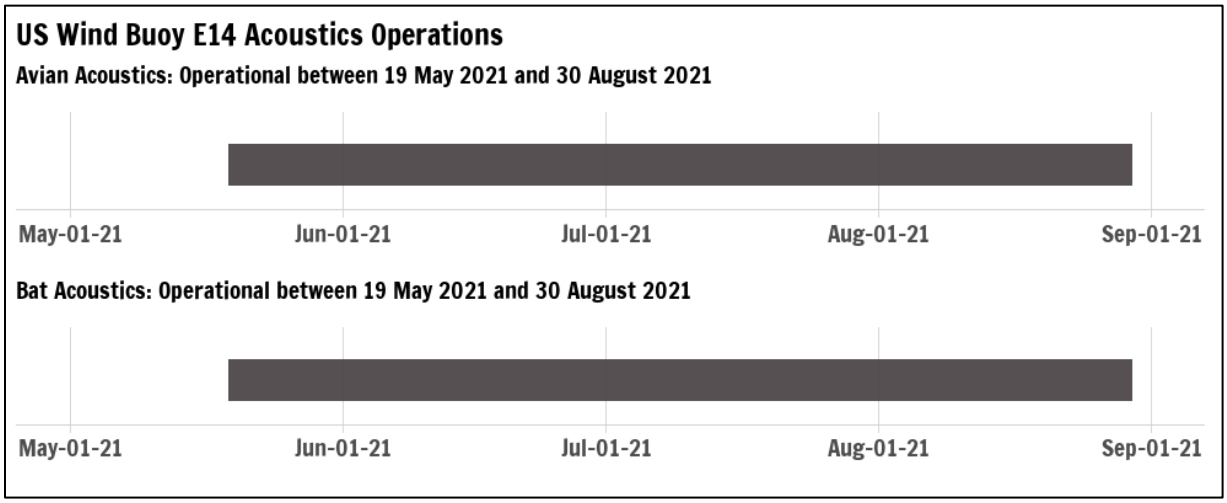

Figure 1. Bird and bat acoustic sensor operations on the E14 US Wind buoy during data collection period 1.

Table 2. Deployment and Operation Information Associated with SM4 Bat Acoustic Data and SM4 Bird Acoustic Data Collected at the E14 US Wind Buoy

Taxonomic Group	Collection Period	Collection Period Date Range	Collection Period (days)	Detector Operational Periods	Detector Operational Period (days)	% Days Operational	Data Status
Bats	1	19 May 2021–30 Aug 2021	103	19 May 2021–30 Aug 2021	103	100%	Analyzed and reported in this volume
	2	30 Aug 2021–Jan 2022	-	TBD	-	-	Data processing
	3	2022–TBD	-	TBD	-	-	Data collection ongoing
Birds	1	19 May 2021–30 Aug 2021	103	19 May 2021–30 Aug 2021	103	100%	Analyzed and reported in this volume
	2	30 Aug 2021–Jan 2022	-	TBD	-	-	Data processing
	3	2022–TBD	-	TBD	-	-	Data collection ongoing

Bat Acoustic Analysis Summary

Upon data receipt we uploaded the contents of each card to the Normandeau ReMOTe server for storage and processing. We then ran each data set through bat acoustic identification software SonoBat (Arcata, USA). Generally running files through a scrubber can eliminate WAV files that are algorithmically determined to be noise files rather than bats based on features of the sonogram. For example, WAV files with bandwidth below 20 kHz can be identified and eliminated as produced by audible insect noises, and files that have pulses of sound above 20 kHz can be kept for further analysis. With the buoy data, it is difficult to pre-filter noise because, unlike insect chatter, noise associated with the other equipment on the buoy such as the LiDAR make detectable pulsing ultrasonic noise that scrubber algorithms will not eliminate. We therefore used the SonoBat automated identification classifier on all recorded WAV files.

We determined the most typical SonoBat output for non-bat high frequency recordings (i.e., noises generated by peripheral buoy sensors) was a constant pulse approximately every 10 m/sec with a mean characteristic frequency of ≈39.75 kHz and a bandwidth of ≈4 kHz. The characteristics of these sounds are not like any bat species, and we determined which calls were more likely bats based on these parameters effectively scrubbing all the files to a reduced batch for manual vetting (≈90% reduction).

Bat Acoustic Results Summary

To date we have recorded bats passing the buoy on two occasions with both recordings being eastern red bats (**Table 3**). Both encounters occurred during the typical eastern red bat migratory periods, with one occurring during the spring migration period in May and one call recorded during the fall migratory period during August. Overall, bat activity was very low throughout the summer months. A spectrogram of an eastern red bat (*Lasiurus borealis*) collected at the E14 US Wind Buoy is shown in **Figure 2**.

