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UNIVERSITY OF CALIFORNIA SAN DIEGO

**Ambisonic Earth: Recording, processing, and archiving biodiverse ecological soundscapes
with higher-order ambisonics**

A Dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Philosophy

in

Music

by

Charles Deluga

Committee in charge:

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Thomas Erbe
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Lei Liang
Shahrokh Yadegari

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University of California San Diego

2026

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LIST OF ABBREVIATIONS

ANH	Acoustic Niche Hypothesis
CARE	Collective Benefit, Authority to Control, Responsibility, and Ethics
FAIR	Findable, Accessible, Interoperable, and Reusable
HOA	Higher-order ambisonics
KBA	Key Biodiversity Area
LATL	Layered ambisonic time-lapse
LSTL	Layered sonic time-lapse
LTSA	Long-term spectral average
LTSP	Long-term spectral peak
MEMS	Micro-electromechanical systems
NWR	U.S. National Wildlife Refuge
PAM	Passive acoustic monitoring
PRNS	Pink residual noise shaping
STL	Sonic time-lapse
WDPA	World Database on Protected Areas
DAW	Digital audio workstation

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ABSTRACT OF THE DISSERTATION

Ambisonic Earth: Recording, processing, and archiving biodiverse ecological soundscapes with higher-order ambisonics

by

Charles Deluga

Doctor of Philosophy in Music

University of California San Diego, 2026

Michelle Lou, Chair

Higher-order ambisonics (HOA) offers a powerful set of methods for immersively recording and reproducing the three-dimensional soundfields of ecological environments, yet HOA content is significantly underrepresented in public soundscape archives. Existing ambisonic collections primarily feature first-order ambisonics or urban acoustic scenes, while the practitioners whose work most compellingly demonstrates the value of immersive ecological recording have largely not made their multichannel recordings accessible. This

dissertation documents *Ambisonic Earth*, an ongoing project to record, process, and publicly archive the soundscapes of biodiverse ecosystems in higher-order ambisonics, while serving as a practical guide for others undertaking this work.

Over 500 hours of third-order ambisonic soundscape recordings have been captured from 2022 through 2025 across 35 RESOLVE ecoregions and nine terrestrial biomes. Recording sites span 27 U.S. National Wildlife Refuges, 19 Key Biodiversity Areas, four Ramsar Wetlands, two UNESCO Biosphere Reserves, and a UNESCO World Heritage Site. This dissertation presents five primary contributions. First, plans for a portable and replicable recording system centered on the ZYLIA ZM-1 array, including a Raspberry Pi-based field recorder prototype enabling autonomous long-form capture in a sealed, weatherproof enclosure. Second, a site selection framework drawing on the World Database on Protected Areas, RESOLVE Ecoregions and Biomes, Key Biodiversity Areas, and other global biodiversity and heritage datasets. Third, a noise reduction methodology, referred to as pink residual noise shaping (PRNS), that shapes the residual noise of the recording system to approximate the spectral slope of pink noise at -3 dB per octave, allowing remaining system noise to blend unobtrusively into the background of ecological recordings. Fourth, a layered sonic time-lapse (LSTL) method that generates and sums multiple time-lapses with incremented start times, processed independently across channels, to condense all sonic material from long-form ambisonic recordings into spatially coherent experiential summaries. Fifth, a multi-platform archival infrastructure, including: The Ambisonic Archive (<https://zenodo.org/communities/ambisonicarchive>) and Ambisonic Earth (<https://zenodo.org/communities/ambisonicearth>) Zenodo communities with persistent DOIs for multichannel source files and metadata, a YouTube channel with binaural audio and spectrogram video (<https://www.youtube.com/@AmbisonicEarth>), and an interactive sound map linking recording locations to both platforms. Archival of the collection is proceeding on a rolling basis, with the infrastructure designed to grow incrementally as processing continues.

1. INTRODUCTION

Soundscapes are acoustic environments, in all of their physical and psychological complexity. They are central to the functioning of ecosystems, as well as our understanding and experience of them. Through audio recording of ecological soundscapes, we can monitor biodiversity to inform action toward conservation and produce artistic, educational, and cultural experiences, facilitating new relationships with nature that would be impossible without technological mediation. David Monacchi (2017) advocates for documenting the sonic heritage of ecosystems with the spatial audio technologies of higher-order ambisonics, allowing for the recording and reproduction of three-dimensional soundscapes as spherical soundfields. Biodiverse ecoacoustic environments can thus be immersively represented on multichannel speaker arrays and headphones for people to experience on a global scale; ideally facilitating direct, embodied identification with ecosystems as unique collections of life in ways that foster ecological empathy and motivate stewardship. However, for such a vision to take shape, the prerequisites exist that people use spatial audio technologies to record ecological soundscapes in the first place, then archive and disseminate these recordings such that they are open and accessible to the broadest range of current and future listeners, practitioners, and researchers. If we are to consider the heritage value of soundscape documentation as ecosystems undergo inevitable change, then future generations cannot inherit the potential of these experiences if they don't have access to the underlying sonic material, stored in stable locations and in approachable formats. Ambisonics involves relatively high barriers to entry for both recordists and listeners, in learning curves and cost of recording hardware and signal processing tools. Long-form field recording adds its own complications, producing large amounts of data to store

and present such that it can be navigated by audiences of varying goals and expertise. This dissertation documents my process in confronting these challenges of recording, processing, archiving, and disseminating the soundscapes of biodiverse ecosystems using higher-order ambisonics; to detail my work thus far on the project *Ambisonic Earth* and to serve as a guide for others who believe in the potential of ecological ambisonic recording.

1.1. Contributions

Higher-order ambisonics (HOA) offers the means for immersive recording and reproduction of ecological soundscapes, yet HOA content is significantly underrepresented in public archives. Many existing ambisonic collections only feature first-order recordings, non-ecological environments, or are minimally-accessible online. *Ambisonic Earth* is an ongoing effort to document the soundscapes of global biodiversity with higher-order ambisonics, making full recordings and metadata accessible to the public for long-term applications in art, science, education, conservation, and heritage studies. This dissertation documents the current state of the *Ambisonic Earth* project, describes methods for HOA recording, signal processing, and archival, and aims to serve as a practical guide for others undertaking this work. The particular contributions are as follows.

First, outlining a replicable field recording system for long-form, autonomous, third-order ambisonic capture. The system centers around the ZYLIA ZM-1 microphone array and a prototype Raspberry Pi-based multichannel field recorder, enabling over 24 hours of continuous unattended recording in a sealed, weatherproof, battery-powered enclosure. The system weighs approximately 12 pounds and is assembled entirely from commercially available components, offering a template for a portable and robust system for HOA field recording.

Second, establishing a framework for site selection informed by global biodiversity and

heritage datasets. The framework draws on the World Database on Protected Areas, Ramsar Wetlands of International Importance, RESOLVE Ecoregions and Biomes, Key Biodiversity Areas, the Biodiversity Intactness Index, UNESCO World Heritage Sites, UNESCO Biosphere Reserves, CEPF terrestrial biodiversity hotspots, WWF Global 200 ecoregions, and Intact Forest Landscapes. These datasets, assembled for navigation in GIS platforms, allow practitioners to evaluate potential recording locations in the context of global biodiversity, protection status, conservation priority, and representativeness across the world's ecoregions and biomes.

Third, presenting a methodology for ambisonic noise reduction that shapes residual noise to approximate a pink noise spectral slope of -3 dB per octave. Noise reduction of recording system self-noise is not well documented. Pink noise, whose power spectral density decreases inversely with frequency, is generally perceived as spectrally balanced and is ubiquitous in natural systems, such that residual recording system noise shaped to this profile blends unobtrusively into the acoustic background of ecological recordings. The methodology details processing parameters for the iZotope RX Spectral De-noise tool and documents a procedure for shaping residual noise to match a pink noise slope, which may be referred to as pink residual noise shaping (PRNS). The noise profile used, recorded in the exceptionally quiet Ancient Bristlecone Pine Forest of California is made available so other users of the ZYLIA ZM-1 specifically can further improve the quality of their recordings. The ambisonic noise reduction and PRNS approaches described are generalizable across microphones and arrays.

Fourth, introducing a novel process for layered ambisonic time-lapse. Existing sonic time-lapse (STL) methods sample short windows at regular intervals throughout a recording, leaving the majority of sonic activity unrepresented in the output. The current layered approach generates and sums multiple time-lapses per channel, with offset start times proportional to window duration, so that all material from the original recording is captured in one of the

layers. By applying this processing independently to all ambisonic channels, artificially dense sound worlds are created that maintain the spatial coherence of their original acoustic environments, offering practitioners an immersive means of surveying long recordings as an artistic abstraction, scientific summary, or both.

Fifth, creating open-access archives for multichannel and binaural ecological soundscape recordings, deployed across platforms to serve audiences of varying expertise. On Zenodo, two "communities" have been established: [Ambisonic Earth](#) (Deluga 2026b), where this project's recordings are collected, and [The Ambisonic Archive](#) (Deluga 2026c), an open-submission repository intended as a broader hub for ambisonic soundscape recordings across projects and practitioners. Each upload to Zenodo features a persistent DOI for long-term citability and may be linked to multiple communities, such that recordings may be associated with The Ambisonic Archive in addition to one's personal and institutional groups. On the [Ambisonic Earth YouTube channel](#) (Deluga 2025), binaural renderings with time-synchronized spectrogram video are published for audiences who may never interact with multichannel source files. Recording locations are documented on an interactive [sound map](#) (Deluga 2026a) linked to both platforms.

1.2. Overview

The Background establishes that ecological soundscapes encode meaningful information about evolutionary relationships and ecosystem integrity, that the biodiversity crisis is irreversibly degrading them, and that they warrant recognition as intangible heritage. It argues that ambisonics preserves the spatial structure on which both ecological significance and perceptual immersion depend, and that immersive listening experiences can foster the connectedness to nature associated with pro-environmental behavior. It then surveys existing soundscape collections, finds them largely inaccessible or spatially limited, and makes the case

for open-data infrastructure as the foundation for durable public access.

The Methods section documents approaches to HOA field recording, signal processing, and archival. It describes the current recording system based on the ZYLIA ZM-1 array, a Raspberry Pi-based recorder prototype, and the portable enclosure for autonomous long-duration capture. Site selection methods are presented at global and local scales, drawing on the GIS datasets used by UNESCO and other international frameworks to evaluate recording locations in the context of biodiversity, conservation priority, and heritage designation. Signal processing methods include the noise reduction methodology with pink residual noise shaping, the layered sonic time-lapse process, and spherical harmonic encoding, decoding, and binaural rendering using the SPARTA plugins. Archival and dissemination methods describe the dual Zenodo community structure, the YouTube channel with spectrogram video, and the sound map linking recording locations to both platforms.

The Results section presents the current extent of the Ambisonic Earth collection: approximately 500 recordings totaling over 600 hours, spanning nine of fourteen RESOLVE terrestrial biomes and thirty-five ecoregions. Recording sites are assessed against global datasets including protected areas, Key Biodiversity Areas, Ramsar Wetlands, UNESCO designations, and indigenous territories, with notable recordings highlighted for their ecological, cultural, or documentary significance. The section reports the current state of archival outputs across Zenodo, YouTube, and the interactive sound map.

The Conclusion summarizes the contributions of this work, reflects on the argument for ecological soundscape documentation as heritage, and outlines plans for future work including postdoctoral research, community engagement, expanded recording in global key biodiversity areas, continued development of the Raspberry Pi field recorder.

2. BACKGROUND

This work rests on a foundational conviction that it is worth recording, archiving, and making accessible the soundscapes of biodiverse ecosystems in immersive spatial audio. The following sections develop this argument across three areas: why ecological soundscapes warrant recognition as heritage, how ambisonics preserves the spatial structure on which immersive experience depends, and why open-data infrastructure is necessary for durable public access.

2.1. A Heritage Under Threat

Ecological soundscapes — which may be considered as the collective acoustic output of living organisms, geophysical processes, and human activities within a habitat — encode information about species interactions, ecological integrity, and evolutionary relationships. They are also being irreversibly degraded. This section establishes the interdisciplinary perspectives through which ecological sound has been studied, documents the scale of the biodiversity crisis that is silencing ecosystems, and argues that soundscapes warrant recognition as intangible heritage.

2.1.1. Interdisciplinary Perspectives

The exploration of ecological sound sits at the intersection of a dizzying array of interdisciplinary perspectives, including acoustic ecology (Schafer, 1970, Schafer, 1977; Truax, 1978), soundscape studies (Schafer, 1973; Truax, 1974), soundscape ecology (Truax, 1978; Pijanowski et al., 2011a; Pijanowski et al., 2011b; Truax & Barrett, 2011; Farina, 2014),

ecoacoustics (Burtner, 2005; Monacchi, 2008; Sueur & Farina, 2015; Farina & Gage, 2017), bioacoustics (Busnel, 1963; Lewis, 1983; Krause, 1987), conservation bioacoustics (Cornell University, n.d.-a; Rice et al., 2023), conservation acoustics (Ritts & Bakker, 2021), soundscape conservation (Dumyahn & Pijanowski, 2011), soundscape composition (Truax, 2002; Westerkamp, 2002), environmental sound composition (Truax, 1996), environmental sound art (Bianchi & Manzo, 2016), ecological sound art (Gilmurray, 2016; Gilmurray, 2017; Barclay, 2019), ecomusicology (Rehding, 2002; Allen & Dawe, 2016; Pedelty et al., 2022), ornithomusicology (Szőke, 1963), zoomusicology (Mâche, 1983/1992; Martinelli, 2002; Keller, 2012), interspecies music (Rothenberg, 2015; Kass, 2024), sonic heritage (Müske, 2010; Birdsall, 2016; Monacchi 2017), and sensory heritage (Parker et al., 2024a; Parker et al., 2024b, Lindborg et al., 2025a), to name a few.

Acoustic ecology can be considered the foundational discipline in the study of soundscapes, emerging through the work of R. Murray Schafer and members of the World Soundscape Project (WSP) at Simon Fraser University in the 1970s (Droumeva & Jordan, 2019; Truax, 2019). Building on its early focus of drawing attention to the degradation of acoustic environments by industrial noise (Schafer, 1970), the WSP developed a perceptual vocabulary that remains influential. The concept of soundscape was generally interpreted in an anthropocentric context, as “an environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society” (Truax, 1978), a perspective that has been retained in its definition by the International Organization for Standardization (2014). Schafer (1977) distinguished “hi-fi” soundscapes, in which acoustic diversity is rich and individual sounds can be perceived with clarity, from “lo-fi” soundscapes, in which sounds mask each other indiscriminately. The group also explored the heritage role of “soundmarks,” or sonic analogues to landmarks, as “highly unique sounds specific to a certain

locale and often affectionately regarded by the public. Many are of historical importance and worthy of preservation as establishing a continuity between generations” (Truax, 1974, p. 38). Acoustic ecology encouraged practices such as “soundwalks” and “ear cleaning” to heighten awareness of one’s sonic surroundings, and advocated for what Schafer termed “acoustic design”: the idea that humans bear responsibility for composing the soundscapes they inhabit (Truax & Barrett, 2011). The field is fundamentally rooted in the humanities, centering the listener’s subjective experience and the cultural dimensions of sound environments. Its institutional home is now the World Forum for Acoustic Ecology, and its legacy includes the detailed vocabulary from which subsequent, more science-oriented disciplines continue to draw.

Soundscape ecology was proposed by Pijanowski et al. (2011a; 2011b) as a subdiscipline of landscape ecology, focused on how biological, geophysical, and anthropogenic sounds integrate across spatial and temporal scales to reflect coupled natural-human dynamics. While “soundscape ecology” appeared in Truax’s *Handbook for Acoustic Ecology*, with the entry for “acoustic ecology” actually redirecting to this term (Truax, 1978, p. 126), Pijanowski et al. explicitly distinguished their science-driven enterprise from the humanities orientation of acoustic ecology. The field formalized the tripartite classification of environmental sound first articulated by Krause (1987) as: biophony, the sounds produced by living organisms; geophony, the sounds of abiotic geophysical processes such as wind, water, and geological activity; and anthrophony, the sounds of human activities and technologies (Pijanowski et al., 2011a, p. 1214). A closely related discipline, ecoacoustics, was formalized in 2014 with the founding of the International Society of Ecoacoustics (Sueur & Farina, 2015), though the term had appeared earlier in artistic contexts — Burtner (2005) used it for compositional techniques derived from environmental processes, and Monacchi (2008) applied it to compositions interacting with recorded ecosystems. The two fields share the tripartite classification but differ in scale and

orientation: soundscape ecology operates at the landscape level, inheriting the pattern-process framework of its parent discipline (Pijanowski et al., 2011a, pp. 1216–1217), while ecoacoustics spans from individual species to entire soundscapes and engages more explicitly with heritage preservation and artistic practice as vehicles for public engagement (Farina, 2019; Monacchi, 2016; Monacchi & Krause, 2017).

The current work may be situated most appropriately within the field of ecoacoustics, given its focus on the acoustic structure of biodiverse ecosystems at varied scales and its engagement with sonic heritage and artistic practice. But nomenclature is not what's important here. As phrased by Kate Soper (1995, p. 151), "it is not language that has a hole in its ozone layer." Biodiversity is in crisis, and ecological soundscapes are being silenced alongside the organisms that produce them. The urgency of that crisis, to which we now turn, requires support from all available disciplines across science, culture, and the arts.

2.1.2. Biodiversity Loss and the Imperative for Documentation

The organisms whose vocalizations constitute biophony — birds, frogs, insects, bats, mammals — are disappearing at rates that dwarf evolutionary baselines, a pattern widely described as the sixth mass extinction (Ceballos et al., 2015; Cowie et al., 2022; Kolbert, 2014; The Nature Record, 2026; WWF, n.d.). Biodiversity, as defined by the United Nations Convention on Biological Diversity, encompasses variability among living organisms at every level: within species, between species, and across ecosystems (United Nations, 1992, Article 2). It is this multilayered diversity — both the richness of species within an ecosystem and the distinctiveness of ecosystems themselves — that the present work seeks to document acoustically. The scale of its loss is difficult to overstate. Global wildlife populations have declined an average of 73% since 1970, as measured by the Living Planet Index across almost 35,000 populations of 5,495 species (WWF, 2024). The Millennium Ecosystem Assessment (2005)

concluded that humans have increased the species extinction rate by as much as a thousandfold over background rates. These figures may even underestimate the true scale of loss, since invertebrates, which constitute the vast majority of species and whose acoustic contributions remain least documented, are dramatically underrepresented in extinction assessments (Cowie et al., 2022, p. 640).

Within the United States, these losses are detailed by The Nature Record, a comprehensive assessment of U.S. lands, waters, and wildlife (The Nature Record, 2026). Originally commissioned as a federal effort, the assessment was disbanded in early 2025; more than 170 scientists then continued the work independently, releasing it as a public review draft in 2026 (Plumer, 2026). Its findings on terrestrial ecosystems explicitly support the sixth mass extinction framing, with 34% of U.S. plant species and 40% of animal species currently at risk of extinction and 41% of ecosystems at risk of range-wide collapse (The Nature Record, Ch. 8). The losses are concentrated among the dominant biophonic taxa. Nearly three billion birds have been lost in the continental U.S. and Canada since 1970, a 57% decline across all species groups, regions, and biomes (The Nature Record, Ch. 8). Amphibians, major contributors to the soundscapes of wetlands, forests, and tropical ecosystems, are among the most threatened vertebrate groups globally, with an estimated half of all species imperiled (The Nature Record, Ch. 8). These losses extend directly into the acoustic domain. Krause (2016) has reported that more than half of the North American soundscapes in his personal archive come from “whole ecoregions now altogether silent or so radically altered that they can no longer be heard in any of their original forms.” Soundscape degradation proceeds through multiple converging pathways: species extinction, habitat destruction, anthropogenic noise, and invasive species, all compounded by climate change disrupting the phenological patterns on which acoustic communities depend (Farina & James, 2016; Pavan, 2017; Sueur, Krause, & Farina, 2019).

The urgency of documentation is underscored by the fact that tropical ecosystems, which harbor the greatest biodiversity of any biome, remain among the most poorly represented in existing soundscape archives (Deichmann et al., 2018). Cowie et al. (2022) argue that scientists should adopt the practices of “preventive archaeology” and “document as many species as possible before they disappear” (p. 640). The present work extends this logic to the acoustic domain: if soundscapes are vanishing alongside the organisms that produce them, then recording those soundscapes before they are silenced is a form of preventive documentation — both as a record of what existed and as a means of drawing people closer to what remains.