Table 3. Bat Occurrences at the E14 US Wind Buoy during Collection Period 19 May 2021–30 August 2021

Species	Date	Count
Eastern Red Bat	23 May 2021	1
Eastern Red Bat	09 August 2021	1

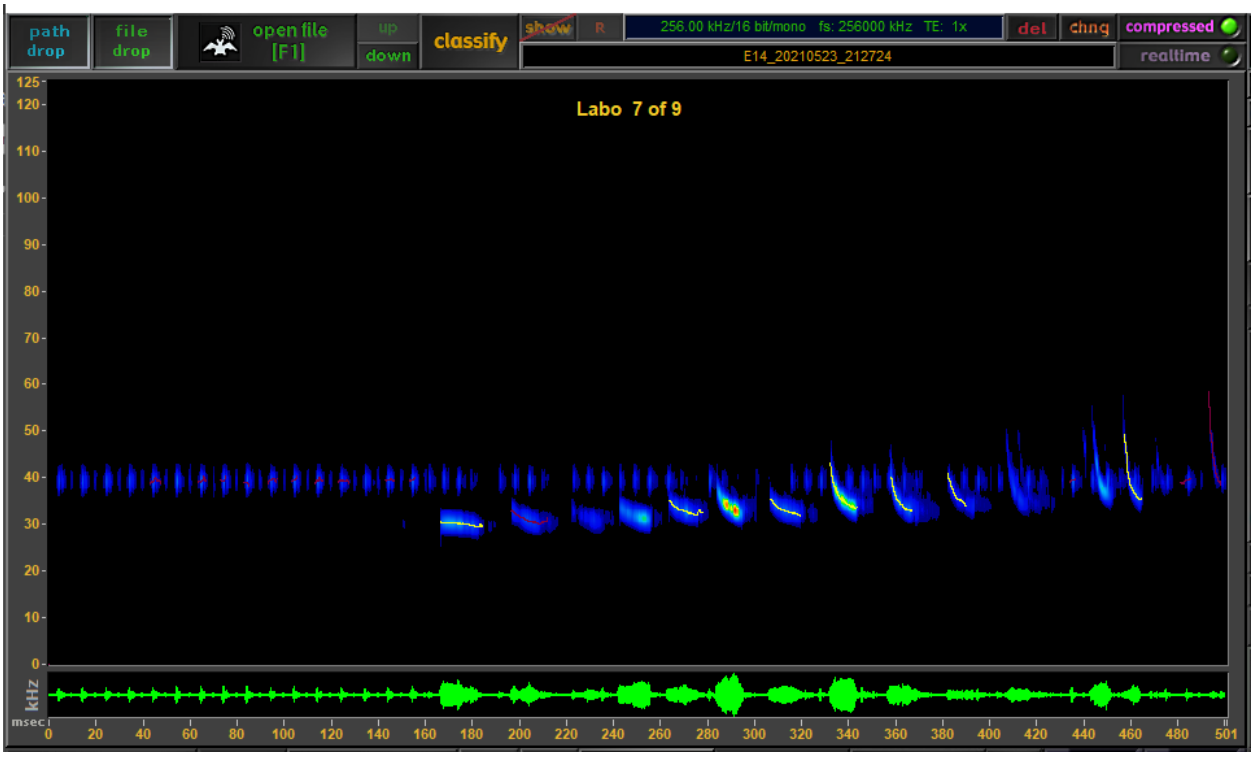

Figure 2. Spectrogram of eastern red bat (*Lasiurus borealis*) collected at the E14 US Wind Buoy

Bird Acoustic Analysis Summary

Bird acoustic data were processed with Wildlife Acoustics Kaleidoscope Pro software using automated detection parameters determined for the flight calls of species in **Table 4** using flight call audio data in the Cornell Lab of Ornithology Macaulay Library archives (https://search.macaulaylibrary.org/catalog). These 30 species were chosen based on sightings noted in ebird.org for the eastern US region and cross-referenced with the Migratory Bird Treaty Act. Note that detection parameters for the species listed do not necessarily exclude other species or non-bird sounds, so manual auditory (headphones) and visual (spectrogram) review of the detections is necessary to confirm any bird call within or outside the list and to exclude false alarms. Additional bird species were confirmed from any detections that did not fall within those listed in **Table 4**, focusing on but not limited to gulls, terns, and sandpipers. This species list is not to be taken as exhaustive as the Kaleidoscope settings can also detect species outside this list.

Manual auditory (headphones) and visual (spectrogram) review was conducted on every detection in the first 200 detections within each cluster generated by the Kaleidoscope Pro software auto-detection cluster analysis (any clusters with fewer than 200 detections had every detection reviewed). Any detections that were not birds were confirmed to be water, wind, or buoy noise, or some combination of those, and are not listed. For this analysis, one call corresponds to at least one confirmed detection within any one-minute time span. Two calls from the same species within the same minute period are counted as one occurrence.

Table 4. Bird Species whose Flight Calls were used for Automatic Detection Parameter Selection

Herring Gull	Bonaparte's Gull	Great Black-backed Gull
Cape May Warbler	Northern Parula	Palm Warbler
Ovenbird	American Redstart	Yellow Rumped Warbler
Gray-cheeked Thrush	Black Throated Blue Warbler	Black and White Warbler
Blackpoll Warbler	Common Yellow Throat	Bay-Breasted Warbler
Least Bittern	Green Heron	Veery
Magnolia Warbler	Chestnut-sided Warbler	White-throated Sparrow
Blackburnian Warbler	Bobolink	Blue Grosbeak
Yellow Warbler	Savannah Sparrow	Indigo Bunting
Swainson's Thrush	Wood Thrush	Northern Waterthrush

Bird Acoustic Results Summary

We detected six species of birds with 26 occurrences during the first data collection period with all detections occurring before the first week of June or after the first week of August (**Figure 3**). Twenty of 26 detections belonged to American herring gull with most calls occurring on two days during the first week of June (**Figure 4**). Overall bird activity at the buoy was consistently low during the summer months only reaching greater than 10 detections per day once. Only American herring gull were detected during the daylight hours with all other species recorded between 20:00 and 06:00 local time (**Figure 5**).

Representative acoustic bird calls from each species detected at the buoy are pictured in **Figure 6** through **Figure 11**.

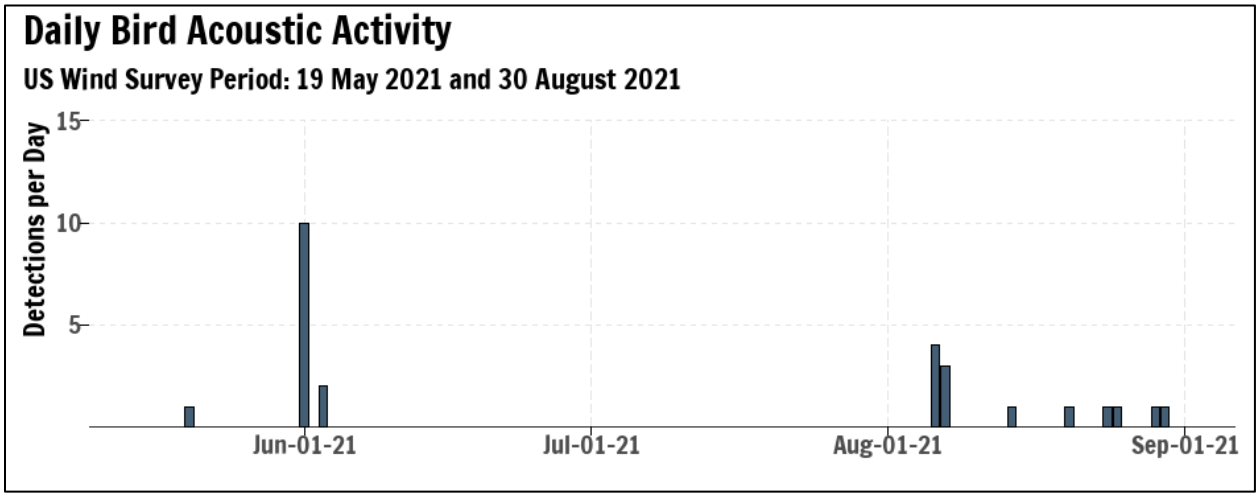

Figure 3. Number of bird calls per night associated with the first data collection period recorded at US Wind buoy E14.