2.1.3. Ecological Soundscapes as Intangible Heritage

If soundscapes encode evolutionary relationships, ecological integrity, and cultural meaning, and if they are being irreversibly transformed, then they warrant recognition as heritage. The importance of intangible cultural heritage, including sound, is recognized at the highest levels of international governance (UNESCO, 2017; UNESCO, 2024). World Heritage Site criteria encompass “outstanding biological and ecological processes” and “habitats critical to biodiversity conservation” (UNESCO, 1972). The United States National Park Service has treated natural soundscape preservation as essential to maintaining park resources (National Park Service, 2000). Soundscapes have come to be recognized as possessing “both ecological and social value” and as “natural resources worthy of study, management, and conservation” (Dumyahn & Pijanowski, 2011). Heritage discourse has historically privileged visual and material dimensions over the auditory (O’Connor, 2008), but growing scholarly attention to acoustics and intangible heritage is redressing this imbalance (Alvarez-Morales & Díaz-Andreu, 2024; Zhu et al., 2024; Lindborg et al., 2025b).

What makes ecological soundscapes especially compelling as heritage is not merely the sum of individual species vocalizations, but the relational structure of those vocalizations — the acoustic fabric of coevolution. The acoustic niche hypothesis, proposed by Krause (1992; 1993), holds that vocalizing organisms in established ecosystems divide the available acoustic space across frequency and time, treating the sound spectrum as a limited resource subject to competitive pressure. This hypothesis builds on the acoustic adaptation hypothesis, which demonstrated that habitat structure constrains the properties of animal vocalizations (Morton, 1975; Farina, 2014). Empirical support continues to accumulate across taxa: interspecific acoustic competition shapes tropical bird communication networks (Tobias et al., 2014), temporal avoidance strategies reduce overlap among tropical songbirds (Budka, Staniewicz, & Sokołowska, 2023), and coevolution between vocal signals and hearing sensitivity has been documented in forest mammals (Charlton et al., 2019). The resulting spectral and temporal partitioning means that a soundscape is not an arbitrary assemblage of sounds but a structured acoustic community whose internal organization reflects evolutionary pressures accumulated over deep time.

The dawn chorus offers perhaps the most vivid expression of this coevolutionary structure. Gil and Llusia (2020, p. 45) describe it as a communal display that likely involves the highest level of sound complexity found among animal signals. Each morning, species join the chorus in a sequence influenced by light sensitivity, eye size, foraging ecology, and social pressures, producing a layered composition in which interspecific and intraspecific signals are distributed across frequency and time (Gil & Llusia, 2020, pp. 50–53). The spectral and temporal coordination observed in dawn choruses, particularly in tropical ecosystems where circadian stability produces more regular and predictable acoustic niches (Monacchi, 2017, p. 85), represents exactly the kind of heritage that cannot be reassembled once it is disrupted. As

species drop out of a soundscape through extinction or displacement, the relational architecture of the chorus degrades in ways that are irreversible on any human timescale.

Monacchi's *Fragments of Extinction* project is motivated by the sixth mass extinction and the conviction that what is being lost is not merely a collection of individual species but the acoustic fabric of their coevolution. Monacchi and Krause describe the soundscapes of primary ecosystems as "the acoustic signatures of millions of years of evolutionary co-adaptation," now vanishing amid "one of the most catastrophic silent events of our times" (Monacchi & Krause, 2017, in Farina & Gage, 2017). To document what remains, Monacchi has recorded full circadian cycles of primary equatorial rainforests in the Amazon, Borneo, and Africa using up to 64-channel arrays for sixth-order ambisonics (mh acoustics, n.d.; Monacchi, 2013; Monacchi, 2016; Monacchi & Krause, 2017). He describes these soundscapes as "unique footprints of the systemic behaviour of healthy ecosystems" and argues that "soundscapes of pristine ecosystems should be taken as targets of patrimonialization in their own right," warranting urgent recording and preservation (Monacchi, 2017, p. 83). This emphasis on heritage preservation distinguishes Monacchi's approach from strictly scientific applications of passive acoustic monitoring and aligns it with the broader argument, shared here, that ecological soundscapes deserve documentation for what they are, rather than what their degradation might prove.

Recognizing ecosystems as heritage is not without complications. The patrimonialization of nature raises questions about who benefits, who determines management, and how local populations are consulted (Vaccaro & Beltran, 2010). Protected areas can produce unexpected consequences for the communities that inhabit or depend on them, from displacement to restricted access to traditional resources (West & Brockington, 2006), and the poorest rural populations are often the most directly dependent on biodiversity-based resources for subsistence and livelihood security (Vira & Kontoleon, 2012). These concerns extend directly

into acoustic documentation. McCartney (2016) identifies foundational ethical questions about working with soundscapes — consent, representation, and the politics of who records whom — that remain largely unresolved in the field. Robinson (2020) examines how colonial listening practices have shaped the documentation and theorization of non-Western acoustic environments. The CARE Principles for Indigenous Data Governance, centering Collective Benefit, Authority to Control, Responsibility, and Ethics, offer an actionable framework for navigating these responsibilities when recording on indigenous lands (Carroll et al., 2020). This work does not claim to resolve these tensions but proceeds with awareness of them, and the archival infrastructure described in later sections is designed with responsiveness to these concerns in mind.

2.2. Recording, Experiencing, and Valuing Sonic Heritage

If ecological soundscapes are heritage, then the technologies used to document them carry consequences for what is inherited. As Mücke (2010) argues, technology is the indispensable condition, or "*conditio sine qua non* for the fixing of sound and thus for the development of sound collections;" sounds are ephemeral by nature and can only enter into heritage processes when they exist in reproducible form. But the choice of recording format does more than determine fidelity, it determines which dimensions of an acoustic environment are admitted into the historical record at all. Spatial relationships that are not encoded at the time of recording cannot be reconstructed after the fact, meaning that a monophonic soundscape archive, however vast, preserves the temporal and spectral content of a soundscape while permanently discarding the spatial structure in which its ecological meaning is embedded. This section describes ambisonics as a spatial recording technology, establishes the perceptual and affective consequences of spatial fidelity, and examines how practitioners have deployed immersive recording for public engagement and ecological stewardship.

2.2.1. Ambisonics and the Preservation of Spatial Structure

Ambisonics is a framework for representing acoustic soundfields through spherical harmonic decomposition, enabling the capture, manipulation, and reproduction of three-dimensional sound environments (Zotter & Frank, 2019). The theoretical foundations were established by Michael Gerzon (1973), who demonstrated that a soundfield could be encoded into directional components corresponding to spherical harmonic basis functions. Rather than capturing discrete source directions, this encoding represents the continuous pressure and velocity characteristics of the soundfield, preserving the phase relationships that give an acoustic environment its spatial texture: the diffuse reflections, the sense of envelopment, and the subtle cues that distinguish one space from another. Because the encoding is format-agnostic, it can be decoded to arbitrary loudspeaker configurations or rendered binaurally for headphones. Higher-order ambisonics (HOA) extends spherical harmonic decomposition beyond the four channels of first-order, capturing finer spatial variations in the soundfield. Each increase in order narrows the effective beam width of the encoding, improving angular resolution, source localization, and the suppression of spatial aliasing artifacts.

What this means for ecological documentation is worth stating precisely. The spectral and temporal partitioning described by the acoustic niche hypothesis is also spatial. Species vocalize from different positions, distances, and elevations, and the physical structure of a habitat — its canopy density, its terrain, its water surfaces — shapes how those signals propagate, scatter, and decay (Farina, 2014). A monophonic recording collapses this three-dimensional acoustic community into a single point of observation; a stereo recording preserves a slice. Ambisonics, by encoding the full sphere, retains the directional relationships among simultaneous sources and the environmental acoustics that bind them. These are not incidental details; they are the spatial expression of the ecological relationships the recording

aims to document. At higher orders, the spatial resolution approaches what the human auditory system can resolve, meaning that the recording can reproduce the perceptual experience of standing in that environment with a fidelity that lower-order formats cannot.

Unfortunately, ambisonics is not particularly well suited for passive acoustic monitoring, the application most directly connected to conservation, due to its data volume per unit time and cost per array. The specialized hardware also limits scaling through citizen science or distributed sensor networks, where low-cost single-channel recorders dominate. The value of ambisonics for ecological documentation therefore rests not on its scalability but on something that more scalable methods do not provide: the capacity to produce recordings that preserve the spatial structure of an acoustic environment faithfully enough that a listener, encountering the recording perhaps decades later, can experience something approaching the perceptual richness of having been there.

2.2.2. Presence and Wellbeing

Presence, the subjective sense of "being there" in a mediated environment, is the perceptual mechanism through which spatial fidelity becomes consequential. Bystrom, Barfield, and Hendrix (1999) proposed that presence depends on the degree to which the spatial, auditory, and haptic transformations in a mediated environment match those of the real world: the closer the correspondence, the more the listener's perceptual system treats the mediated environment as real, and the more fully the listener inhabits it. This is not a metaphor. The sense of presence involves measurable shifts in attention, emotional response, and physiological state; it is the point at which a recording stops being something a person listens to and becomes an environment a person listens within.

The relationship between presence and emotion is bidirectional. Perceptual cues elicit emotional reactions, and those emotional reactions in turn deepen the sense of presence (Diemer et al., 2015). This feedback loop has physiological consequences. Van Praag et al. (2017) demonstrated that listening to naturalistic sounds shifts default mode network connectivity and increases parasympathetic nervous system activity, providing a neurophysiological basis for restorative effects previously documented only behaviorally. A meta-analysis by Buxton et al. (2021) confirms aggregate evidence that natural sounds decrease stress and annoyance and improve health outcomes, concluding that "natural sounds provide important ecosystem services." Ratcliffe (2021) narrows the finding: the sounds most consistently associated with restoration are birdsong, wind, and water; precisely the biophonic and geophonic components often documented through ecological recording. Critically, these benefits are not limited to being physically present in a natural environment. Bates et al. (2020) argue that recorded soundscapes should be "understood on their own terms rather than as 'less than' or a simulation of natural environments." Kjaer et al. (2025) lend empirical support to this position, finding that exposure to natural soundscapes induces awe and that awe significantly predicts pro-environmental intent through fostering "connectedness with nature." Participants hearing recorded whale vocalizations showed no significant difference in awe levels compared to those hearing the soundscape in situ.

Together, these findings suggest a perceptual chain with potential implications for the role of ambisonic field recording in conservation. Higher spatial fidelity contributes to a stronger sense of presence. Greater presence is associated with deeper emotional responses. Emotional engagement fosters connectedness to nature — and connectedness to nature is, as a growing body of evidence suggests, a reliable predictor of pro-environmental behavior (Guazzini et al., 2025; Taylor, 2024; Santoso et al., 2025). The spatial information that ambisonics

preserves is therefore not an audiophile luxury; it is a perceptual substrate on which ecological engagement is grounded. A recording that discards spatial structure does not merely sound less realistic — it forecloses the very mechanism through which recorded environments produce the empathetic and behavioral responses that conservation requires.

2.2.3. Engagement and Stewardship

The perceptual chain described above, from spatial fidelity through presence to emotional engagement, gains significance from a further link between emotional engagement and conservation-relevant behavior. The evidence here is growing but not yet definitive, and most studies do not isolate spatial audio as a variable. What they do establish is that the kinds of experiences ambisonics is uniquely positioned to produce — immersive, emotionally resonant encounters with ecological environments — are associated with measurable shifts in attitude and intent.

A systematic review of 29 studies confirmed a "significant and positive relationship" between connectedness to nature and pro-environmental behaviors (Guazzini et al., 2025, p. 1). Taylor (2024) argues that the "robust link between nature connectedness (including soundscapes) and pro-environmental behaviour" should be drawn upon more widely to validate creative and ecological sound practices (p. 24). Santos et al. (2025) demonstrated that virtual reality experiences of climate-affected locations reduce psychological distance and heighten climate concern, with effects strongest for geographically distant locations; a finding with direct relevance to recordings of remote ecosystems listeners may never visit. At the same time, Americans are increasingly disconnected from nature, a trend termed "the extinction of experience" (The Nature Record, Ch. 13), underscoring the need for technologies that can

deliver meaningful encounters with ecological environments to populations whose direct access is limited.

These findings do not prove that ambisonic field recording will produce conservation outcomes. But they do suggest that the qualities ambisonics preserves — spatial structure, envelopment, perceptual realism — are precisely those associated with the emotional and attitudinal responses that conservation depends on. Various practitioners have tested this proposition through sustained creative and institutional work.

Leah Barclay's *Biosphere Soundscapes* project engages communities and ecosystems through immersive recording in UNESCO biosphere reserves, combining scientific documentation with artistic practice and public outreach (Barclay, 2014; Barclay & Gifford, 2017; Barclay, 2019). Barclay frames acoustic ecology as a broadly accessible field capable of mobilizing communities around climate concerns, treating her creative works not as endpoints but as “catalysts embedded within larger participatory research programs” (Barclay, 2019). The *Listen* project, led by Paine and Barclay, established what the authors describe as “the largest database of ambisonic and stereo field recordings of the Southwestern landscapes of the United States,” designed not only to archive sound but to explore how “virtual environmental engagement through media arts and sound can cultivate environmental awareness and community agency” (Paine et al., 2015c).

Francisco López (1998a) has challenged the instrumentalization of nature recordings, arguing that ecological sound deserves engagement as “sound matter” in its own right rather than as a documentary tool or wellness commodity. He acknowledges that surround sound technologies offer compelling spatial envelopment but argues that these techniques produce something closer to “hyper-realism rather than realism” (López, 1998a). Krause (2016) reaches a

parallel conclusion, noting that “the primary goal of any natural sound recording I produce is the creation of an illusion that conveys a strong sense of place.” López’s observation is well taken: microphones are non-neutral interfaces, and the noise reduction and time-lapse methods described in this work explicitly produce enhanced experiences. But hyper-realism and documentation need not be in conflict. Rather than concealing these transformations, this work acknowledges them, maintaining that processing which heightens a listener’s perceptual access to an environment can serve documentary aims rather than undermining them. The heritage value of a soundscape is not diminished by making it more vividly available to those who were not there. Whatever one’s stance on the aesthetic or representational status of field recordings, the prerequisite for any engagement is that the recordings exist and that people can access them. Despite the demonstrated value of these practitioners’ work, their soundscape archives are, in various ways, inaccessible; a pattern documented in the following section.

2.3. Making Sonic Heritage Accessible

The preceding sections established that ecological soundscapes encode irreplaceable information about ecosystems under threat, that spatial structure is a meaningful dimension of that information, and that ambisonics can preserve it in ways that monophonic and stereo recording cannot. Yet this point is moot if the recordings themselves cannot be found or accessed. Müske’s (2010) insight applies with equal force to the archival stage: if technology is the indispensable condition for fixing sound, then infrastructure is the indispensable condition for keeping it fixed — ensuring that what was captured remains available to listeners, researchers, and practitioners across the timescales over which heritage accrues its value. A recording stored on a personal hard drive, hosted on an unstable website, or not made available online effectively does not exist for the audiences it was meant to serve. This section surveys the

state of soundscape archival, outlines the principles of open data, and identifies the gap that *Ambisonic Earth* is designed to address.

2.3.1. Inaccessible Archives

Long-term scientific study, cultural preservation, and public experience of ecological environments all depend on recordings that are stored in stable, findable locations and in formats that remain usable over time. In practice, inaccessibility is pervasive across existing soundscape collections, even those produced by the practitioners whose work most compellingly demonstrates the value of ecological recording. Krause's Wild Sanctuary site offers "Biophony™ Albums" for sale (Wild Sanctuary, n.d.-b), but no access to his "vast and important collection of whole-habitat field recordings and precise metadata dating from the late 1960s." These over 4500 hours of recordings are inaccessible as sonic heritage, only made worse by the fact that "Fully half of the natural soundscapes in this rare set are from habitats that no longer exist, are radically altered because of human endeavor, or have gone altogether silent" (Wild Sanctuary, n.d.-a). Monacchi's *Fragments of Extinction* site offers only short binaural excerpts without downloadable multichannel files (Monacchi, n.d.). The *Listen*" website is only partially functional, with a blank home page that offers no means of navigating to subpages without reaching them by other means (Paine et al., 2015a; Paine et al., 2015b). The soundscape archive link at the Center for Global Soundscapes archive is broken (Center for Global Soundscapes, n.d.); and at the time of writing, the link to Francisco López's sound archive redirects to a sports gambling website (López, n.d.). In each case, work of significant artistic and scientific value is effectively nonexistent to the audiences, researchers, and future practitioners who might benefit from it. The irony is pointed: a body of practice organized around the urgency of documenting disappearing soundscapes has yet to solve the problem of its own persistence.

Functional soundscape archives do exist, and they demonstrate that the infrastructure problem is solvable. The Macaulay Library at the Cornell Lab of Ornithology provides an extensive, well-maintained collection of animal sound recordings (Cornell Lab of Ornithology, n.d.). Xeno-canto is a collaborative platform for sharing bird sounds worldwide (Xeno-canto Foundation, n.d.). Freesound hosts user-contributed audio including field recordings with spatial metadata (Universitat Pompeu Fabra, n.d.). Aporee is a collaborative sound mapping platform integrated with the Internet Archive (Noll, n.d.). Ecosounds, maintained by the QUT Ecoacoustics Research Group, manages long-duration environmental audio (QUT Ecoacoustics, 2026). Additional platforms include Cities and Memory (Fowkes, 2025), Dawn Chorus (Naturkundemuseum Bayern & BIOTOPIA Lab, n.d.), and Earth.fm (Earth.fm, n.d.). These resources collectively represent a substantial and growing investment in making ecological sound publicly available. However, they share a common limitation: virtually none feature multichannel higher-order ambisonic recordings available for download, with Freesound as the lone exception. The spatial dimension of soundscapes, the very dimension this work argues is ecologically and perceptually significant, remains almost entirely absent from the public archival record.

2.3.2. Open Data

If even established institutions and well-resourced practitioners struggle to maintain accessible archives, the case for open data practices is difficult to dismiss. The FAIR Guiding Principles provide an actionable framework: research data should be Findable (with persistent identifiers and rich metadata), Accessible (using open protocols and stated access conditions), Interoperable (featuring standard formats and vocabularies), and Reusable (providing clear licensing terms, provenance documentation, and community standards) (Wilkinson et al., 2016). These principles resonate with the broader mandate of national-scale nature assessment: The

Nature Record emphasizes that “accessibility, reusability, and transparency lead to datasets that live on beyond any one assessment product” (The Nature Record, Ch. 3). The CARE Principles for Indigenous Data Governance complement FAIR by centering Collective Benefit, Authority to Control, Responsibility, and Ethics in managing data pertaining to indigenous communities (Carroll et al., 2020); a concern directly relevant to the ethical questions of patrimonialization and colonial listening practices discussed earlier. Standardized approaches to soundscape recording and analysis have been advocated to promote interoperability (Darras et al., 2023), and FAIR platforms for bioacoustic data are under development (Homo et al., 2025).

Zenodo, a free and open-access repository operated by CERN, provides institutional stability that self-hosted platforms cannot match (Crespo Garrido et al., 2025). Its DOI assignment supports findability; its standardized metadata schemas support interoperability; and its thematic communities allow independently published outputs to be collected into coherent archives. For ecological sound archives, whose value may not be fully apparent for decades, this model of institutionally subsidized perpetual access addresses precisely the issues documented above: broken links and defunct websites. Zenodo does not require practitioners to maintain their own servers, fund their own web hosting, or solve the problem of long-term digital preservation independently. It externalizes those burdens to an institution whose mandate is durability.

2.3.3. Ambisonic Datasets on Zenodo

Several ambisonic datasets already hosted on Zenodo demonstrate that the platform can support the storage and distribution of large multichannel audio archives. The EigenScape database provides 64 fourth-order ambisonic recordings across eight acoustic scene classes — Beach, Busy Street, Park, Pedestrian Zone, Quiet Street, Shopping Centre, Train Station, and

Woodland — captured with the mh Acoustics Eigenmike em32 at 24-bit/48 kHz, totaling approximately 130 Gb in compressed form (Green & Murphy, 2017a; Green & Murphy, 2017b). The Ambisonic Recordings of Typical Environments (ARTE) database offers acoustically calibrated higher-order ambisonic recordings of 13 everyday environments, encoded from a custom 62-capsule array (Buchholz & Weisser, 2019; Weisser et al., 2019). The Urban Soundscapes of the World project has assembled first-order ambisonic recordings with simultaneous binaural audio and 360-degree video across cities including Montreal, Boston, Tianjin, Hong Kong, and Berlin (De Coensel et al., 2017; De Coensel et al., 2023; Sun et al., 2018).