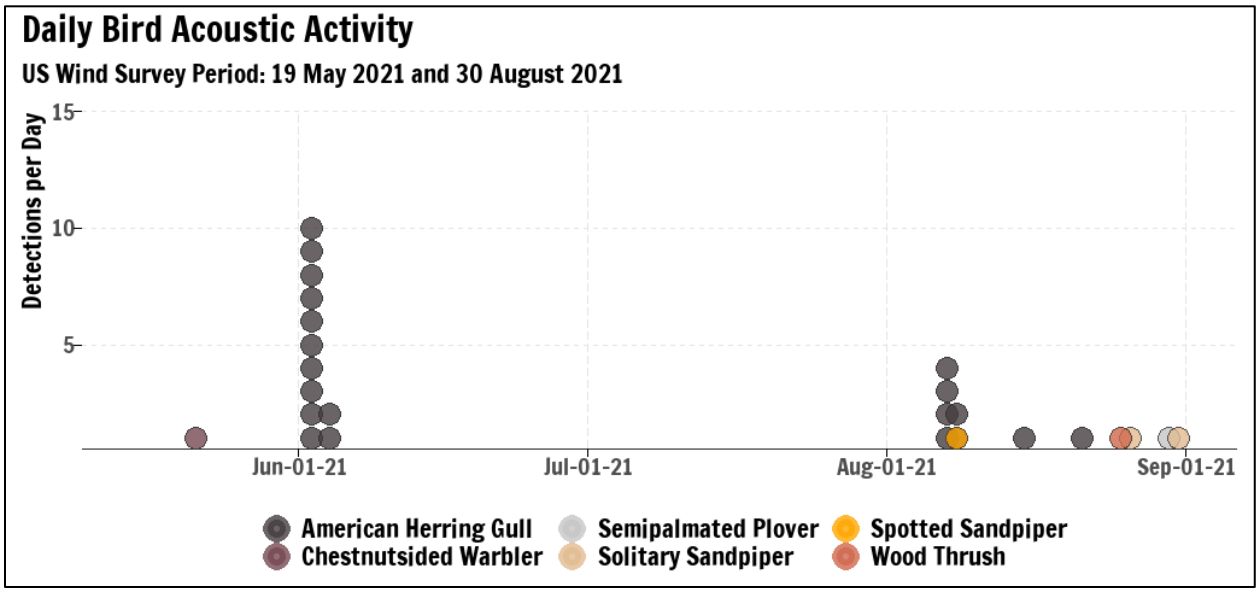

Figure 4. Number of bird calls per night and species associated with the first data collection period recorded at US Wind buoy E14 for each species.

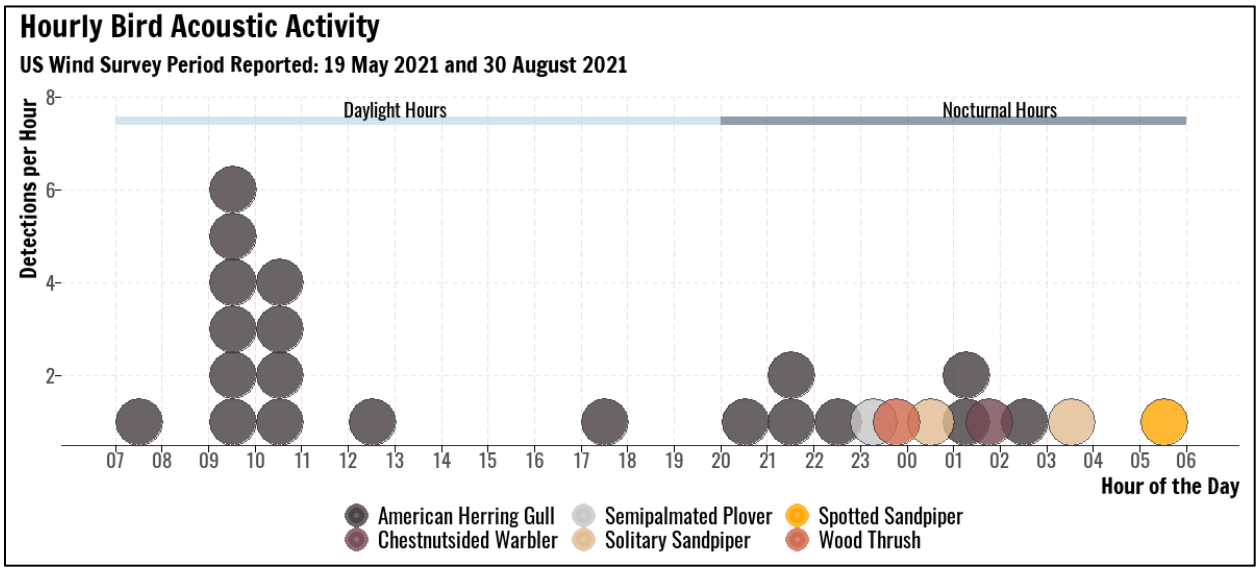

Figure 5. Number of bird calls per hour and species associated with the first data collection period recorded at US Wind buoy E14.

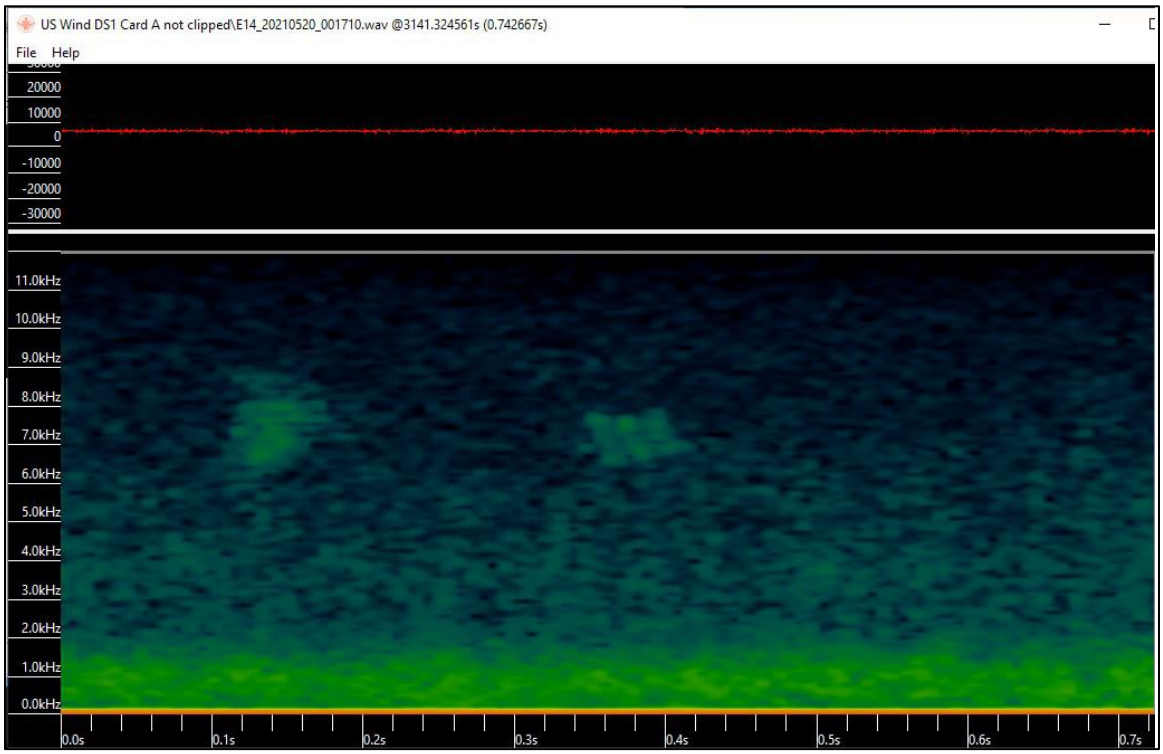

Figure 6. Spectrogram of chestnut-sided warbler call collected at the E14 US Wind Buoy.