These resources are valuable, and they are more durably accessible than many of the practitioner archives surveyed above. But a consistent gap persists across them: the datasets that offer open-access to high spatial resolution recordings document urban environments; while the practitioners whose work most compellingly demonstrates the value of immersive ecological recording — Monacchi, Barclay, and Krause — have not made their multichannel recordings on open-access platforms. None of the projects encountered in the current research combine higher-order ambisonic recording of biodiverse ecosystems with open access to multichannel files. This is the goal of *Ambisonic Earth*.

3. METHODS

The preceding sections have established that global biodiversity is under threat, that ecological soundscapes encode scientifically and culturally significant information, and that higher-order ambisonics offers a powerful means of spatially documenting and disseminating these soundscapes. However, the potential of ambisonic ecological recording remains largely unrealized due to fragmented archival practices and high barriers. The *Ambisonic Earth* project aims to address these gaps by making higher-order ambisonic recordings of biodiversity publicly accessible in a variety of formats on multiple platforms, while outlining replicable methods by which others may engage in these practices.

This section outlines the methods adopted for recording, signal processing, archival, and dissemination of ecological soundscapes in this work. Contributions of particular interest include a replicable system for long-form third-order field recording, including a Raspberry Pi-based recorder for low-cost capture with the ZYLIA ZM-1; a collection of GIS datasets by which potential recording sites may be identified in the context of global biodiversity and ecological heritage; a process for ambisonic noise reduction that shapes residual noise to a minimally obtrusive spectral slope of -3 dB per octave; a novel process for layered ambisonic time-lapse enabling long-form recordings to be experienced at condensed timescales; and the establishment of multiple avenues for public access to multichannel recordings and metadata via Zenodo, YouTube, and Google Maps.

3.1. Recording

Long-form field recording in higher-order ambisonics requires assembling a recording system that is robust and ideally straight-forward to operate. The more portable and reliable the system, the more likely one is to establish a regular recording practice and thus more actively document sonic heritage. With data to support an understanding of biodiversity at global and local levels, one can then more effectively apply their efforts to archiving and disseminating the soundscapes of ecosystems in need.

3.1.1. Technology

The recording system used in this project is centered around the ZYLIA ZM-1 third-order ambisonic microphone array (ZYLIA, n.d.-c). The unit features 19 omnidirectional MEMS capsules distributed over a rigid spherical housing, configured roughly in line with the vertices of a dodecahedron. The capsule that would correspond to the downward-facing vertex is omitted to allocate space for a mounting point.

Third-order ambisonics has been found to produce significant improvements in localization accuracy beyond first and second orders, with diminishing perceptual returns at higher orders (Huisman et al., 2021; Power, 2015). While Monacchi's *Fragments of Extinction* project employs the considerably more expensive fourth- and sixth-order Eigenmike arrays (Monacchi, 2013; Monacchi, 2016), the system described here aims to balance spatial resolution, cost, and portability in ways that make higher-order ambisonic field recording feasible for a broader range of practitioners. If one is to advocate for higher-order ambisonics as an accessible tool for global documentation of biodiversity, cost cannot be dismissed as incidental. Table 3.1 provides a thorough, though not necessarily exhaustive, list of commercially-produced

ambisonic microphone arrays available at the time of writing, for those interested in exploring other potential systems for ambisonic recording.

Table 3.1: Commercially-available ambisonic microphone arrays.

Order	Make	Model	Capsules
7	HD Audio 3D	M480	480
6	mh acoustics	em64 Eigenmike	64
4	mh acoustics	em32 Eigenmike	32
3	Harpex	spcmic	84
3	ZYLIA	ZM-1	19
2	Audio-Technica	BP3600	8
2	Brahma	Field 8	8
2	Core Sound	OctoMic	8
2	Reynolds	A-Type 8	8
2	Voyage Audio	Spatial Mic	8
1	Brahma	Zoom Pocket	4
1	Core Sound	TetraMic	4
1	miniDSP	ambiMIK-1	4
1	Reynolds	A-Type 4	4
1	RØDE	NT-SF1	4
1	Sennheiser	AMBEO VR Mic	4
1	SoundField	SPS200	4
1	SoundField	ST450 MKII	4
1	Soyuz	013 Ambisonic	4
1	Zoom	H3-VR	4
1	Zoom	VRH-8	4

In working with the ZM-1, analog-to-digital conversion is carried out on the array to transmit multichannel signals digitally via USB, such that recording can be performed with any laptop running a compatible digital audio workstation. In the field, however, the risks of regularly exposing a laptop to water, dirt, and the possibility of theft during unattended, long-duration recording can make laptop-based workflows impractical. At the time of procurement in 2022, ZYLIA offered the ZR-1, a dedicated 19-channel USB field recorder. While

still listed on the company's website, it does not appear currently available for purchase (ZYLIA, n.d.-d). At the time of writing, there are no other products or plans available for dedicated field recording with the ZM-1. To address this gap, a prototype multichannel field recorder built on the Raspberry Pi single-board computer has been developed, with code available in Appendix A and a system narrative as follows.

After installing the ZYLIA drivers for Raspberry Pi (ZYLIA, n.d.-b), a low-level connection to the ZM-1 may be established using the built-in "arecord" function for the Advanced Linux Sound Architecture (ALSA). A Bash command may then be executed to initiate 19-channel, 24-bit, 48 kHz capture, outputting raw PCM audio. A Python script then renders this audio to WAV files of uniform length, keeping file sizes small to allow for circadian recording. Handling this file segmentation in Python avoids discontinuities between files when "arecord" handles this process directly, as observed during testing. Passing raw PCM data to Python circumvents issues of WAV file headers from "arecord" being written as audio data. A relatively short file size of 60 seconds has been selected for rendering at this stage, such that this is the maximum duration of audio that can be lost if power or connection to the microphone are lost. Though not yet implemented, future development of this device will initiate recording on startup, enabling the shortest turn-around time to begin recording with the need for a display or peripherals.

All hardware for the recording system employed in this project is presented in Table 3.2, with proposed modifications noted with an asterisk. This list should not be interpreted as an endorsement of any specific brand or product, but merely as documentation of the system I have implemented for myself and believe may serve as a useful template.

Table 3.2: Components of current and proposed systems for circadian HOA field recording.

Component	Make	Model
Microphone array	ZYLIA	ZM-1
Windshield	Rycote	Windshield for ZYLIA ZM-1
Field recorder	ZYLIA	ZR-1
Field recorder*	Raspberry Pi	4 Model B
Battery	EcoFlow	RIVER 3
IP67 Case	Pelican	iM2300
IP67 Case*	Lykus	HC-2821
IP67 USB Port	CNLINKO	USB 3.0 Socket with Cable (2-Point Snap Fit) (0.3m)

A key feature of this system's design is the integration of an IP67 case and USB port to protect the field recorder and battery from the elements during recording. The cases above are sized for their respective field recorders and a 245Wh battery, which has been tested for over 30 hours of continuous recording. The ZM-1 array connects to the exposed USB port, while the cable inside connects to the recorder. Thus, the system can function while the IP67 case is closed, sealed, and locked with a padlock if desired, minimizing exposure of the battery and electronics to moisture. Figure 3.1 illustrates the compactness and portability of this system in two different settings and slightly modified configurations. As battery technology improves and smaller, longer-life models become available, the case may of course be sized to fit accordingly. As specified, the proposed system above weighs roughly 12 lbs. and occupies just over half of a cubic foot in volume. Additional, more generic components include a microSD card, microphone stand or tripod, mounting adapters as necessary, a USB-A to USB-Micro cable to connect the ZM-1 to the case, and a USB-C to USB-C to connect the battery to the Raspberry Pi. Since 24 hours of recording with the ZM-1 produces more than 250 Gb of uncompressed audio,

a 500 Gb or 1 Tb card should be considered. Including an Apple AirTag or similar GPS device in the case is also highly recommended to locate one's equipment if moved. While any of these components and ideas should be adapted to suit one's needs, this system may serve as a stable and replicable baseline for circadian recording with higher-order ambisonics.



Figure 3.1: Site documentation of HOA recording system.

3.1.2. Site Selection

This project adopts a site selection methodology that may be described as a cross-sectional with longitudinal potential: sampling a broad range of spatially and ecologically distinct environments while leaving open the possibility of revisiting sites over extended time intervals. Given the relative cost of ambisonic recording equipment and the volume of data it produces, other technologies designed for passive acoustic monitoring, such as the Audio Moth (Open Acoustic Devices, n.d.), may be more effective for continuous longitudinal study that allows for generalization of findings at any given site. The present work prioritizes recording over a range of biomes, ecoregions, and habitat types, with the goal of documenting high biodiversity both within and across environments. Site selection is informed by the classification

system outlined for soundscape conservation (Dumyahn & Pijanowski, 2011), where this project seeks out natural quiet, sensitive, threatened, unique, and representative soundscapes over the cultural, recreational, and everyday. While these guidelines are flexible, recording cultural or otherwise interesting soundscapes as opportunities arise, they are meant to prevent this project from becoming overwhelmed with data that doesn't further the goal of documenting the acoustic structure of ecological systems.

At the local scale, this project aims to inform site selection based on acoustic communities or sonotopes as encountered in the field (Truax, 1984; Farina, 2014). A sonotope may be defined as "a spatially unique 'sonic patch' of uninterpreted sonic information" (Farina et al., 2024), or the smallest unit of an acoustic community. In practical terms, some geophysical feature of an environment, such as a dense patch of trees or a still pool of water, may create the conditions for a unique ecological configuration to arise. Situating the microphone near such a community without disturbing it, can then provide a more spatially-distributed and immersive experience of the ecosystem. Variations in microclimate can help identify where these pockets may be located, especially when attempting to predict in the evening where they will arise in the morning. Natural barriers such as terrain features, vegetation, or rock formations can be used where possible to attenuate wind or persistent anthropophony or geophony if desired. The array is generally oriented such that loud or persistent sound sources fall directly at the front or back of the soundfield, with one potential approach being to place biophony or geophony ahead of the array and anthropophony behind. While the soundfield can always be rotated in post-production, establishing a consistent default orientation reduces processing time across the archive. Sources of interest are ideally positioned at roughly equal distances or levels relative to the array to avoid disproportionate dominance by any single source. Array height and distance to sources are adjusted according to the character of the recording: a "panoramic" approach,

with a generally raised array height, is adopted when the goal is to capture the broad spatial distribution of an acoustic community surrounding the microphone, while a "closeup" approach, with array height and position set relative to a primary source of interest, is used when the aim is to document a particular organism or sound source in greater spatial detail. Figure 3.2 illustrates these "panoramic" and "closeup" approaches in the context of two environments, aiming for a wide perspective to maximize direct sound received from across a wetland while zooming to experience the sonotope of a particular bush.



Figure 3.2: Site documentation of (a) "panoramic" and (b) "closeup" recordings.

At the global scale, this project uses datasets featured by UNESCO to evaluate potential recording sites in the context of global biodiversity and ecological heritage. These datasets, available for navigation in the "Advanced" table of the UNESCO Sites Navigator (UNESCO, n.d.-c) include the World Database on Protected Areas (WDPA), Ramsar Wetlands of International Importance, RESOLVE Ecoregions and Biomes (Dinerstein et al., 2017), Key Biodiversity Areas, and the Biodiversity Intactness Index. UNESCO World Heritage Sites are

selected based on a range of criteria that include outstanding examples of biodiversity and ecological processes (UNESCO, n.d.-a), in what could be considered a singularly clear guide to sites of ecological heritage. While one can filter by selection criteria on UNESCO's interactive map (UNESCO, n.d.-e), they cannot easily be filtered on the corresponding interactive world heritage list (UNESCO, n.d.-d). Due to the import of these sites, Appendix B provides a hyper-linked list of all UNESCO World Heritage sites selected on the basis of ecology and biodiversity, criteria IX and X. UNESCO Biosphere Reserves provide another lens for considering global ecology in its relation to human communities (UNESCO, n.d.-b; UNESCO, n.d.-f). Additionally, CEPF terrestrial biodiversity hotspots, WWF Global 200 ecoregions (Olson & Dinerstein, 2002), and Intact Forest Landscapes (Watson et al., 2018) may be used to identify large-scale regions of greater priority for documentation and conservation.

Table 3.3: ArcGIS layers related to global ecology, biodiversity, protected areas, natural heritage, and indigenous territories.

Dataset	Publisher (Curation)	Server URL
RESOLVE Ecoregions and Biomes	Esri (Authoritative) (Living Atlas)	https://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/Resolve_Ecoregions/FeatureServer
WDPA - World Database of Protected Areas	UN Environment World Conservation Monitoring Centre (Authoritative) (Living Atlas)	https://services5.arcgis.com/Mj0hjkNtV7NRhA7/arcgis/rest/services/WDPA_v0/FeatureServer
UNESCO Natural and Mixed World Heritage Sites	World Wide Fund for Nature (Authoritative)	https://wwf-sight-maps.org/arcgis/rest/services/Global/World_Heritage_Sites/MapServer
Biodiversity Intactness Index 1970 to 2050	Esri Environment (Living Atlas)	https://tiledimageservices.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/biodiversity_loss_1t/ImageServer
CEPF terrestrial biodiversity hotspots 2016	ArcGIS StoryMaps (Authoritative)	https://services.arcgis.com/nzS0F0zdNLvs7nc8/arcgis/rest/services/Terrestrial_biodiversity_hotspots/FeatureServer

Table 3.3: ArcGIS layers related to global ecology, biodiversity, protected areas, natural heritage, and indigenous territories. (Continued)

Dataset	Publisher (Curation)	Server URL
Indigenous Territories (Native Land Digital)	Rudo Kemper (Living Atlas)	https://services6.arcgis.com/SC70xY1nSLm15pYn/arcgis/rest/services/Native_Land_Digital_territories/FeatureServer

3.2. Signal Processing

Ambisonic field recordings inherently require signal processing to be properly experienced, encoding A-format microphone signals to spherical harmonics, which may then be decoded to multichannel loudspeaker feeds or rendered binaural headphone signals. Beyond these steps, additional processing can substantially enhance the utility and experiential quality of the recordings. Noise reduction can attenuate broadband recording system noise that would otherwise compromise the sense of presence for listeners, minimizing artifacts that make the technological mediation of the acoustic environment explicitly audible. The noise reduction techniques employed in this project thus far are outlined, including a novel process to shape the residual noise of the recording system to match a pink noise spectrum, such that it blends more effectively into the background of the field recordings. Another novel process is presented for layered sonic time-lapse (LSTL), sampling and layering all acoustic activity from long-form recordings into spatially coherent experiential summaries at timescales more conducive to human attention and pattern recognition. Approaches to ambisonic encoding, decoding, and binaural rendering are then discussed to ensure prospective users have the appropriate tools to listen to the recordings archived through this work.

3.2.1. Ambisonic Noise Reduction

Noise reduction may be viewed as a key step in increasing listeners' sense of presence within ambisonic reproductions of recorded environments (Lessiter & Freeman, 2001; Lindquist et al., 2020). As applied in this project, noise reduction is used solely as a means of minimizing the audibility of broadband electrical noise introduced by the recording system, not environmental sound of any kind, regardless of source or perceived desirability. In quiet ecological environments, system noise can serve as a persistent reminder that one is listening to a recording, detracting from the experience of the material as a spatial acoustic environment in its own right. Noise reduction may be particularly impactful when working with less expensive recording equipment, such that an understanding of these techniques could be considered as broadening access to the production of higher-quality ambisonic recordings of global biodiversity. Georgiou et al. (2024) note the relatively high noise floor of the ZYLIA ZM-1, but do not address it since it was deemed imperceptible in their recordings of urban soundscapes. This becomes a greater issue, however, when recording quiet or “high-fidelity” (Schafer, 1977) ecological environments.

The literature on noise reduction as applied to ambisonics is sparse but present, with academic treatments often exploring the reduction of unwanted sound within an environment (Herzog & Habets, 2020; Borrelli et al., 2018). Reduction of recording system noise has tended to receive more informal coverage on personal websites and discussion boards (Farina, 2020; Lossius, 2016; Pisano-Riise, 2022). Two related patents have also been identified for consideration in future work (Grosche & Kechichian, 2017; Salehin & Sen, 2021). The current work carries out noise reduction in A-format using the Spectral De-noise tool in iZotope RX, which may be considered the industry-standard for noise reduction. The tool has been described by iZotope as not introducing variation in phase delay (Beaudoin, 2016), such that it

is appropriate for processing of A-format signals, while also enabling residual noise shaping central to this work. A novel process is presented for shaping residual noise to approximate a pink noise slope of -3 dB per octave, a spectral profile that may be considered as perceptually-balanced and ubiquitous in natural systems (Bies, 2018; Voss & Clarke, 1978), with the intention of blending remaining system noise unobtrusively into the background of ecological recordings. The sections that follow detail ambisonic noise profiles, de-noising parameters, the pink residual noise shaping process, and a batch processing workflow that has allowed this approach to scale to long-form, multichannel field recordings.

3.2.1.1. Noise Profiles

A “noise profile” may be interpreted in both the time and frequency domains as the region of a recording containing only the “noise” one wishes to reduce (iZotope, n.d.), or the spectral average of that region after analysis. To “learn” a noise profile, in the language of iZotope, is the process of analyzing the time domain signal to produce a frequency domain representation that is then used for subsequent processing. The term “noise profile” is typically used in more practical contexts, with “noise” in this usage corresponding to Schafer’s definition of “unwanted sound” (1977), considering that one explicitly defines the unwanted frequency content in a signal to reduce through spectral subtraction (Boll, 1979; Benesty et al., 2012). Throughout this discussion, the term “noise” will refer to “self-noise” of the recording system, or “...the signal the microphone [or recording system] produces of itself, even when no sound source is present” (Neumann, n.d.; International Electrotechnical Commission, 2018), since noise reduction in this project is employed exclusively to attenuate such self-noise from the ambisonic microphone array. While microphones are certainly not neutral interfaces (López, 1998a; Sterne, 2003), lowering the noise floor of the recording system can help improve clarity in ambisonic

reproduction by reducing persistent artifacts and unmasking sound present in the original acoustic environments.

In the context of ambisonics, a suitable noise profile may be produced as follows. Record with the ambisonic microphone array and field recorder in question in or the quietest location to which one has access or a soundproof container (Neumann, n.d.). Identify the region in time of the recording where the self-noise of the recording system is best isolated across all channels. Audacity, a free and open-source audio editor (Audacity Team, n.d.), can be an effective tool for this task since it allows for spectrogram display of independent signals within multichannel files. Trim this portion of the file and render as a multichannel file for future reference. Concatenate all channels of this selection into a monophonic signal to render a noise profile representative of the entire array. Finally, use the iZotope RX Spectral De-noise plugin to learn the average spectrum of this composite noise profile. This frequency domain noise profile can now be used for subsequent processing. While processing channels independently could produce more precise results, it was deemed infeasible for this project after repeated issues recovering 19 sets of Spectral De-noise presets in iZotope RX. Working from a composite noise profile also ensures that any acoustic energy from the environment is treated similarly across channels, rather than as channel-specific spatial information. Construction of a custom soundproof container, illustrated by Neumann (n.d.) as a sealed metal pipe with vibration-isolating suspension, could help reduce spatial differences in the ambisonic array, though this approach was not pursued.

Candidate noise profiles for this project were recorded in three locations: the Hoh Rainforest on the Olympic Peninsula of Washington State, the anechoic chamber at Orfield Laboratories, and the Ancient Bristlecone Pine Forest in Inyo National Forest, California. The recording location in the Hoh Rainforest was only a few miles from Gordon Hempton's "One

"Square Inch of Silence" (2009), a site and project raising awareness of the scarcity of natural quiet. The anechoic chamber at Orfield Laboratories was awarded as "The quietest place on Earth" by Guinness World Records (2021). The Ancient Bristlecone Pine Forest in the eastern Sierra Nevadas is home to the Methuselah tree, considered the world's oldest living non-clonal organism, confirmed as over 4,850 years in age (Schulman, 1958; Westover, 2011; Brown, n.d.). The isolation that has likely aided this tree in its millennia of survival is clearly significant, as this site is where I managed to obtain a recording with the lowest noise floor across the broadband spectrum. Figure 3.3 illustrates a comparison of the best composite noise profile spectra identified from recordings at these three sites, as visualized in the Spectral De-noise tool. Figure 3.4 shows photos from these sites for additional context.



Figure 3.3: Noise profile spectra from (a) the Hoh Rainforest, (b) the anechoic chamber at Orfield Laboratories, and (c) the Ancient Bristlecone Pine Forest.

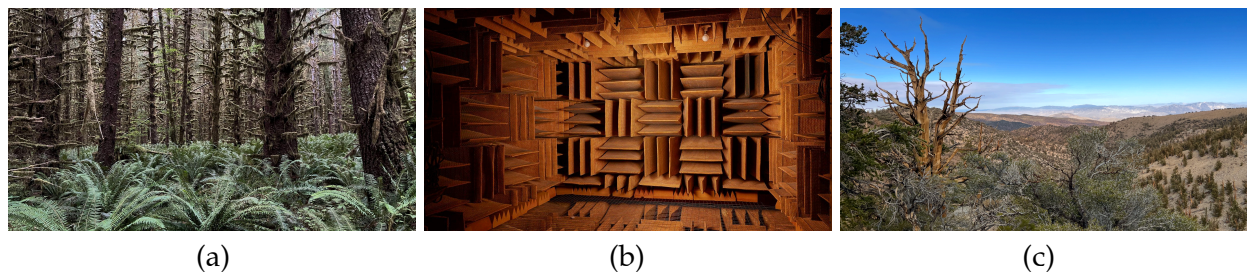


Figure 3.4: Photos from (a) the Hoh Rainforest, (b) the anechoic chamber at Orfield Laboratories, and (c) the Ancient Bristlecone Pine Forest.

Figure 3.5 shows a spectrogram of the final composite noise profile, with clear spectral uniformity across channels that supports the approach of using a single profile for processing, at least in the case of this array. All recordings in this project have been captured at the same level, unamplified upon output from the ZM-1, such that all content can be processed with this same noise profile. The multichannel and monophonic composite versions of this noise profile will be made available as part of the current archive, so anyone with a ZM-1 can implement this noise reduction approach to the level of fidelity outlined here, to the extent of similarity of self-noise in the arrays.

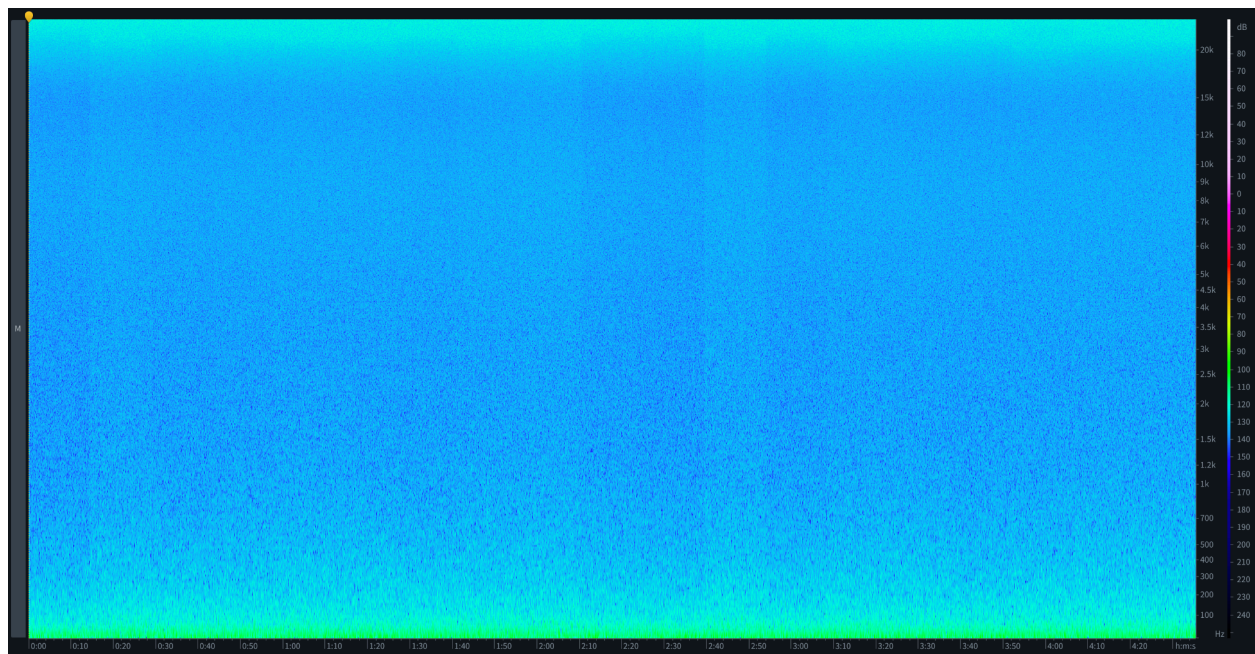


Figure 3.5: Spectrogram of composite noise profile from all channels of ZM-1 array.

3.2.1.2. Residual Noise

Residual noise can be understood as the noise floor that remains after de-noise processing (iZotope, n.d.). Through residual noise shaping, the spectrum of that residual noise can be sculpted to fit a desired target contour. In speech enhancement, Shin et al. (2007)

proposed shaping residual noise to a perceptually comfortable target, less objectionable to listeners than the artifacts that can arise from aggressive broadband suppression. Pink noise, also known as $1/f$ noise, is a signal whose power spectral density is inversely proportional to frequency, decreasing at a rate of approximately 3 dB per octave. Because each octave carries equal energy, and the human auditory system resolves frequency on an approximately logarithmic basis, pink noise may be perceived as more balanced than other noise types, such as white or Brownian noise, and is often used as a reference signal in musical and architectural acoustics and sound system calibration (Bies et al., 2018; Hosch, n.d.). The $1/f$ spectral structure has been observed across a remarkably diverse range of physical, biological, and electrical systems, from ionic solutions to nerve membranes to vacuum tubes (Voss & Clarke, 1975), as well as the dynamics of rural and urban soundscapes (De Coensel et al., 2003; Yang et al., 2015). Air, ground, and foliage all as low-pass filters (International Organization for Standardization, 1993; Aylor, 1972; Martens, 1980), shaping environmental sound toward decreasing power spectral density. Thus, shaping residual noise to a $1/f$ target contour can cause any remaining self-noise to mimic natural systems in a perceptually-balanced way, such that it blends into the background of recorded soundscapes rather than drawing attention to itself as an artifact of technological mediation.

To set the stage for this implementation of pink residual noise shaping, the parameters used for noise reduction in the Spectral De-noise tool of iZotope RX 11 are as follows. “Adaptive mode” is disabled since a stable noise profile of recording system self-noise has been learned. Figure 3.6(a) shows the Spectral De-noise interface as “Reduction” is introduced, reducing values of the yellow residual noise curve by a constant in relation to the orange noise profile curve. A relatively high value of 18 dB is currently used in this work based on close listening

tests and high confidence in the isolation of the noise profile. One will likely want to begin with less reduction if the precision of the noise profile is unclear.



Figure 3.6: Spectral De-noise interfaces in iZotope RX 11, showing the introduction of (a) “Reduction” and (b) “Whitening.”

The lowest “Threshold” value of -6.0 is set, as the Spectral De-noise documentation states that, “Lower threshold preserves low-level signal details” (iZotope, n.d.). All processing decisions aim to follow this logic of maintaining detail, minimizing artifacts, and reducing abrupt changes in processing. “Artifact control” is set to 0.0, or “Musical noise,” such that noise reduction relies on spectral subtraction rather than gating (iZotope, n.d.). Algorithm behavior “Smoothing” is set to a value of 10.0 for maximum reduction of musical noise artifacts. “Algorithm” is set to its most intensive setting of “Adv.+Extr.,” with “Multi-resolution” FFT enabled to minimize the smearing of transients while achieving high-frequency resolution where needed (iZotope, n.d.). “Knee” is set to 0.0 to prevent abrupt transitions between identification as signal and noise, where, “At lower values, the denoising becomes more forgiving around the knee, and applies less attenuation to signals that are only slightly below

the threshold. This may result in a lower depth of noise reduction, but can also have fewer artifacts” (iZotope, n.d.). “Release” is unused when the algorithm is set to “Synthesis” and “Enhancement” are set to zero to avoid alteration of high frequency and harmonic content in ways not required by the most straight-forward implementation of the spectral subtraction and residual noise shaping processes. “Quality” registers as a value “C*” rather than “D” or “Best” only because “Synthesis” is disabled. The “Quality” slider has no impact on its own, functioning merely as a preset selector. “Masking” is set to 0.0, such that, “...the amount of noise suppression is uniformly governed to the yellow curve in spectrum analyzer (more precisely — by the difference between the yellow curve and orange curve)” (iZotope, n.d.). Meaning, custom residual noise shaping is followed as defined across the spectrum. “Whitening” is set to a maximum value of 10.0, acting as a means of flattening and simplifying the curvature of the noise floor before customization. Figure 3.6(b) shows the introduction of the “Whitening” parameter, reducing the need to manually correct for more minute changes in spectral curvature, as found in the highest frequencies of the current noise profile.



Figure 3.7: Spectral De-noise interface in iZotope RX 11, showing the introduction of a “Reduction curve,” with custom control points.

With all of these parameters in place, the “Reduction curve” may be enabled to shape the residual noise spectrum to a pink noise contour, as shown in Figure 3.7. Matching this target requires the careful arrangement of control points to shape the curve appropriately. In the context of this reduction curve, “Smoothing” determines the type of interpolation between control points. A value of 0.0 produces linear interpolation between points, which is unhelpful for reshaping the gentle curve of the residual noise after whitening. A maximum “Smoothing” value of 10.0 is used here, such that no influence of linear interpolation remains. When editing the reduction curve with fully-smoothed interpolation, each new control point affects the entirety of the both the reduction curve and the residual noise shape, making determination of the control points required to achieve the target curve unpredictable. Table 3.4 lists the control point frequencies and curve values used to attain a pink residual noise curve in this work. Maximum “Whitening” of the residual noise appears to produce the same curve shape, or at least quite similar, regardless of the input noise profile. As such, the control points illustrated in Figure 3.7 and listed in Table 3.4 should generalize to support others in replicating this approach across microphones, with minor adjustments applied as needed. Note that while the x-coordinate of each control point corresponds to frequency in the spectral display, curve value doesn’t correspond to its y-coordinate. It is instead the value of the curve at that frequency, rather than the control point itself. In replicating this approach, one should instantiate all eight control points in rough agreement with their locations in the previous figure, then refine based on the values of the residual noise curve, as sampled across the spectrum.

Table 3.4: Control point frequencies and reduction curve values for pink residual noise shaping (PRNS) in the current work.

Control Point	Frequency	Curve Value
1	21 Hz	1.6 dB
2	98 Hz	-4.6 dB
3	1135 Hz	-4.7dB

Table 3.4: Control point frequencies and reduction curve values for pink residual noise shaping (PRNS) in the current work. (Continued)

Control Point	Frequency	Curve Value
4	1754 Hz	-5.1 dB
5	6243 Hz	-9.3 dB
6	7435 Hz	-10.2 dB
7	16460 Hz	-16.2 dB
8	23852 Hz	-19.9 dB

Table 3.5 shows the frequencies sampled in the current work to verify the -3 dB per octave slope of the target residual noise curve. These frequencies were selected to provide representative coverage across octaves, within the constraints of the x-axis resolution of the Spectral De-noise interface. The second column shows the residual noise values associated with an ideal pink noise slope at these frequencies, in relation to a reference of -173 dB at 23852 Hz for the current noise profile. The third column lists the difference in decibels of the pink residual noise value for each sampled frequency in relation to the value at the reference frequency. Thus, for others to implement this process, these difference values can be added to the residual noise value at the reference, as found in practice with the noise profile for one's microphone or array.

Table 3.5: Residual noise values and offsets at various frequencies for PRNS.

Sampled Frequency (Hz)	Current Residual (dB)	Difference Relative to Reference (dB)
21	-142.55	30.45
42	-145.55	27.45
62	-147.24	25.76
83	-148.50	24.50
100	-149.31	23.69
126	-150.31	22.69
165	-151.47	21.53
200	-152.31	20.69
248	-153.24	19.76
329	-154.46	18.54

Table 3.5: Residual noise values and offsets at various frequencies for PRNS. (Continued)

Sampled Frequency (Hz)	Current Residual (dB)	Difference Relative to Reference (dB)
403	-155.34	17.66
498	-156.25	16.75
797	-158.29	14.71
1006	-159.30	13.70
1601	-161.31	11.69
1996	-162.26	10.74
3205	-164.31	8.69
3973	-165.24	7.76
4983	-166.22	6.78
6401	-167.31	5.69
8013	-168.28	4.72
10024	-169.25	3.75
12848	-170.32	2.68
16057	-171.29	1.71
20062	-172.25	0.75
23852	-173.00	0.00

Figure 3.8 shows the spectrum of the composite noise profile before and after processing with the parameters and custom reduction curve outlined above. One can see there is very little deviation from the ideal pink noise slope from about 100 to 16000 Hz. In the current implementation, this processing results in noise reduction of about 15 dB at 100 Hz, 14 dB at 1000 Hz, and 19 dB at 10000 Hz across the soundfield with no audible artifacts in listening tests thus far and very little loss of low-level soundscape content. Figure 3.9 illustrates the detail revealed by this processing in the spectrograms of a field recording excerpt from a single channel of the ZM-1. Through pink residual noise shaping, the quietest recordings captured with the ZM-1 have been amplified by roughly 60 dB before the noise floor can be perceived as such in current tests. This approach offers a means of rendering largely imperceptible the noise floor in soundscape recordings from both low- and high-cost microphone arrays, presented here

with the intention of helping practitioners more compellingly convey immersive soundscapes from the natural world.

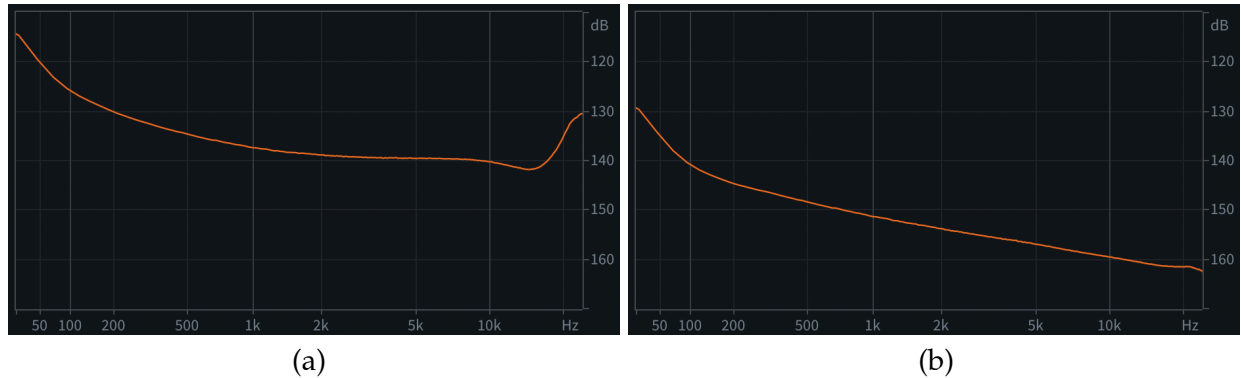


Figure 3.8: Noise profiles (a) before PRNS and (b) after PRNS, with the noise reduction parameters discussed.

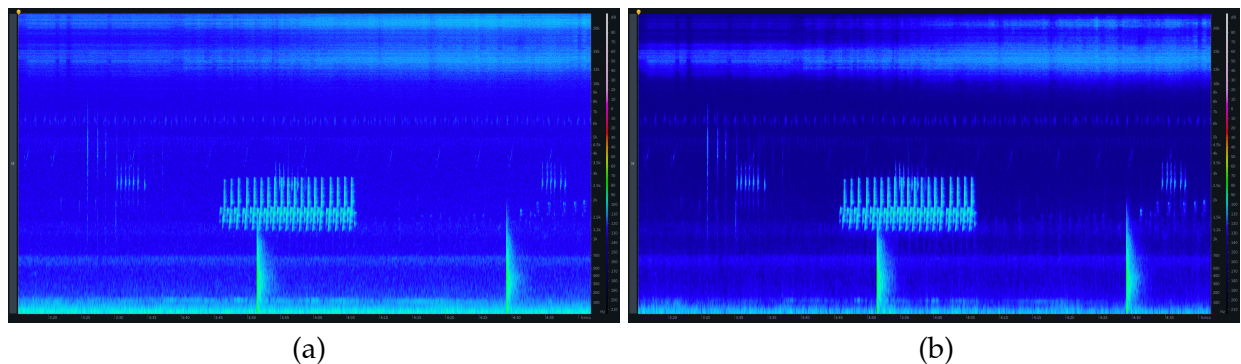


Figure 3.9: Field recording spectrograms (a) before PRNS and (b) after PRNS, with the noise reduction parameters discussed.

3.2.1.3. Batch Processing

To apply such noise reduction to long-form ambisonic recordings, batch processing workflows are significant assets, allowing large quantities of files to be processed with minimal user input. iZotope offers integrated batch processing functionality, accessed via the menu “Window” > “Batch Processor.” At the time of writing, however, even the highest tier of iZotope

RX only handles multichannel files of up to 10 channels, which is insufficient for ambisonics of third-order and higher. As a result, this project uses MATLAB for a variety of file handling tasks, in conjunction with RX. The general process is as follows: read A-format recordings into MATLAB and render each channel as a series of monophonic files, process these files in iZotope, then use MATLAB to recombine them into A-format. Buffer regions are included at the start and end of each mono file, then they are removed after processing, preventing discontinuities at file boundaries caused by latency or time domain artifacts. For instance, any filter produces some degree of smearing in the time domain. If a recording is processed in segments, the initial portion of the processed signal will not feature the processing tail from the end of the previous segment, producing a discontinuity when the sections are concatenated. By including buffer regions, applying processing, then removing the buffers, such artifacts carry over across files. This project slices files to a length of 10 minutes and 10 seconds, where the main body of the selection is 10 minutes long, plus two buffer regions of five seconds. The buffers contain the last five seconds of the body of the previous slice and the first five seconds of the body of the subsequent slice. Figure 3.10 illustrates a conceptual diagram of this process. The five second buffer duration was selected to accommodate the maximum “Learn time” for adaptive noise reduction in the Spectral De-noise tool, if this is to be explored in future work. The 10 minute length, after buffers have been removed, is intuitive for working with large collections of files, while also allowing 19-channel A-format files to be rendered in 32-bit float without surpassing the file size limitations of the WAV format. Through this process, hundreds of hours of ecological recordings have been de-noised thus far for archival and dissemination.

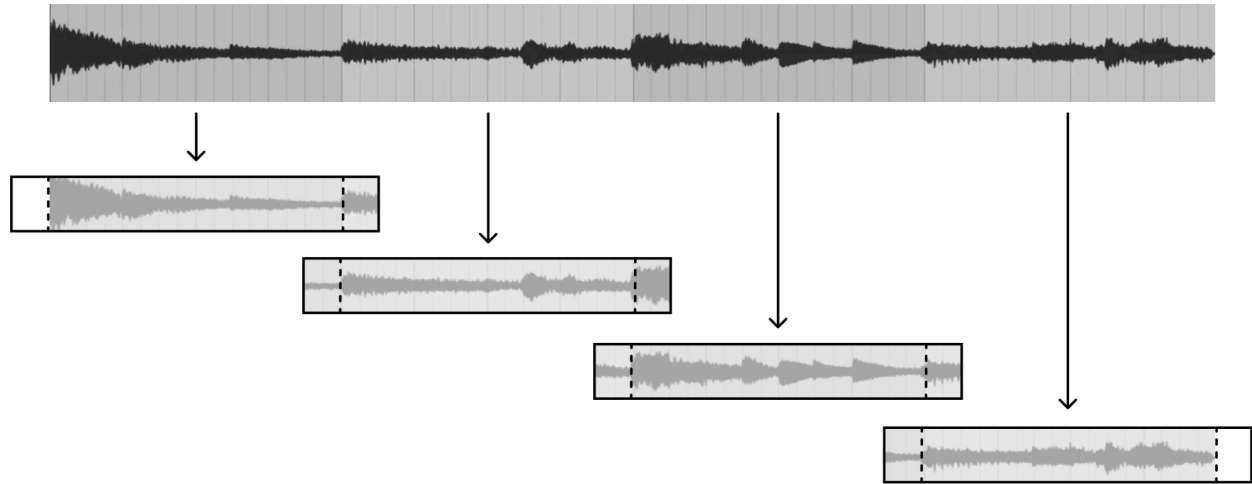


Figure 3.10: Diagram of file segmentation with buffer regions for batch processing of long-form recordings.