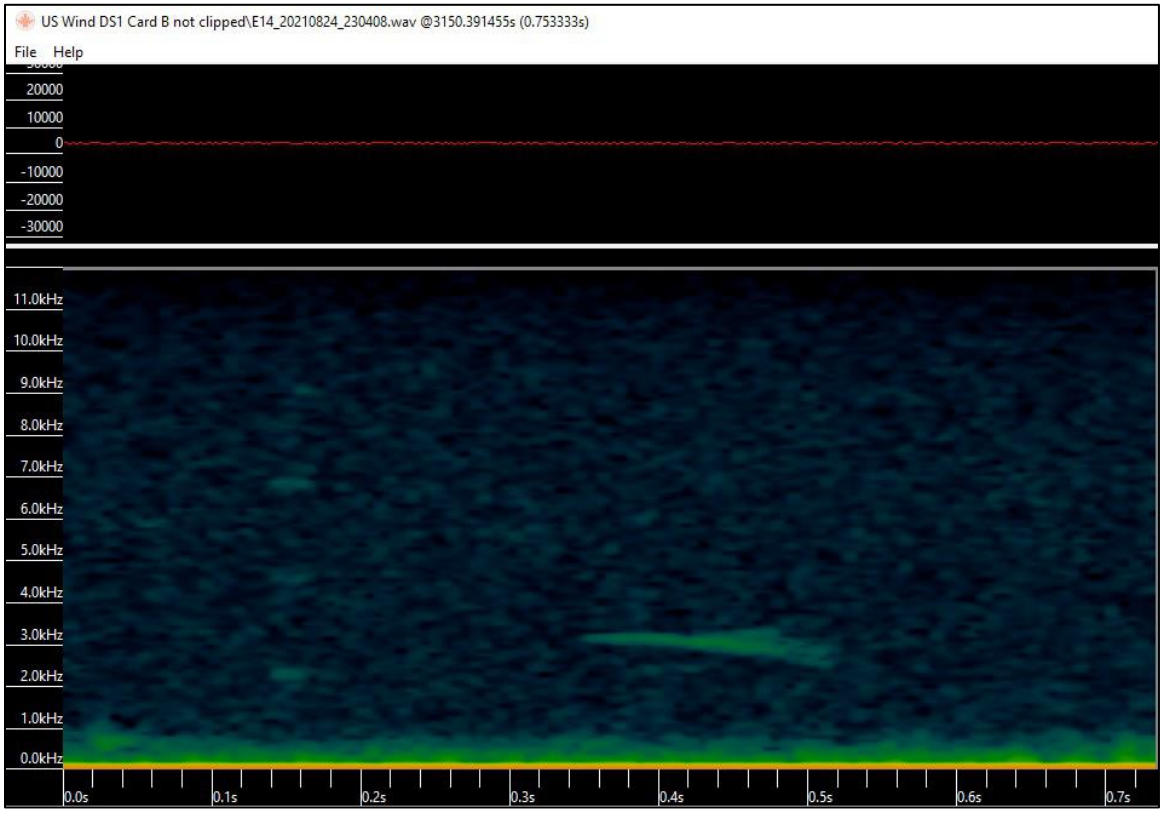

Figure 7. Spectrogram of wood thrush call collected at the E14 US Wind Buoy.

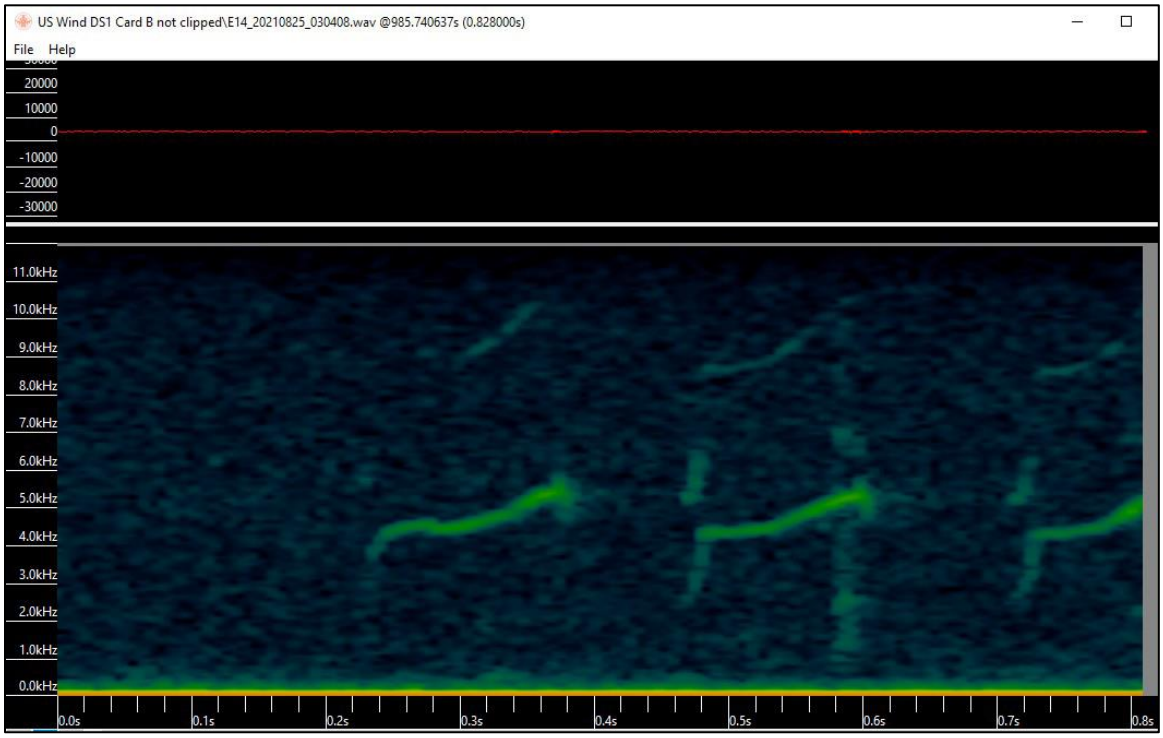

Figure 8. Spectrogram of solitary sandpiper call collected at the E14 US Wind Buoy.