3.2.2. Layered Sonic Time-Lapse

Long-form ambisonic recordings offer a wealth of spatio-temporal information about acoustic environments; however, they demand significant and potentially impractical time commitments from listeners to explore in their entirety. Software tools displaying long-term spectral averages (LTSAs) help researchers navigate such data (Wiggins et al., 2010), while many artists have explored manually editing long recordings into creative montages that, for instance, span the course of a day or a night in about an hour (López, 1998b; Feld, 2001; Dłużyk, 2016; Rawes, 2022; Testen & Šerc, 2025). Evelyn Ficarra (2020) works with audio time-lapse techniques based on granular synthesis and explores compositional approaches of temporal layering, where multiple timescales coexist in a single perceptual frame. Felipe Otondo has extensively documented sonic time-lapse (STL) methods for algorithmically condensing the timescale of long-form recordings of wetland soundscapes in Chile (Otondo, 2018; Otondo & Poblete, 2020; Otondo & Rabello-Mestre, 2022a). His implementations of the STL method sample around 20 seconds from each hour of 24-hour field recordings, concatenating them chronologically with

RMS-matched crossfades (Espejo et al., 2021). In documentation of the Soundlapse Project, these approaches are applied specifically to ambisonics using the first-order Sennheiser AMBEO VR Mic array, with processing “carried out independently on each recorded channel” (Otondo & Rabello-Mestre, 2022b).

The current work proposes a novel method that builds on these approaches, tentatively called a layered sonic time-lapse (LSTL), or layered ambisonic time-lapse (LATL) when applied to ambisonic content. The technique is motivated by the fact that existing algorithmic time-lapse implementations discard the vast majority of sonic material in producing time-condensed versions. Unique sonic events are more than likely to be missed, all depending on the sampling interval, window length, and start time of the initial window. To address this, a layered sonic time-lapse generates multiple STLs with different offsets in start time, such that all material from the original recording is captured in one of the layers. These layers are then summed together with reduced offsets so windows across layers are in constant states of fading in and out, creating seamless and dynamic experiences of all sonic activity that takes place. A layered ambisonic time-lapse applies this processing independently to all A-format channels, in line with Otondo and Rabello-Mestre (2022b). As such, artificially-dense sound worlds are created that maintain the spatial coherence of their original acoustic environments. These processed recordings can thus be used by practitioners to listen for interesting material in long recordings, to better understand long time-frame change without missing events occurring on shorter time-scales as well, and to create immersive experiences that lean into the material as an artistic abstraction, scientific summary, or both. Figure 3.11 illustrates a diagram of an LSTL as applied to a single audio channel. This approach will be documented in more detail in future work.

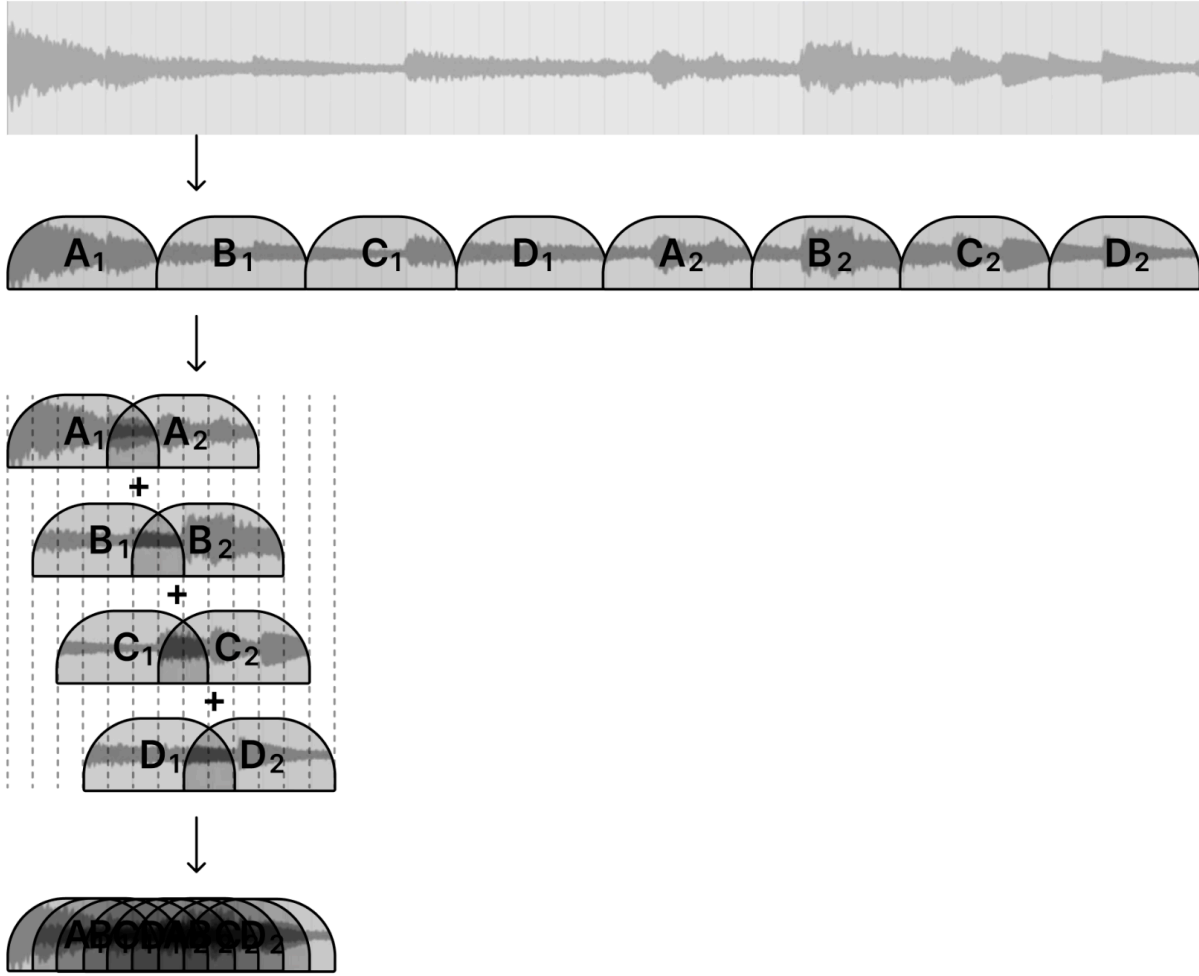


Figure 3.11: Diagram of layered sonic time-lapse (LSTL).

3.2.3. Encoding and Decoding

Spherical harmonic encoding converts the raw microphone signals from an ambisonic array into the spherical harmonic domain, the mathematical representation from which signals for arbitrary loudspeaker configurations and binaural headphone listening can be decoded and rendered. The theory behind ambisonic encoding and decoding is treated thoroughly by Zotter and Frank (2019). For the purposes of the current work, it is most important to establish how these processes have been implemented thus far and how they may be carried out by others encountering the archived recordings from this project.

The current work uses the SPARTA plugin suite (McCormack & Politis, 2019) for encoding, decoding, and binaural rendering of HOA signals. MATLAB has been used for batch processing with these tools, using the “loadAudioPlugin” function (MathWorks, n.d.). The SPARTA Array2SH plugin (McCormack et al., 2018) allows for encoding of microphone array signals to spherical harmonics, featuring a preset for working with the ZYLIA ZM-1 specifically, as shown in Figure 3.12. The SPARTA encoder is preferred to the ZYLIA Ambisonics Converter (ZYLIA, n.d.-a) based on comparative evaluation: the ZYLIA tool applies hard low-pass filtering around 20 kHz that impacts the ability to visualize high frequency activity of insects and bats, while also limiting possible applications of pitch and frequency shifting. For those without access to MATLAB though, the ZYLIA tool does offer batch processing functionality when used as a standalone application.

After carrying out spherical harmonic encoding on multichannel files with buffer regions, as discussed in Section 3.2.1.3., the recordings may be processed for listening. The SPARTA AmbiDEC plugin allows for decoding to arbitrary multichannel speaker systems, while SPARTA AmbiBIN supports binaural rendering for immersive headphone listening (McCormack & Politis, 2019). The standard approach in this project has been to render binaural versions of all recordings to files for ease of evaluation, while multichannel speaker decoding is carried out in real-time as necessary in Reaper (Cockos, 2026), a low-cost DAW that supports multichannel tracks and plugins. Typical workflows for the ZM-1 in Reaper could include routing A-format recordings through Array2SH and AmbiBIN for binaural listening, or Array2SH, AmbiDEC, and the IEM DistanceCompensator (Rudrich et al., 2018) for speaker decoding. Figure 3.13 illustrates the SPARTA AmbiBIN interface, configured for third-order processing for use with the ZM-1. In the final stage of batch processing, buffer regions may be

removed such that files concatenate without discontinuities when imported into Reaper, Audacity, or one's preferred DAW.

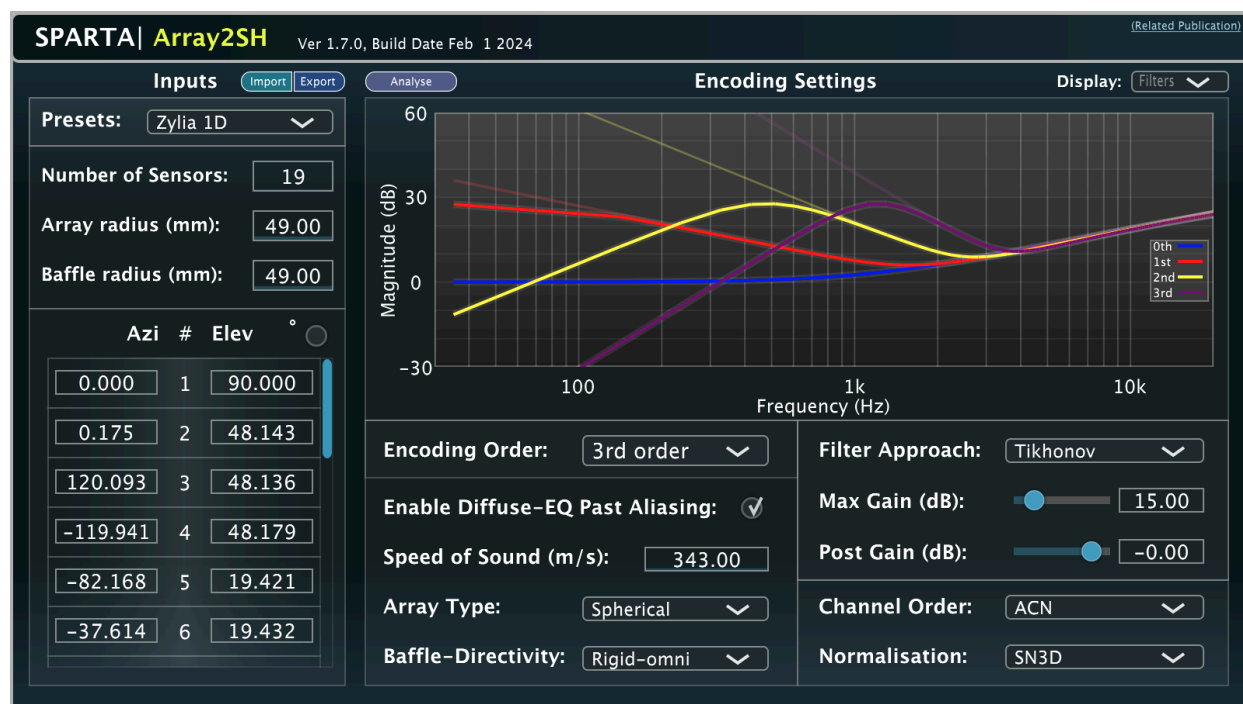


Figure 3.12: SPARTA Array2SH plugin preset for A- to B-format encoding with ZYLIA ZM-1.

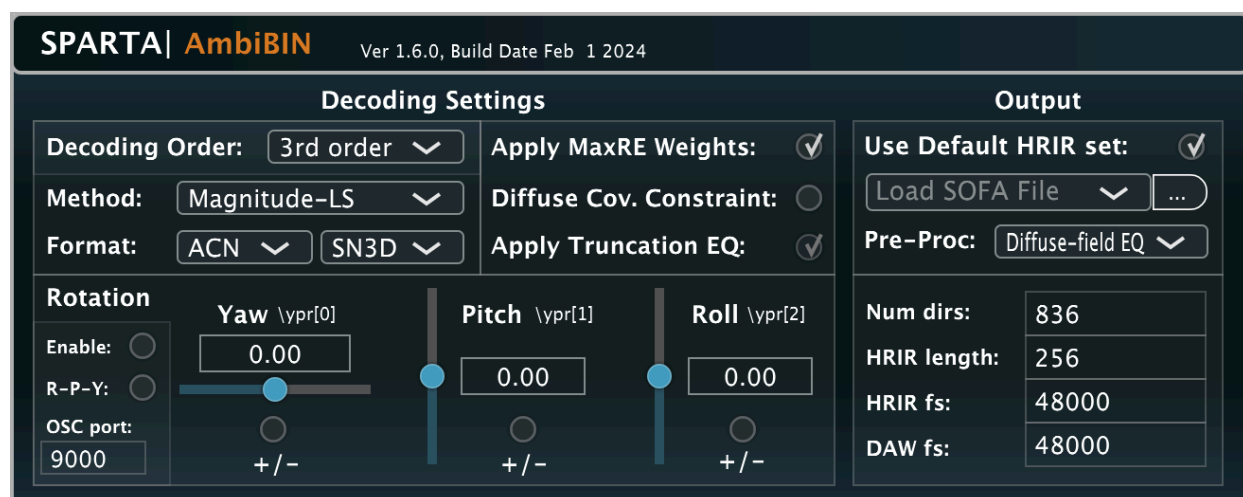


Figure 3.13: SPARTA AmbiBIN plugin for binaural rendering, shown with third-order processing appropriate for ZYLIA ZM-1.

3.3. Archival and Dissemination

The preceding sections have described how ecological soundscapes are recorded and processed in this project. For any of this work to serve future applications, whether scientific reuse, heritage preservation, artistic engagement, or public experience, the resulting materials must be stored in stable locations, in formats that remain usable over time, and on platforms where the audiences who would benefit from them are likely to encounter them. These audiences likely differ substantially in expertise, intent, and the formats they can use: an ecoacoustics researcher may need multichannel source files with comprehensive metadata; a composer may seek noise-reduced B-format recordings for spatial composition; while a casual listener may engage with binaural recordings on a streaming platform. A single archival strategy cannot serve all of these users. This project therefore deploys four complementary approaches to archival and dissemination. Zenodo provides institutionally backed, DOI-assigned, long-term storage of full multichannel and binaural recordings with comprehensive metadata, serving the needs of reproducibility, citability, and scientific reuse. YouTube extends reach to non-specialist audiences through binaural renderings with synchronized spectrogram video and recording information included in the description, functioning as a form of social archiving that can bring ecological soundscapes to listeners who would never seek out a research data repository. An interactive sound map links recording locations to both platforms, allowing geographic navigation of the archive and providing spatial context for each recording site. Public exhibitions present the recordings and compositional works derived from them in multichannel loudspeaker environments, offering the immersive spatial experience that headphone-based formats can only approximate while engaging audiences who may have no prior exposure to ecological soundscapes or spatial audio.

3.3.1. Zenodo

Zenodo is a free and open-access repository operated by CERN that assigns persistent digital object identifiers (DOIs) to each upload, supports standardized metadata schemas and an open API, and is backed by institutional infrastructure that self-hosted platforms cannot match (Zenodo, n.d.-a; Crespo Garrido et al., 2025). Zenodo's community feature allows projects, institutions, and research domains to curate and manage collections of research outputs within shared spaces on the platform (Zenodo, n.d.-b). Because independently published uploads can be linked to multiple communities non-exclusively, a community functions as an overlay archive: it collects and organizes materials that retain their own DOIs and landing pages while becoming navigable as a coherent collection. This makes communities well suited for projects like the present one, where individually published recordings must also be browsable as a unified body of work. Two Zenodo communities have been created for this project. The first, Ambisonic Earth (Deluga, 2026b), serves as the primary repository for the recordings and associated materials produced in this work. The second, The Ambisonic Archive (Deluga, 2026c), is open for public submission and is intended as a broader hub for ambisonic soundscape recordings across projects and practitioners, so that spatial recordings of ecological intangible heritage may be collected and accessed in a single, stable, findable location.

Each recording linked to the Ambisonic Earth community will include a comprehensive set of assets. Multichannel audio is provided in raw A-format, noise-reduced A- or B-format, and multichannel time-lapse. Binaural renderings are provided in raw, noise-reduced, and time-lapse versions, with amplification and dynamic range reduction applied where appropriate. Spectrogram video with binaural audio is included for visual navigation of each recording. Metadata accompanies each upload, including recording information, site photographs, spectrogram images, KML files, GIS dataset information, and BirdNET analyses

(Kahl et al., 2021). Each upload receives a persistent DOI, ensuring long-term citability and discoverability in accordance with the FAIR Principles (Wilkinson et al., 2016; Crespo Garrido et al., 2025).

3.3.2. YouTube

YouTube serves as a complementary platform for soundscape dissemination, reaching audiences who would be unlikely to encounter an academic data repository. Pietrobruno (2013) has argued that the participatory nature of YouTube transforms it into a form of social archiving: users continuously create, upload, and organize collections of intangible heritage, enabling the platform to capture and store diverse practices in their lived context and to circulate heritage narratives that may challenge those put forward by institutional authorities. While YouTube lacks the persistent identifiers, standardized metadata, and institutional preservation guarantees of a platform like Zenodo, its scale and accessibility give it a distinct role in heritage dissemination. Taylor (2024) argues that field recordings serve as media of invitation and transportation, drawing listeners into encounters with unfamiliar acoustic environments and fostering emotionally heightened engagement that can provoke ecological reflection. YouTube is well suited to this function: non-specialist audiences regularly engage with long-form audio content on the platform, and providing access to full recordings — rather than curated excerpts — preserves listeners' ability to form their own connections with material that a more editorial approach might exclude.

The Ambisonic Earth YouTube channel (Deluga, 2026a) publishes binaural renderings of noise-reduced and time-lapse recordings, synchronized with spectrogram video. Figure 3.14 illustrates a typical video frame, showing the scrolling spectrogram, overview spectrogram, sun cycle visualization, and mel-scaled frequency labels in Hz and semitones. BirdNET species

detections may be formatted as YouTube chapters, allowing viewers to navigate directly to the moments where detected species can be heard. Each video description includes the location, date, duration, ecoregion, protected area designations, and links to the sound map and corresponding Zenodo upload for those who wish to access multichannel source files or structured metadata. This approach treats YouTube not as a substitute for the archival infrastructure on Zenodo but as a point of first contact, a platform where someone searching for nature sounds, a specific ecosystem, or a particular species might encounter an ecological soundscape for the first time and, if interested, follow the link to the full archive.

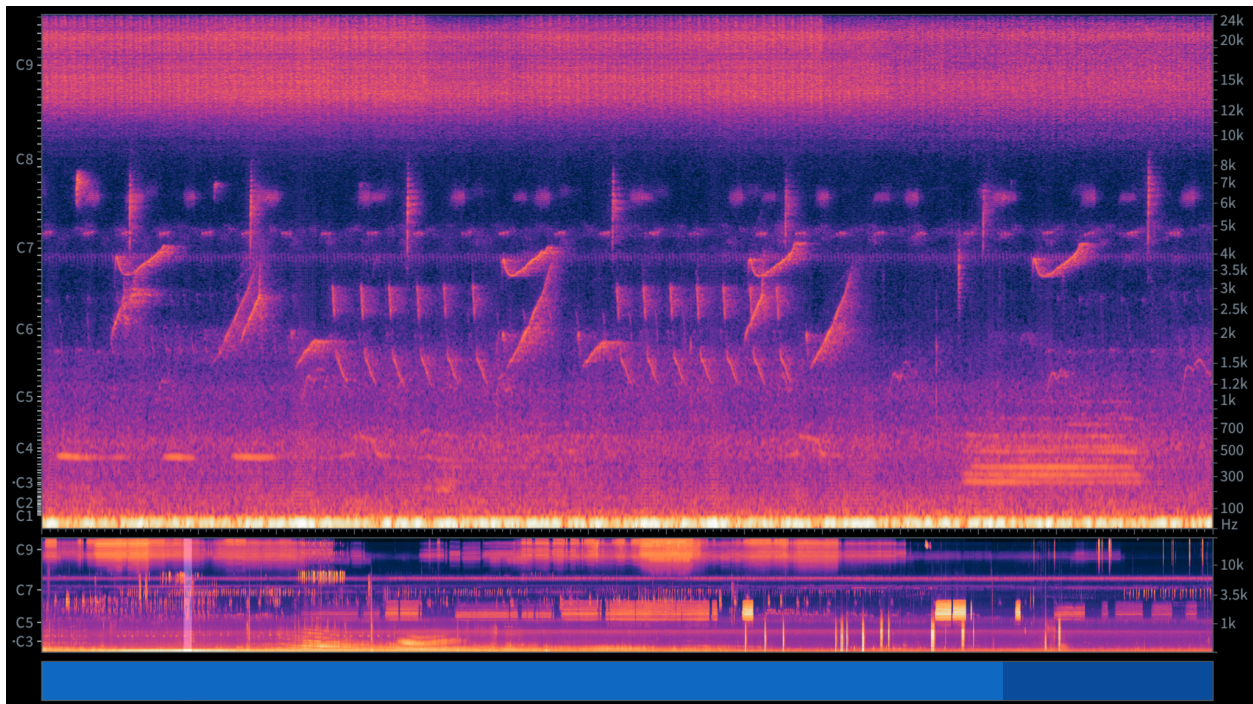


Figure 3.14: YouTube video frame showing data visualization of soundscape from Shick Shack Sand Pond Nature Preserve, IL, USA. Includes spectrogram synchronized with binaural audio at top (scrolling right to left), overview spectrogram highlighting location within recording, sun cycle visualization, and mel-scaled frequency axis labeled in Hz and semitones.

3.3.3. Sound Map

Sound maps — interactive cartographic interfaces that link geolocated recordings to their positions on a map — have become an established medium for navigating and engaging with soundscape collections. Platforms such as Aporee, the British Library's UK Soundmap, and Freesound's geotag browser all use geographic location as a primary means of organizing and accessing acoustic material. Droumeva (2017) argues that sound maps function as a form of public-facing environmental cartography, adding temporality and spatiality to representations of place in ways that static maps cannot. For soundscape archives spanning many sites across diverse geographies, geographic navigation offers an intuitive entry point: a user can explore recordings by where they were made, discovering sites through spatial proximity and ecological context rather than through the titles or metadata of individual files.

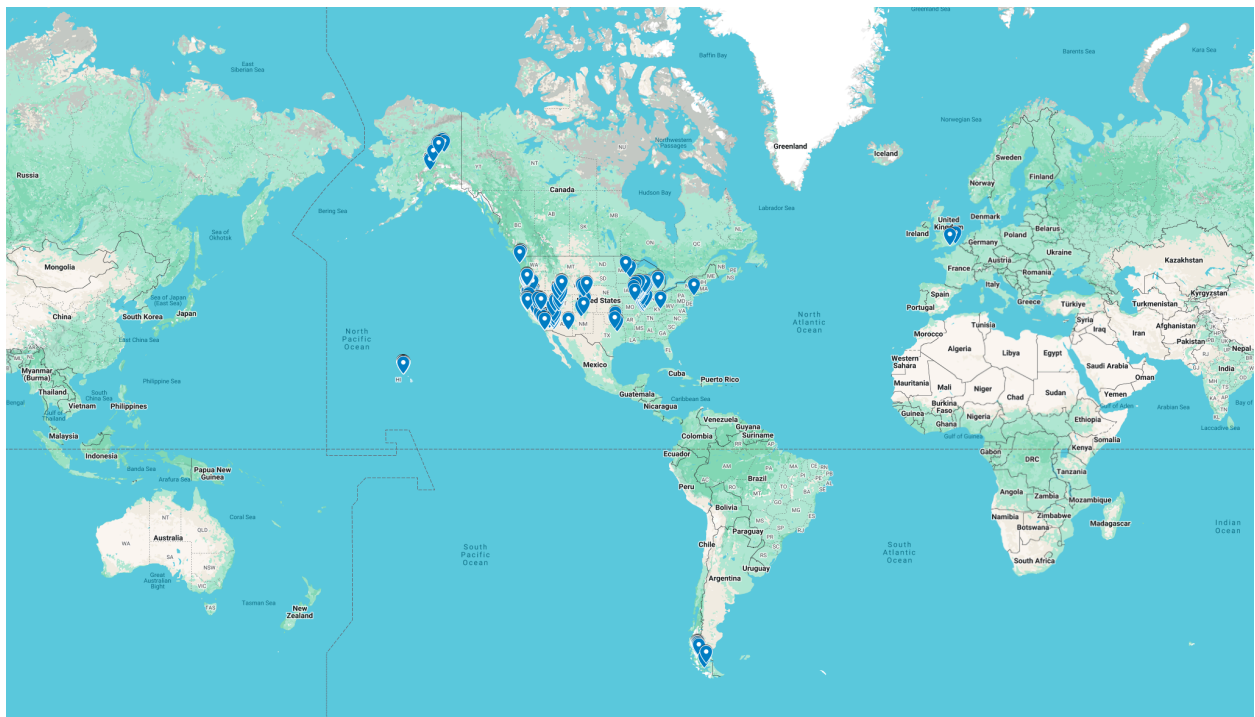


Figure 3.15: Sound map of *Ambisonic Earth* recording locations (2022-2025).

The Ambisonic Earth sound map (Deluga, 2026a), shown in Figure 3.15, is built on Google Maps and serves as a geographic index linking the project's recording sites to their corresponding content on Zenodo and YouTube. Each marker on the map represents a recording location and includes the site name, coordinates, date, protected area designations, and direct links to the YouTube spectrogram video and the Zenodo upload. Site photographs are embedded in each marker, providing visual context for the acoustic environment. The map is linked in the description of every YouTube video in the project, so that a viewer who encounters a single recording can navigate geographically to other sites and, from there, to the full archive. In this way, the sound map does not host recordings itself but functions as a navigational layer across the two archival platforms, allowing users to browse the collection spatially and to move between Zenodo and YouTube without needing to know the structure of either platform in advance.

3.3.4. Public Exhibitions

Immersive public exhibition represents the most direct means of conveying the spatial richness of ecological soundscapes to audiences, offering an experience that headphone-based binaural rendering can only approximate. Multichannel loudspeaker reproduction reconstructs the three-dimensional soundfield in a shared physical space, allowing listeners to perceive sound arriving from distinct directions, distances, and elevations — the spatial structure that, as argued in Section 2.2.2, carries ecological and experiential significance. The precedent for this mode of presentation in ecological contexts is well established. Monacchi's *Fragments of Extinction* has been presented since 2002 across concert venues, art galleries, museums, and public spaces, with Monacchi engineering a dedicated Eco-acoustic Theatre — a scalable geodesic facility with up to 65 loudspeakers in spherical geometry — designed specifically for

the periphonic reproduction of primary rainforest soundscapes (Monacchi, 2013; Monacchi & Krause, 2017). In each presentation, audiences are guided through a progression from unaltered sound documentaries to sonic time-lapses and electroacoustic explorations to eco-acoustic compositions in which the artist performs within the acoustic niches of the recorded ecosystem (Monacchi, 2013). The Great Animal Orchestra, a collaboration between Bernie Krause and United Visual Artists, translates Krause's field recordings into an immersive audiovisual installation in which spectrograms of global soundscapes are projected as abstract landscapes above a reflective pool, with speakers generating ripples to visualize frequencies below the threshold of human hearing (United Visual Artists, 2019). The installation has toured internationally since 2016, including presentations in Paris, London, Shanghai, Seoul, and Boston (Peabody Essex Museum, 2022). These projects demonstrate that immersive exhibition can reach audiences who might never engage with a data repository or seek out soundscapes on a streaming platform, and that the spatial and affective qualities of ecological acoustic environments may be more fully realized in shared physical space.

Artistic works within the *Ambisonic Earth* project explore the relationship between abstraction and realism across two large-scale works. *Ecospherical* is an ambisonic multichannel composition immersing listeners in natural and hybrid soundscapes of California and the Pacific Northwest. Premiered at the Qualcomm Institute's SPAT Lab at UC San Diego (Qualcomm Institute, 2023), the work initiated the ambisonic recording practice that became *Ambisonic Earth*, capturing roughly 50 hours of recordings in its first campaign through California's Sierra Nevada and Central Valley. *Ecospherical* features two approaches to convolution: monophonic instrumental signals convolved with B-format impulse responses from natural environments to spatialize sources within recorded soundfields, and B-format field recordings convolved with monophonic impulse responses of instruments to transform the

soundfield's sense of space and timbre (Deluga, 2023). Excerpts of the work have since been presented at VU Symposium in Park City, Utah (2023), the Experiments in Electronic Sound Festival at CalArts (2023), MUSLAB Electroacoustic Music Festival in Guayaquil, Ecuador (2023), the International Computer Music Conference in Shenzhen, China (2023), SEAMUS at the University of North Texas (2024), the San Francisco Tape Music Festival (2025), the CCRMA Colloquium and Spring Concert at Stanford University (2025), and NOIS//E Festival in Tropea, Italy (2025). Figure 3.16 shows documentation from *Soundfield Ecologies*, the second large-scale work within the project.



(a)



(b)

Figure 3.16: *Soundfield Ecologies* (a) exhibition photo, and (b) event poster.

Soundfield Ecologies is an immersive soundscape installation designed for maximum public accessibility. In its presentation at UC San Diego (UC San Diego Department of Music, 2025), the installation was open for extended hours across multiple days, framed with the

intention of acoustically transporting listeners to a range of ecosystems through noise-reduced higher-order ambisonic recordings. Each environment was given sufficient duration for listeners to settle into its rhythm without persisting so long that casual visitors disengaged. The work was then presented in a condensed form at Stanford's Center for Computer Research in Music and Acoustics (CCRMA, 2025). Informed by Monacchi's approach of separating documentary and compositional modes (Monacchi, 2013; Monacchi, 2016), these two works maintain a clear distinction between faithful representation and artistic transformation, allowing each to function with integrity. Documentation brings out the intrinsic aesthetic and scientific value of the recordings, while composition operates without the constraints of perceived realism, addressing different audiences on their own terms.

4. RESULTS

This section presents the current state of the *Ambisonic Earth* project across two dimensions: the scope and geographic distribution of recording undertaken to date, and the status of archival and dissemination efforts. Recording results are contextualized against the global biodiversity and heritage datasets described in the site selection methodology, mapping recordings across ecoregions, biomes, protected area designations, and indigenous territories. Archival results document the current state of uploads to Zenodo, YouTube, and the sound map, and describe the curated dataset in preparation. Detailed tables and site-level information are provided in the appendices; the presentation here focuses on the patterns, coverage, and gaps that emerge from the collection as a whole.

4.1. Recording

A total of 497 recordings have been captured from May 2022 through the end of 2025, totaling approximately 625 hours. Of these, 402 are considered soundscape recordings, totaling about 572 hours, and approximately 373 may be characterized as ecological soundscapes, totaling roughly 526 hours. While the distinction between these categories can be open to interpretation, for the purposes of this overview, soundscape recordings exclude material related to equipment testing while ecological soundscapes further exclude recordings captured indoors and in urban environments without clear biophony. Thus, even by conservative estimates, the volume of recording in this project becomes clear with over 500 hours of recording in varied natural environments. A full directory of soundscape recordings is provided

in Appendix C, including identification number, date, start time, duration, country, state, and recording name.

Table 4.1: Number of soundscape recordings in various duration ranges.

Duration Range	Number of Soundscape Recordings
0 - 10 min	62
10 - 20 min	67
20 - 30 min	81
30 - 60 min	90
1 - 2 hrs	41
2 - 3 hrs	12
3 - 6 hrs	31
6 - 12 hrs	7
12 - 24 hrs	10
24+ hrs	1

The distribution of recording durations reflects the project's emphasis on both sustained long-form capture and opportunistic documentation. The mean soundscape recording duration is approximately 85 minutes, while the median is about 29 minutes; a disparity that reflects a collection weighted toward shorter recordings but anchored by much more extended sessions. Table 4.1 presents an overview of the number of soundscape recordings in various duration ranges. Over half of these recordings fall under 30 minutes, capturing focused snapshots of acoustic communities at particular times of day or under particular conditions. Forty-one recordings span one to two hours, while an additional 49 exceed two hours, including 10 recordings of 12 to 24 hours and one exceeding 24 hours. These longer sessions document full or near-full circadian cycles, capturing the dawn and dusk choruses that represent the most concentrated periods of biophonic activity as well as quieter nocturnal and midday intervals that can reveal the acoustic baseline of an environment. There would likely be more circadian

captures if not for issues with recordings on the ZYLIA ZR-1 ending prematurely due to power dropouts at file boundaries, emphasizing the need for robust recording systems.

Table 4.2: Hours of soundscape recording across biomes.

RESOLVE Biome	Hours of Recording
Temperate Conifer Forests	152
Deserts & Xeric Shrublands	109
Boreal Forests/Taiga	79
Temperate Grasslands, Savannas & Shrublands	66
Mediterranean Forests, Woodlands & Scrub	54
Temperate Broadleaf & Mixed Forests	53
Tropical & Subtropical Grasslands, Savannas & Shrublands	25*
Tundra	21
Tropical & Subtropical Moist Broadleaf Forests	10
Tropical & Subtropical Dry Broadleaf Forests	0
Tropical & Subtropical Coniferous Forests	0
Montane Grasslands & Shrublands	0
Flooded Grasslands & Savannas	0
Mangroves	0

Recording sites span 9 of the 14 terrestrial biomes and 35 of the 846 ecoregions defined by the RESOLVE classification (Dinerstein et al., 2017). Table 4.2 presents the hours of recording captured across biomes. The biomes most extensively documented here are temperate conifer forests, deserts and xeric shrublands, reflecting the geographic concentration of fieldwork in the western United States. Boreal forests and taiga are particularly well-represented due to recording system improvements implemented before recording in Alaska; most notably, powering the ZR-1 field recorder via the 100W USB-C outlet on a new power station to prevent dropouts. The 25 hours of material from tropical and subtropical grasslands, savannas and shrublands is marked with an asterisk in Table 4.2, since most of this recording took place in

urban and beach environments. Tropical and subtropical moist broadleaf forests — the biome harboring the greatest global biodiversity and among the most poorly represented in existing soundscape archives (Deichmann et al., 2018) — only account for about 10 hours of material, underscoring the need for expanded recording in equatorial regions. Ecoregion and biome classifications for all recording sites are provided in Appendix D.

These recordings have also been placed in context of the datasets on global biodiversity and heritage described in Section 3.1.2. Recording sites include one UNESCO World Heritage Site (Olympic National Park), two UNESCO Biosphere Reserves, four Ramsar Wetlands of International Importance, 19 Key Biodiversity Areas, 27 National Wildlife Refuges, seven National Parks, six National Forests, nine other nationally designated sites, and 27 additional sites in the World Database on Protected Areas. The overlap between recording sites and formally designated conservation areas is substantial, despite many of the biodiversity frameworks not being explicitly targeted during the early phases of recording. This suggests that prioritizing National Wildlife Refuges, wetlands, and mature forests — an approach guided largely by intuition in the search for high integrity ecosystems — produces meaningful alignment with internationally recognized priority areas for biodiversity. Subsequent recording campaigns can make more deliberate use of the GIS datasets to target underrepresented ecoregions and biomes. Table 4.3 presents the protected areas where soundscapes have been recorded in this work, including the quantity of sites visited in each classification and the duration of recording. Asterisks indicate that recordings were taken just outside the official boundaries of a protected area, within one kilometer and in a similar ecological setting, such that it is worth considering the recordings as representing that area even if they don't technically fall within it. Appendix E lists the protected area classifications associated with each soundscape recording.

Table 4.3: Soundscape recordings across protected areas.

Protected Area Type	Quantity	Duration
UNESCO World Heritage Sites	1	7.25 hours
Olympic National Park*		
UNESCO Biosphere Reserves	2	18.75 hours
Olympic* and Torres del Paine		
Ramsar Wetlands	4	13.5 hours
Cache River and Cypress Creek Wetlands, the Emiquon Complex, Grasslands Ecological Area, and the Kawainui and Hamakua Marsh Complex		
Key Biodiversity Areas	19	82 hours
Bear River Bay UT02, Bill Williams River NWR, Cache River SNA, Crowley Lake Area, Cypress Creek NWR, Grasslands Ecological Area, Imperial NWR, Imperial Valley, Iroquois County State Conservation Area*, Lower Colorado River Valley, Lower Ohio River, Midewin National Tallgrass Prairie, Mittry Lake State Wildlife Area, O‘ahu Uplands*, Olympic Coast Marbled Murrelet, Parque Nacional Torres del Paine, Sand Ridge - Tulare Lake Bed (incl. Pixley and Kern NWRs, Creighton Ranch), Waterloo Recreation Area*, and Zion National Park UT20		
U.S. National Wildlife Refuges	27	60 hours
Arapaho, Bill Williams River, Chautauqua, Cibola, Colusa, Cypress Creek, Don Edwards San Francisco Bay, Emiquon, Fish Springs, Great River, Havasu, Imperial, Kankakee, Kern, Kofa, Lower Klamath, Merced, Meredosia, Modoc, Patoka River*, Port Louisa*, Sacramento, San Luis, Sherburne, Sonny Bono Salton Sea, Tishomingo, and Tule Lake.		
National Parks	7	64.75 hours
Crater Lake, Lassen Volcanic, Olympic*, Sequoia, and Zion in the United States. Bernardo O’Higgins and Torres del Paine in Chile.		
U.S. National Forests:	6	63 hours
Dixie, Fishlake, Fremont-Winema, Inyo, Shawnee, and Tahoe		

Table 4.3: Soundscape recordings across protected areas. (Continued)

Protected Area Type	Quantity	Duration
Other National Designations	9	15 hours
Beaver Dam Wash National Conservation Area, Great Sand Dunes National Preserve, Lava Beds National Monument, Midewin National Tallgrass Prairie, Río Grande Del Norte National Monument, and Valles Caldera National Preserve in the United States. Monumento Natural Los Pingüinos, Reserva Nacional Laguna Parrillar, and Reserva Nacional Magallanes in Chile.		
Other sites in WDPA	20	66.25 hours
Audubon Wildlife Area, Cedar Glen State Natural Area, Creamer’s Field, Eden Landing Ecological Reserve, Gray Own Farm Conservation Area, H & B Bremer Wildlife Sanctuary, Julius J. Knobeloch Woods State Natural Area, Kawainui Marsh Wildlife Sanctuary, Langdon Cliffs & Foxhill Down Nature Reserve, Liberty Fen-Skiff Lake, McKinley Woods Local Conservation Area, Mendota Wildlife Area, Mermet Lake SFWA, Natural Bridge State Park Nature Preserve, North Table Mountain Ecological Reserve, Palo Verde Ecological Reserve, Raccoon Grove Nature Preserve, Saline County SFWA, Sand Ridge State Forest, and Scripps Coastal Reserve		

Several recordings document soundscapes of particular ecological, historical, or acoustic significance. The Olympic Peninsula recordings capture environments of exceptional natural quiet, made near Gordon Hempton's One Square Inch of Silence in the Hoh Rainforest. The Ancient Bristlecone Pine Forest recordings document almost a full day in the soundscape of the Methuselah Tree, the oldest known non-clonal organism on Earth at over 4,850 years of age. A selection from this site also served as the noise profile for noise reduction, as it provided a quieter characterization of recording system noise in the low frequencies than the anechoic chamber at Orfield Laboratories. Recordings along the Lower Colorado River document the soundscapes of a threatened river system that sustains a chain of National Wildlife Refuges through one of the most arid regions of North America. Recordings at the Hot Creek Geologic Site captured the acoustic environment of an active geothermal area shortly before the site was directly affected by a major wildfire, lending urgency to the case for preventive documentation.