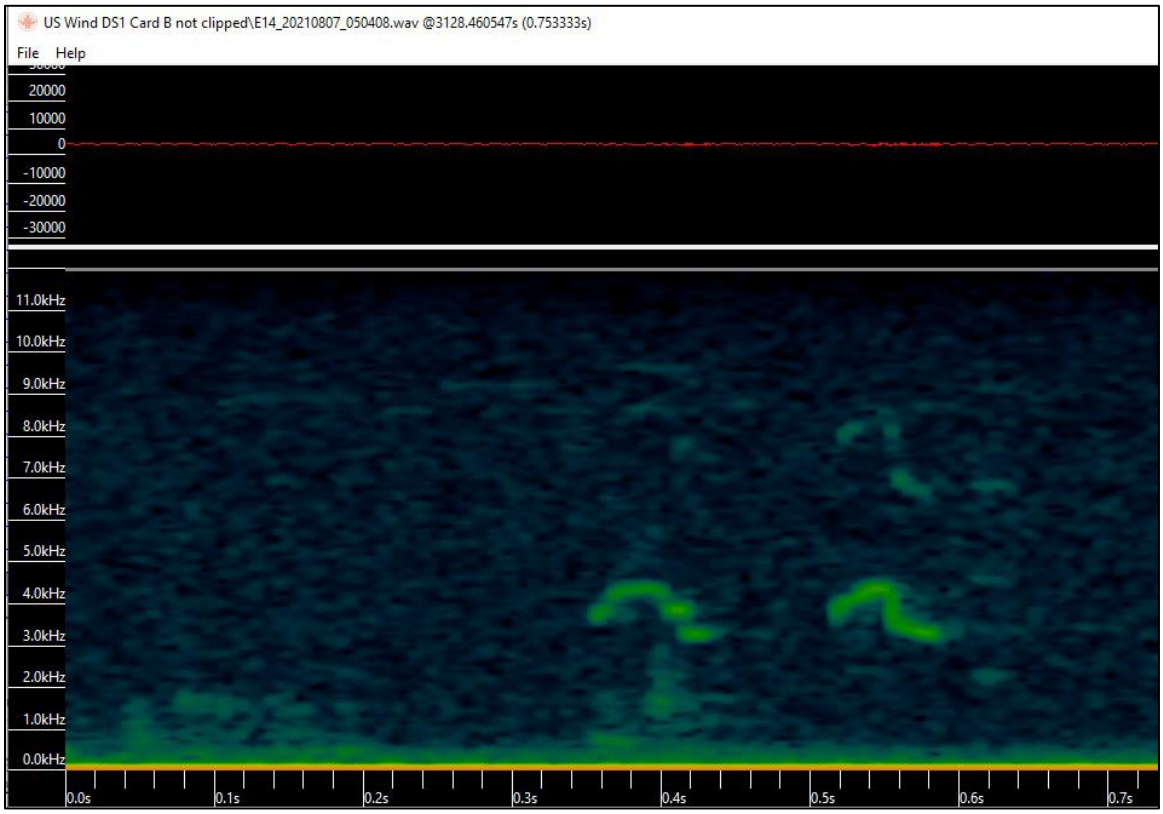

Figure 9. Spectrogram of spotted sandpiper call collected at the E14 US Wind Buoy.