Recordings at Iron Gate Dam and Copco Lake document the soundscapes of the Klamath River shortly after four dams were demolished to allow the river to flow freely for the first time in a century. The recording at Iron Gate Dam specifically includes the sounds of machinery as the debris from the dam was cleared. A recording of the total solar eclipse of April 8, 2024, captures the acoustic response of an ecosystem to the sudden onset and cessation of darkness. Recordings from the 2024 emergence of 13- and 17-year periodical cicadas in Illinois, Broods XIX and XIII, respectively, document a co-emergence event that last occurred in 1803 and will not occur again until 2245; among the most striking examples of temporally-constrained biophonic activity in North American soundscapes.

Appendix F recognizes the indigenous territories where these soundscapes were recorded, based on data from Native Land Digital (Native Land Digital, n.d.) as accessed through an ArcGIS Living Atlas feature layer (Kemper, n.d.). Including this information is intended to help indigenous communities and individuals more easily find, search, and engage with these soundscape recordings and the archive as a whole. I also want to support the Right of Reply, recognizing indigenous peoples' right to update, correct, critique, and enhance indigenous knowledge held in archives (Indigenous Archives Collective, 2025). All are invited to reach out directly at ambisonicearth@gmail.com.

4.2. Archival

Archival and dissemination of the recordings documented above is an ongoing process. At the time of writing, raw A-format recordings of approximately the first 100 soundscapes have been uploaded to Zenodo but not yet published. Noise-reduced B-format files, binaural renderings, spectrogram videos, and associated contextual materials are being processed and uploaded on a rolling basis as signal processing, species detection, and video rendering are

completed. The YouTube channel currently hosts spectrogram videos with binaural audio for a small subset of the archive, with additional uploads proceeding alongside the Zenodo workflow. The sound map is populated with all recording locations documented to date and is linked from each YouTube video description, providing geographic navigation across the full extent of the project regardless of the current state of processing for any individual recording.

A curated dataset — consisting of soundscape excerpts of uniform two-minute duration, recorded at a consistent reference level across multiple protected areas and ecoregions — is in preparation. Its completion will provide a simplified entry point to the archive for listeners, researchers, and artists who seek representative samples of the collection without engaging with full-length recordings or multichannel source files. Figure 4.1 presents an example of the metadata that would accompany recordings in this dataset.

The gap between the volume of material captured and the volume of material fully processed and archived reflects the inherent asymmetry of this work: a day of field recording with the ZYLIA ZM-1 produces almost 240 Gb of uncompressed audio, meaning the process of noise reduction, encoding, binaural rendering, spectrogram generation, species detection, metadata assembly, and upload can require substantially more time than the recording itself. This asymmetry is not a limitation unique to the present project but a structural feature of long-form, multichannel ecological field recording that any future practitioner should anticipate. The archival infrastructure described in the Methods section — Zenodo communities with persistent DOIs, the YouTube channel, and sound map — is designed to accommodate ongoing uploads as processing continues, such that the archive grows incrementally without requiring retroactive restructuring.

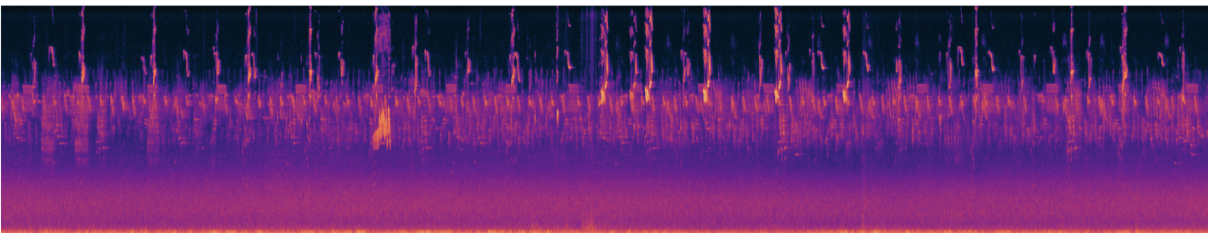
ID	Name	Time	Date	Coordinates
0050	Tahoe NF (Dawn)	5:29:56 AM	2022-06-06	39.49543, -121.02600, 941 m
				
				
BirdNET	[33, 0.9858] Brown-headed Cowbird (<i>Molothrus ater</i>) [11, 0.8835] Black Phoebe (<i>Sayornis nigricans</i>) [1, 0.8350] Purple Finch (<i>Haemorhous purpureus</i>) [1, 0.3951] Stellar's Jay (<i>Cyanocitta stelleri</i>)			
RESOLVE	Sierra Nevada forests Temperate Conifer Forests Nearctic			
ELU	Warm Wet Mountains on Non-Acidic Volcanics with Mostly Needleleaf/Evergreen Forest			
Native Land	Cayuse, Umatilla and Walla Walla Nisenan			

Figure 4.1: Example metadata from dataset of HOA ecological soundscape excerpts.

5. CONCLUSION

This dissertation has documented the creation and current state of *Ambisonic Earth*, an ongoing project to record, process, and archive the soundscapes of biodiverse ecosystems with higher-order ambisonics. Over 500 hours of ecological soundscape recordings have been captured thus far across nine terrestrial biomes and thirty-five ecoregions, and are being made publicly available on a rolling basis through Zenodo, YouTube, and an interactive sound map — representing, to the author's knowledge, the first open-access archive dedicated to higher-order ambisonic recordings of ecological soundscapes.

The Background established that ecological soundscapes are not arbitrary assemblages of sound but structured acoustic communities whose internal organization reflects evolutionary pressures accumulated over deep time. These soundscapes are being irreversibly degraded as biodiversity declines and climatic conditions shift. The spatial relationships among vocalizing organisms and the habitats that shape their signals are ecologically meaningful dimensions of this heritage, yet they are permanently collapsed by monophonic and stereo recording. Ambisonics preserves these relationships, and the spatial fidelity it affords can contribute to a stronger sense of presence — a perceptual substrate on which emotional engagement and connectedness to nature depend. Yet the practitioners and institutions whose work most compellingly demonstrates the value of immersive ecological recording have largely failed to make their recordings durably accessible, a problem that open-data infrastructure is designed to solve.

The Methods section addressed these challenges through a set of integrated

contributions: a portable recording system and Raspberry Pi-based field recorder for autonomous long-form capture; a site selection framework informed by global biodiversity and heritage datasets; a noise reduction methodology that shapes residual noise to approximate the spectral slope of pink noise, blending recording system artifacts unobtrusively into the acoustic background of ecological recordings; a novel layered time-lapse process that condenses timescales while preserving the sonic activity and spatial coherence of recordings; and an archival framework structured around FAIR principles and deployed across multiple platforms to serve audiences with varying goals and levels of expertise.

The Results situated the current collection against global biodiversity and heritage datasets, revealing substantial overlap with formally designated conservation areas including a UNESCO World Heritage Site, Biosphere Reserves, Ramsar Wetlands, and nineteen Key Biodiversity Areas across nine terrestrial biomes and thirty-five ecoregions. Recordings range from focused snapshots to full circadian cycles, and include various soundscapes of particular significance — the exceptional natural quiet of the Olympic Peninsula and the Ancient Bristlecone Pine Forest, the 2024 periodical cicada co-emergence, and the Klamath River following dam removal. The indigenous territories associated with all recordings have been acknowledged in support of the Right of Reply. The archival workflow is proceeding on a rolling basis, reflecting the structural asymmetry of long-form multichannel field recording: processing and upload require substantially more time than capture.

Archiving ecological soundscapes in higher-order ambisonics is ultimately about preserving the acoustic signatures of evolutionary co-adaptation and making them available to listeners, researchers, and future practitioners across the timescales over which heritage accrues its value. Soundscapes have ecological and social value, scientific and aesthetic significance, and their documentation matters; connecting us to ecosystems in need of protection while providing

some means of experiencing them into the future if they are degraded or lost.

5.1. Future Work

Future goals for this project center on expanding both the geographic reach of the archive and the depth of its engagement with ecosystems and communities. Through an upcoming position with the ARC Laureate Fellowship program, *Resonant Earth: Music, Ecology, and Climate Justice*, at the University of Sydney (n.d.), this work will extend into the biodiverse soundscapes of Australian ecosystems. Continued public archival and communal listening practices will aim to make immersive encounters with remote and endangered ecosystems more widely accessible — fostering connections with diverse forms of life and illuminating ecological interrelationships across local and global scales. Increased coordination with communities and conservation organizations will draw on frameworks for participatory ecoacoustics and communal listening outlined by Barclay, Paine, and others (Barclay, 2017; Barclay & Gifford, 2017; Paine, 2017; Paine et al., 2015c; Paine & Yang, 2023), incorporating in-community listening sessions with a compact multichannel loudspeaker array to bring ecological soundscapes to audiences with direct stakes in the environments recorded. Layered sonic and ambisonic time-lapse methods can support this work, making audible the patterns of long time-scale change that no single listening session could otherwise reveal.

Greater focus on recording in global Key Biodiversity Areas, Ramsar Wetlands, and tropical ecosystems can help address geographic and ecological gaps identified in the Results, particularly the underrepresentation of tropical and subtropical moist broadleaf forests — the biome harboring the greatest global biodiversity. A curated dataset of selections from particularly biodiverse soundscapes will be explored to provide another entrypoint to the archive that doesn't require engagement with full, long-form recordings. Further development

of the Raspberry Pi field recorder will aim to increase the autonomy and reliability of HOA recording systems, while the MATLAB scripts developed for this project may be made available to support reproducibility and lower barriers to entry.

At its core, this work holds that ecological soundscapes are worth listening to carefully, worth preserving spatially, and worth making accessible to the broadest possible range of people — not because technology alone can solve the biodiversity crisis, but because hearing ecosystems in their visceral, spatial complexity can foster the kind of connectedness from which stewardship follows. The tools, methods, and infrastructure described here are offered in that spirit: as contributions to a practice that is ultimately about paying attention to what remains and working to ensure others can do the same.

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Appendix A: Code for ZYLIA ZM-1 field recorder prototype on Raspberry Pi.

Bash:

```
arecord \  
-D hw:2,0 \  
-c 19 \  
-r 48000 \  
-f S24_3LE \  
-t raw \  
--buffer-size=524288 \  
--period-size=131072 \  
| ./file_slice.py
```

Python (file_slice.py):

```
#!/usr/bin/env python3  
  
import sys  
import wave  
from datetime import datetime  
from pathlib import Path  
  
# =====  
# Locked configuration  
# =====  
  
CHANNELS = 19  
RATE = 48000  
SAMPLE_WIDTH = 3      # 24-bit packed (S24_3LE)  
SECONDS = 60  
  
FRAMES_PER_FILE = RATE * SECONDS  
BYTES_PER_FRAME = CHANNELS * SAMPLE_WIDTH  
BLOCK_FRAMES = 1024  
BLOCK_BYTES = BLOCK_FRAMES * BYTES_PER_FRAME  
  
BASE = "zylia"
```

```

# =====
# Directory setup
# =====

start_time = datetime.utcnow()
date_str = start_time.strftime("%Y-%m-%d")
time_str = start_time.strftime("%H-%M-%S")

base_dir = Path(date_str) / time_str
base_dir.mkdir(parents=True, exist_ok=True)

# =====
# WAV handling
# =====

file_id = 1
frames_written = 0

def open_file(i):
    name = f"{BASE}_{date_str}_{time_str}_{i:03d}.wav"
    path = base_dir / name
    print(f"Opening {path}", file=sys.stderr)

    wf = wave.open(str(path), 'wb')
    wf.setnchannels(CHANNELS)
    wf.setsampwidth(SAMPLE_WIDTH)
    wf.setframerate(RATE)
    return wf

wf = open_file(file_id)

# =====
# Main loop
# =====

try:
    while True:
        buf = sys.stdin.buffer.read(BLOCK_BYTES)
        if not buf:
            break

```

```

frames = len(buf) // BYTES_PER_FRAME
offset = 0

while frames > 0:
    remaining = FRAMES_PER_FILE - frames_written
    n = min(remaining, frames)

    byte_count = n * BYTES_PER_FRAME
    wf.writeframes(buf[offset:offset + byte_count])

    frames_written += n
    frames -= n
    offset += byte_count

    if frames_written == FRAMES_PER_FILE:
        wf.close()
        file_id += 1
        wf = open_file(file_id)
        frames_written = 0

except KeyboardInterrupt:
    pass

finally:
    wf.close()

```

Appendix B: UNESCO World Heritage Sites selected for ecology or biodiversity (ix & x).

UNESCO (n.d.-a) World Heritage Site selection criteria:

(x): to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation;

(ix): to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

(viii): to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

(vii): to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

(vi): to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);

(v): to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

(iv): to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

(iii): to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

(ii): to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

(i): to represent a masterpiece of human creative genius.

Countries / States	Name	Category	Criteria	Coordinates	Danger
Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, France, Germany, Italy, North Macedonia, Poland, Romania, Slovakia, Slovenia, Spain, Switzerland, Ukraine	Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe	Natural	(ix)	48.9000, 22.1833	-
Argentina	Iguazu National Park	Natural	(vii) (x)	-25.5774, -54.2861	-
Argentina	Península Valdés	Natural	(x)	-42.5000, -64.0000	-
Argentina	Los Alerces National Park	Natural	(vii) (x)	-42.8528, -71.8728	-
Australia	Kakadu National Park	Mixed	(i) (vi) (vii) (ix) (x)	-12.8333, 132.8333	-
Australia	Great Barrier Reef	Natural	(vii) (viii) (ix) (x)	-18.2861, 147.7000	-
Australia	Tasmanian Wilderness	Mixed	(iii) (iv) (vi) (vii) (viii) (ix) (x)	-43.1185, 146.2306	-
Australia	Lord Howe Island Group	Natural	(vii) (x)	-31.5656, 159.0883	-
Australia	Gondwana Rainforests of Australia	Natural	(viii) (ix) (x)	-28.2500, 150.0500	-
Australia	Wet Tropics of Queensland	Natural	(vii) (viii) (ix) (x)	-15.6500, 144.9667	-
Australia	Heard and McDonald Islands	Natural	(viii) (ix)	-53.1000, 73.5000	-
Australia	Shark Bay, Western Australia	Natural	(vii) (viii) (ix) (x)	-25.4861, 113.4361	-
Australia	K'gari (Fraser Island)	Natural	(vii) (viii) (ix)	-25.2167, 153.1333	-
Australia	Australian Fossil Mammal Sites (Riversleigh / Naracoorte)	Natural	(viii) (ix)	-19.0833, 138.7167	-
Australia	Greater Blue Mountains Area	Natural	(ix) (x)	-33.7000, 150.0000	-
Australia	Ningaloo Coast	Natural	(vii) (x)	-22.5625, 113.8103	-
Azerbaijan, Iran (Islamic Republic of)	Hyrcanian Forests	Natural	(ix)	37.4215, 55.7243	-
Bangladesh	The Sundarbans	Natural	(ix) (x)	21.9500, 89.1833	-
Belarus, Poland	Białowieża Forest	Natural	(ix) (x)	52.7275, 23.9811	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Belize	Belize Barrier Reef Reserve System	Natural	(vii) (ix) (x)	17.1905, -87.8462	-
Benin, Burkina Faso, Niger	W-Arly-Pendjari Complex	Natural	(ix) (x)	11.8842, 2.4878	-
Bolivia (Plurinational State of)	Noel Kempff Mercado National Park	Natural	(ix) (x)	-14.2667, -60.8667	-
Bosnia and Herzegovina	Vjetrenica Cave, Ravno	Natural	(x)	42.8450, 17.9889	-
Botswana	Okavango Delta	Natural	(vii) (ix) (x)	-19.2833, 22.9000	-
Brazil	Iguaçu National Park	Natural	(vii) (x)	-25.4481, -53.8001	-
Brazil	Discovery Coast Atlantic Forest Reserves	Natural	(ix) (x)	-16.5000, -39.2500	-
Brazil	Atlantic Forest South-East Reserves	Natural	(vii) (ix) (x)	-24.1667, -48.0000	-
Brazil	Central Amazon Conservation Complex	Natural	(ix) (x)	-2.3333, -62.0083	-
Brazil	Pantanal Conservation Area	Natural	(vii) (ix) (x)	-17.6560, -57.3590	-
Brazil	Brazilian Atlantic Islands: Fernando de Noronha and Atol das Rocas Reserves	Natural	(vii) (ix) (x)	-3.8579, -32.4251	-
Brazil	Cerrado Protected Areas: Chapada dos Veadeiros and Emas National Parks	Natural	(ix) (x)	-14.0057, -47.6846	-
Brazil	Paraty and Ilha Grande – Culture and Biodiversity	Mixed	(v) (x)	-23.0186, -44.6854	-
Bulgaria	Srebarna Nature Reserve	Natural	(x)	44.1144, 27.0781	-
Bulgaria	Pirin National Park	Natural	(vii) (viii) (ix)	41.7427, 23.4305	-
Cameroon	Dja Faunal Reserve	Natural	(ix) (x)	3.1250, 12.9830	-
Cameroon, Central African Republic, Congo	Sangha Trinational	Natural	(ix) (x)	2.6094, 16.5542	-
Canada	Wood Buffalo National Park	Natural	(vii) (ix) (x)	59.3583, -112.2933	-
Canada	Pimachiowin Aki	Mixed	(iii) (vi) (ix)	51.8264, -95.4113	-
Canada, United States of America	Kluane / Wrangell-St. Elias / Glacier Bay / Tatshenshini-Alsek	Natural	(vii) (viii) (ix) (x)	61.1976, -140.9920	-
Canada, United States of America	Waterton Glacier International Peace Park	Natural	(vii) (ix)	48.9961, -113.9042	-
Central African Republic	Manovo-Gounda St Floris National Park	Natural	(ix) (x)	9.0000, 21.5000	X

Countries / States	Name	Category	Criteria	Coordinates	Danger
Chad	Ennedi Massif: Natural and Cultural Landscape	Mixed	(iii) (vii) (ix)	17.0417, 21.8628	-
China	Mount Huangshan	Mixed	(ii) (vii) (x)	30.1453, 118.1551	-
China	Mount Emei Scenic Area, including Leshan Giant Buddha Scenic Area	Mixed	(iv) (vi) (x)	29.5449, 103.7693	-
China	Mount Wuyi	Mixed	(iii) (vi) (vii) (x)	27.7264, 117.7253	-
China	Three Parallel Rivers of Yunnan Protected Areas	Natural	(vii) (viii) (ix) (x)	27.8950, 98.4064	-
China	Sichuan Giant Panda Sanctuaries - Wolong, Mt Siguniang and Jiajin Mountains	Natural	(x)	30.8333, 103.0000	-
China	Xinjiang Tianshan	Natural	(vii) (ix)	41.9683, 80.3542	-
China	Hubei Shennongjia	Natural	(ix) (x)	31.4697, 110.2078	-
China	Qinghai Hoh Xil	Natural	(vii) (x)	35.3803, 92.4392	-
China	Fanjingshan	Natural	(x)	27.8956, 108.6800	-
China	Migratory Bird Sanctuaries along the Coast of Yellow Sea-Bohai Gulf of China	Natural	(x)	31.5129, 121.9994	-
Colombia	Los Katíos National Park	Natural	(ix) (x)	7.8040, -77.1463	-
Colombia	Chiribiquete National Park – “The Maloca of the Jaguar”	Mixed	(iii) (ix) (x)	0.5253, -72.7972	-
Colombia	Malpelo Fauna and Flora Sanctuary	Natural	(vii) (ix)	4.0033, -81.6076	-
Congo	Forest Massif of Odzala-Kokoua	Natural	(ix) (x)	1.3356, 14.8603	-
Costa Rica	Cocos Island National Park	Natural	(ix) (x)	5.5333, -87.0667	-
Costa Rica	Area de Conservación Guanacaste	Natural	(ix) (x)	10.8500, -85.6167	-
Costa Rica, Panama	Talamanca Range-La Amistad Reserves / La Amistad National Park	Natural	(vii) (viii) (ix) (x)	9.4071, -82.9388	-
Côte d'Ivoire	Taï National Park	Natural	(vii) (x)	5.6489, -7.0953	-
Côte d'Ivoire	Comoé National Park	Natural	(ix) (x)	9.0000, -4.0000	-
Côte d'Ivoire, Guinea	Mount Nimba Strict Nature Reserve	Natural	(ix) (x)	7.6032, -8.3910	X