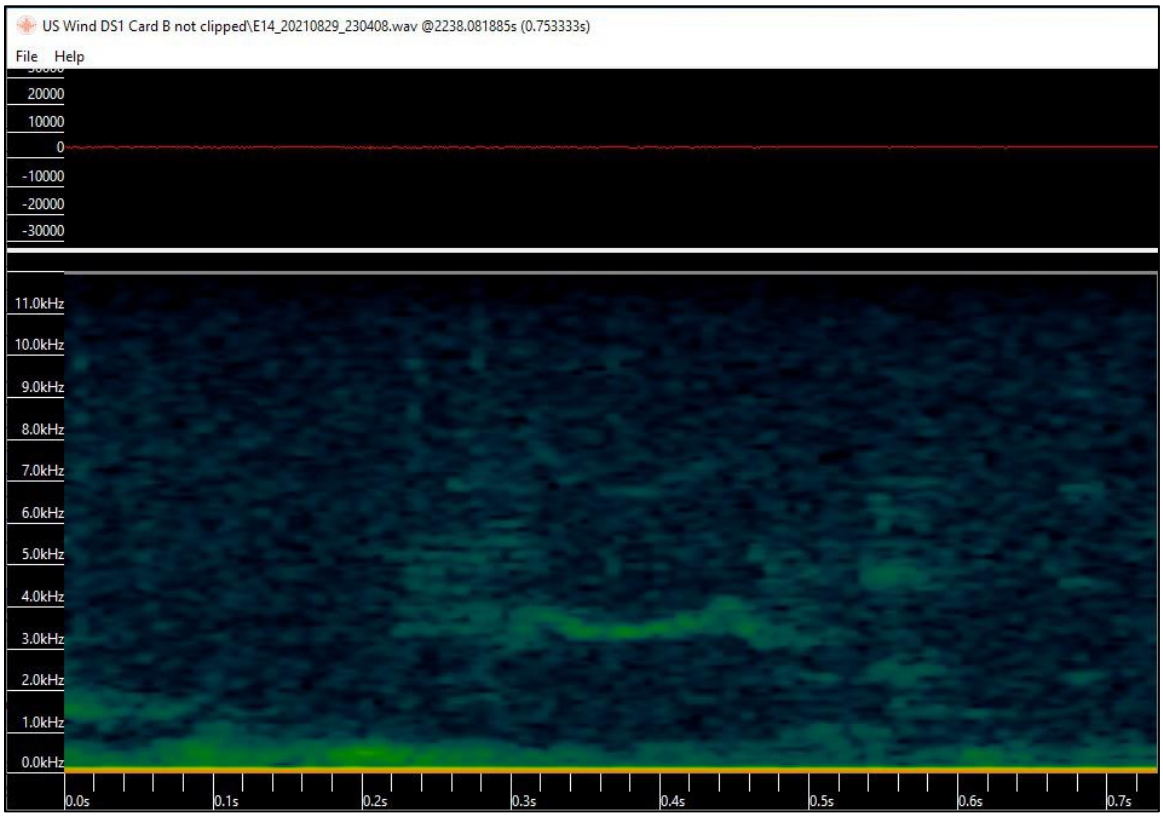

Figure 10. Spectrogram of semipalmated plover call collected at the E14 US Wind Buoy.

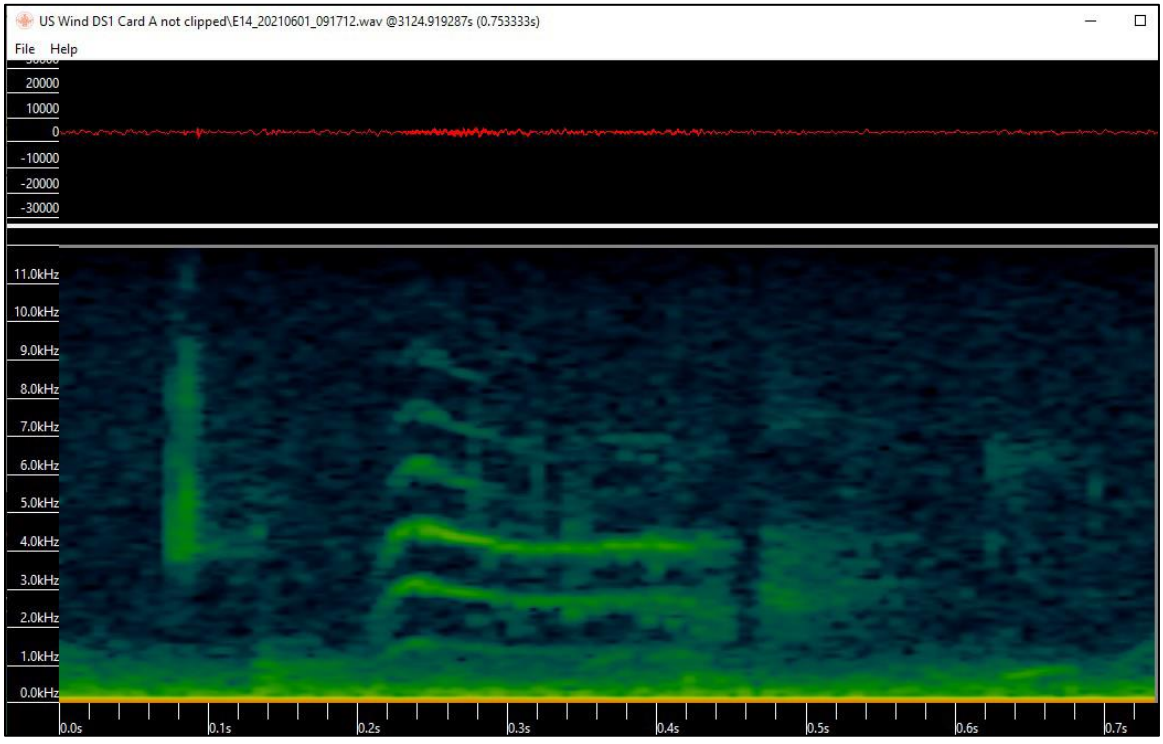

Figure 11. Spectrogram of American herring gull call collected at the E14 US Wind Buoy.

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