Countries / States	Name	Category	Criteria	Coordinates	Danger
Croatia	Plitvice Lakes National Park	Natural	(vii) (viii) (ix)	44.8778, 15.6144	-
Cuba	Alejandro de Humboldt National Park	Natural	(ix) (x)	20.4500, -75.0000	-
Democratic Republic of the Congo	Virunga National Park	Natural	(vii) (viii) (x)	0.9167, 29.1667	X
Democratic Republic of the Congo	Garamba National Park	Natural	(vii) (x)	4.0000, 29.2500	X
Democratic Republic of the Congo	Kahuzi-Biega National Park	Natural	(x)	-2.3341, 28.1807	X
Democratic Republic of the Congo	Salonga National Park	Natural	(vii) (ix)	-2.0000, 21.0000	-
Democratic Republic of the Congo	Okapi Wildlife Reserve	Natural	(x)	2.0000, 28.5000	X
Denmark, Germany, Netherlands (Kingdom of the)	Wadden Sea	Natural	(viii) (ix) (x)	53.5286, 8.5561	-
Dominica	Morne Trois Pitons National Park	Natural	(viii) (x)	15.3311, -61.3066	-
Ecuador	Galápagos Islands	Natural	(vii) (viii) (ix) (x)	-0.6899, -90.5013	-
Ecuador	Sangay National Park	Natural	(vii) (viii) (ix) (x)	-1.8333, -78.3333	-
Ethiopia	Simien National Park	Natural	(vii) (x)	13.1833, 38.0667	-
Ethiopia	Bale Mountains National Park	Natural	(vii) (x)	6.7978, 39.7489	-
France	Gulf of Porto: Calanche of Piana, Gulf of Girolata, Scandola Reserve	Natural	(vii) (viii) (x)	42.3252, 8.6288	-
France	Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems	Natural	(vii) (ix) (x)	-20.4119, 164.5664	-
France	Pitons, cirques and remparts of Reunion Island	Natural	(vii) (x)	-21.0994, 55.4800	-
France	French Austral Lands and Seas	Natural	(vii) (ix) (x)	-49.3804, 69.3528	-
France	Volcanoes and Forests of Mount Pelée and the Pitons of Northern Martinique	Natural	(viii) (x)	14.8233, -61.1759	-
France	Te Henua Enata – The Marquesas Islands	Mixed	(iii) (vi) (vii) (ix) (x)	-7.9699, -140.6460	-
Gabon	Ecosystem and Relict Cultural Landscape of Lopé-Okanda	Mixed	(iii) (iv) (ix) (x)	-0.5000, 11.5000	-
Gabon	Ivindo National Park	Natural	(ix) (x)	0.1130, 12.6480	-
Georgia	Colchic Rainforests and Wetlands	Natural	(ix) (x)	41.7023, 41.9512	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Guatemala	Tikal National Park	Mixed	(i) (iii) (iv) (ix) (x)	17.2167, -89.6167	-
Guinea-Bissau	Coastal and Marine Ecosystems of the Bijagós Archipelago – Omatí Minhô	Natural	(ix) (x)	11.1200, -15.9489	-
Honduras	Río Plátano Biosphere Reserve	Natural	(vii) (viii) (ix) (x)	15.7444, -84.6750	X
Iceland	Surtsey	Natural	(ix)	63.3031, -20.6022	-
India	Nanda Devi and Valley of Flowers National Parks	Natural	(vii) (x)	30.7167, 79.6667	-
India	Kaziranga National Park	Natural	(ix) (x)	26.6667, 93.4167	-
India	Manas Wildlife Sanctuary	Natural	(vii) (ix) (x)	26.7250, 91.0306	-
India	Keoladeo National Park	Natural	(x)	27.1589, 77.5086	-
India	Sundarbans National Park	Natural	(ix) (x)	21.9450, 88.8958	-
India	Western Ghats	Natural	(ix) (x)	8.5297, 77.2497	-
India	Great Himalayan National Park Conservation Area	Natural	(x)	31.8333, 77.5833	-
India	Khangchendzonga National Park	Mixed	(iii) (vi) (vii) (x)	27.7647, 88.3772	-
Indonesia	Ujung Kulon National Park	Natural	(vii) (x)	-6.7500, 105.3333	-
Indonesia	Komodo National Park	Natural	(vii) (x)	-8.5433, 119.4894	-
Indonesia	Lorentz National Park	Natural	(viii) (ix) (x)	-4.7500, 137.8333	-
Indonesia	Tropical Rainforest Heritage of Sumatra	Natural	(vii) (ix) (x)	-2.5000, 101.5000	X
Iraq	The Ahwar of Southern Iraq: Refuge of Biodiversity and the Relict Landscape of the Mesopotamian Cities	Mixed	(iii) (v) (ix) (x)	31.5622, 47.6578	-
Jamaica	Blue and John Crow Mountains	Mixed	(iii) (vi) (x)	18.0775, -76.5711	-
Japan	Yakushima	Natural	(vii) (ix)	30.3150, 130.5086	-
Japan	Shirakami-Sanchi	Natural	(ix)	40.4525, 140.1156	-
Japan	Shiretoko	Natural	(ix) (x)	43.9494, 144.9658	-
Japan	Ogasawara Islands	Natural	(ix)	27.7183, 142.0997	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Japan	Amami-Oshima Island, Tokunoshima Island, Northern part of Okinawa Island, and Iriomote Island	Natural	(x)	28.2792, 129.3783	-
Kazakhstan	Saryarka – Steppe and Lakes of Northern Kazakhstan	Natural	(ix) (x)	50.4333, 69.1889	-
Kazakhstan, Kyrgyzstan, Uzbekistan	Western Tien-Shan	Natural	(x)	43.7183, 68.6789	-
Kazakhstan, Turkmenistan, Uzbekistan	Cold Winter Deserts of Turan	Natural	(ix) (x)	44.0258, 79.0342	-
Kenya	Mount Kenya National Park/Natural Forest	Natural	(vii) (ix)	-0.1550, 37.3156	-
Kenya	Lake Turkana National Parks	Natural	(viii) (x)	3.0513, 36.5037	X
Kenya	Kenya Lake System in the Great Rift Valley	Natural	(vii) (ix) (x)	-0.4425, 36.2400	-
Kiribati	Phoenix Islands Protected Area	Natural	(vii) (ix)	-3.8645, -172.6502	-
Lao People's Democratic Republic, Viet Nam	Phong Nha-Ke Bang National Park and Hin Nam No National Park	Natural	(viii) (ix) (x)	17.4276, 105.9053	-
Lesotho, South Africa	Maloti-Drakensberg Park	Mixed	(i) (iii) (vii) (x)	-29.7653, 29.1231	-
Madagascar	Andrefana Dry Forests	Natural	(vii) (ix) (x)	-18.6616, 44.7674	-
Madagascar	Rainforests of the Atsinanana	Natural	(ix) (x)	-14.4597, 49.7025	-
Malawi	Lake Malawi National Park	Natural	(vii) (ix) (x)	-14.0333, 34.8833	-
Malaysia	Kinabalu Park	Natural	(ix) (x)	6.2500, 116.5000	-
Malaysia	Gunung Mulu National Park	Natural	(vii) (viii) (ix) (x)	4.1333, 114.9167	-
Mauritania	Banc d'Arguin National Park	Natural	(ix) (x)	20.2347, -16.1089	-
Mexico	Sian Ka'an	Natural	(vii) (x)	19.3833, -87.7917	-
Mexico	Whale Sanctuary of El Vizcaino	Natural	(x)	27.7922, -114.2278	-
Mexico	Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche	Mixed	(i) (ii) (iii) (iv) (ix) (x)	18.0530, -89.7373	-
Mexico	Islands and Protected Areas of the Gulf of California	Natural	(vii) (ix) (x)	27.6267, -112.5458	X
Mexico	El Pinacate and Gran Desierto de Altar Biosphere Reserve	Natural	(vii) (viii) (x)	32.0000, -113.9167	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Mexico	Archipiélago de Revillagigedo	Natural	(vii) (ix) (x)	18.7881, -110.9753	-
Mexico	Tehuacán-Cuicatlán Valley: originary habitat of Mesoamerica	Mixed	(iv) (x)	17.9900, -97.1872	-
Mongolia, Russian Federation	Uvs Nuur Basin	Natural	(ix) (x)	50.2750, 92.7197	-
Mongolia, Russian Federation	Landscapes of Dauria	Natural	(ix) (x)	49.9302, 115.4254	-
Montenegro	Durmitor National Park	Natural	(vii) (viii) (x)	43.1330, 19.0166	-
Mozambique, South Africa	iSimangaliso Wetland Park – Maputo National Park	Natural	(vii) (ix) (x)	-27.8389, 32.5500	-
Namibia	Namib Sand Sea	Natural	(vii) (viii) (ix) (x)	-24.8853, 15.4078	-
Nepal	Chitwan National Park	Natural	(vii) (ix) (x)	27.5000, 84.3333	-
New Zealand	Te Wahipounamu – South West New Zealand	Natural	(vii) (viii) (ix) (x)	-45.0360, 167.3196	-
New Zealand	New Zealand Sub-Antarctic Islands	Natural	(ix) (x)	-50.7500, 166.1044	-
Niger	Air and Ténéré Natural Reserves	Natural	(vii) (ix) (x)	19.0762, 9.6620	X
Palau	Rock Islands Southern Lagoon	Mixed	(iii) (v) (vii) (ix) (x)	7.2469, 134.3525	-
Panama	Darién National Park	Natural	(vii) (ix) (x)	7.7361, -77.5472	-
Panama	Coiba National Park and its Special Zone of Marine Protection	Natural	(ix) (x)	7.4330, -81.7660	-
Peru	Historic Sanctuary of Machu Picchu	Mixed	(i) (iii) (vii) (ix)	-13.1849, -72.5334	-
Peru	Manú National Park	Natural	(ix) (x)	-12.2500, -71.7500	-
Peru	Río Abiseo National Park	Mixed	(iii) (vii) (ix) (x)	-7.7500, -77.2500	-
Philippines	Puerto-Princesa Subterranean River National Park	Natural	(vii) (x)	10.1667, 118.9167	-
Philippines	Tubbataha Reefs Natural Park	Natural	(vii) (ix) (x)	8.9533, 119.8675	-
Philippines	Mount Hamiguitan Range Wildlife Sanctuary	Natural	(x)	6.7172, 126.1734	-
Portugal	Laurisilva of Madeira	Natural	(ix) (x)	32.7667, -17.0000	-
Republic of Korea	Getbol, Korean Tidal Flats	Natural	(x)	34.8288, 126.1044	-
Romania	Danube Delta	Natural	(vii) (x)	45.0833, 29.5000	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Russian Federation	Virgin Komi Forests	Natural	(vii) (ix)	63.6258, 58.9525	-
Russian Federation	Lake Baikal	Natural	(vii) (viii) (ix) (x)	53.1736, 107.6625	-
Russian Federation	Volcanoes of Kamchatka	Natural	(vii) (viii) (ix) (x)	56.3333, 158.5000	-
Russian Federation	Central Sikhote-Alin	Natural	(x)	46.6833, 136.6611	-
Russian Federation	Golden Mountains of Altai	Natural	(x)	50.4667, 86.0000	-
Russian Federation	Western Caucasus	Natural	(ix) (x)	44.0000, 40.0000	-
Russian Federation	Natural System of Wrangel Island Reserve	Natural	(ix) (x)	71.1889, -179.7153	-
Russian Federation	Putorana Plateau	Natural	(vii) (ix)	69.0469, 94.1581	-
Rwanda	Nyungwe National Park	Natural	(x)	-2.5553, 29.2473	-
Saudi Arabia	'Uruq Bani Ma'arid	Natural	(vii) (ix)	19.3639, 45.5983	-
Senegal	Djoudj National Bird Sanctuary	Natural	(vii) (x)	16.4146, -16.2379	-
Senegal	Niokolo-Koba National Park	Natural	(x)	12.8413, -12.8998	-
Seychelles	Aldabra Atoll	Natural	(vii) (ix) (x)	-9.4167, 46.4167	-
Seychelles	Vallée de Mai Nature Reserve	Natural	(vii) (viii) (ix) (x)	-4.3310, 55.7380	-
Sierra Leone	Gola-Tiwai Complex	Natural	(ix) (x)	7.5412, -11.3479	-
Solomon Islands	East Rennell	Natural	(ix)	-11.6833, 160.3333	X
South Africa	Cape Floral Region Protected Areas	Natural	(ix) (x)	-34.3558, 18.4750	-
Spain	Garajonay National Park	Natural	(vii) (ix)	28.1263, -17.2372	-
Spain	Ibiza, Biodiversity and Culture	Mixed	(ii) (iii) (iv) (ix) (x)	38.9111, 1.4352	-
Spain	Doñana National Park	Natural	(vii) (ix) (x)	36.9477, -6.3589	-
Sri Lanka	Sinharaja Forest Reserve	Natural	(ix) (x)	6.4167, 80.5000	-
Sri Lanka	Central Highlands of Sri Lanka	Natural	(ix) (x)	7.4525, 80.8021	-
Sudan	Sanganeb Marine National Park and Dugonab Bay – Mukkawar Island Marine National Park	Natural	(vii) (ix) (x)	19.7361, 37.4431	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
Suriname	Central Suriname Nature Reserve	Natural	(ix) (x)	4.0000, -56.5000	-
Sweden	Laponian Area	Mixed	(iii) (v) (vii) (viii) (ix)	67.3333, 17.5833	-
Switzerland	Swiss Alps Jungfrau-Aletsch	Natural	(vii) (viii) (ix)	46.5000, 8.0333	-
Tajikistan	Tugay forests of the Tigrovaya Balka Nature Reserve	Natural	(ix)	37.2047, 68.3414	-
Thailand	Dong Phrayayen-Khao Yai Forest Complex	Natural	(x)	14.3300, 102.0500	-
Thailand	Thungyai-Huai Kha Khaeng Wildlife Sanctuaries	Natural	(vii) (ix) (x)	15.3333, 98.9167	-
Thailand	Kaeng Krachan Forest Complex	Natural	(x)	12.8657, 99.4002	-
Tunisia	Ichkeul National Park	Natural	(x)	37.1636, 9.6747	-
Uganda	Bwindi Impenetrable National Park	Natural	(vii) (x)	-1.0470, 29.6920	-
Uganda	Rwenzori Mountains National Park	Natural	(vii) (x)	0.2236, 29.9242	-
United Kingdom of Great Britain and Northern Ireland	St Kilda	Mixed	(iii) (v) (vii) (ix) (x)	57.8172, -8.5767	-
United Kingdom of Great Britain and Northern Ireland	Henderson Island	Natural	(vii) (x)	-24.3667, -128.3333	-
United Kingdom of Great Britain and Northern Ireland	Gough and Inaccessible Islands	Natural	(vii) (x)	-40.3247, -9.9286	-
United Kingdom of Great Britain and Northern Ireland	The Flow Country	Natural	(ix)	58.3992, -4.0461	-
United Republic of Tanzania	Ngorongoro Conservation Area	Mixed	(iv) (vii) (viii) (ix) (x)	-3.1872, 35.5408	-
United Republic of Tanzania	Serengeti National Park	Natural	(vii) (x)	-2.3333, 34.5667	-
United Republic of Tanzania	Selous Game Reserve	Natural	(ix) (x)	-9.0000, 37.4000	X
United States of America	Yellowstone National Park	Natural	(vii) (viii) (ix) (x)	44.4606, -110.8278	-
United States of America	Grand Canyon National Park	Natural	(vii) (viii) (ix) (x)	36.1008, -112.0906	-
United States of America	Everglades National Park	Natural	(viii) (ix) (x)	25.5544, -80.9964	X
United States of America	Redwood National and State Parks	Natural	(vii) (ix)	41.3739, -123.9981	-
United States of America	Mammoth Cave National Park	Natural	(vii) (viii) (x)	37.1872, -86.1031	-

Countries / States	Name	Category	Criteria	Coordinates	Danger
United States of America	Olympic National Park	Natural	(vii) (ix)	47.7483, -123.4489	-
United States of America	Great Smoky Mountains National Park	Natural	(vii) (viii) (ix) (x)	35.5931, -83.4356	-
United States of America	Papahānaumokuākea	Mixed	(iii) (vi) (viii) (ix) (x)	25.3491, -170.1458	-
Venezuela (Bolivarian Republic of)	Canaima National Park	Natural	(vii) (viii) (ix) (x)	5.3380, -62.0379	-
Yemen	Socotra Archipelago	Natural	(x)	12.5000, 53.8333	-
Zimbabwe	Mana Pools National Park, Sapi and Chewore Safari Areas	Natural	(vii) (ix) (x)	-15.8194, 29.4081	-

Appendix C: Directory of soundscape recordings in *Ambisonic Earth*.

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0002	2022-05-14	5:22:22 PM	0:09:25	USA	CA	33.743406, -116.728744	Idyllwild Regional Park
0003	2022-05-14	5:32:22 PM	0:01:17	USA	CA	33.743406, -116.728744	Idyllwild Regional Park
0004	2022-05-14	5:33:46 PM	0:04:36	USA	CA	33.743406, -116.728744	Idyllwild Regional Park
0005	2022-05-14	6:15:00 PM	0:00:11	USA	CA	33.743406, -116.728744	Idyllwild Regional Park
0006	2022-05-14	7:10:20 PM	1:05:48	USA	CA	33.739136, -116.717178	Idyllwild-Pine Cove Marian View Dr
0007	2022-05-14	9:15:22 PM	1:30:18	USA	CA	33.739136, -116.717178	Idyllwild-Pine Cove Marian View Dr
0008	2022-05-15	12:45:21 AM	5:57:46	USA	CA	33.739136, -116.717178	Idyllwild-Pine Cove Marian View Dr
0011	2022-05-25	2:00:08 AM	2:30:05	USA	CA	32.763447, -117.134614	San Diego Oregon St Living Room
0012	2022-05-25	10:30:16 PM	0:25:03	USA	CA	32.7634, -117.134658	San Diego Oregon St Window South
0014	2022-05-26	6:40:00 AM	0:05:19	USA	CA	32.763517, -117.134583	San Diego Oregon St Window East
0015	2022-05-26	6:46:23 AM	0:09:20	USA	CA	32.763517, -117.134583	San Diego Oregon St Window East
0016	2022-05-26	7:00:00 AM	0:07:53	USA	CA	32.763517, -117.134583	San Diego Oregon St Window East
0021	2022-06-04	4:55:06 AM	0:04:26	USA	CA	39.757011, -120.352394	Sierra Valley Marble Hot Springs Rd
0022	2022-06-04	5:00:00 AM	0:08:14	USA	CA	39.757011, -120.352394	Sierra Valley Marble Hot Springs Rd
0023	2022-06-04	5:15:00 AM	0:02:30	USA	CA	39.757011, -120.352394	Sierra Valley Marble Hot Springs Rd
0024	2022-06-04	5:20:00 AM	0:03:13	USA	CA	39.757011, -120.352394	Sierra Valley Marble Hot Springs Rd

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0025	2022-06-04	6:00:00 AM	0:11:38	USA	CA	39.757011, -120.352394	Sierra Valley Marble Hot Springs Rd
0026	2022-06-04	6:27:45 AM	0:02:33	USA	CA	39.762767, -120.335258	Sierra Valley Marble Hot Springs Bridge
0027	2022-06-04	6:30:26 AM	0:16:20	USA	CA	39.762767, -120.335258	Sierra Valley Marble Hot Springs Bridge
0028	2022-06-04	9:00:00 AM	0:02:07	USA	CA	39.698836, -120.460756	Carman Valley Pond
0029	2022-06-04	9:04:00 AM	0:00:29	USA	CA	39.698836, -120.460756	Carman Valley Pond
0030	2022-06-04	9:05:00 AM	0:20:32	USA	CA	39.698836, -120.460756	Carman Valley Pond
0031	2022-06-04	9:50:00 AM	0:05:01	USA	CA	39.698464, -120.460914	Carman Valley Meadow
0032	2022-06-04	9:57:00 AM	0:10:02	USA	CA	39.698464, -120.460914	Carman Valley Meadow
0033	2022-06-04	8:40:16 PM	0:15:38	USA	CA	39.617992, -120.491089	Yuba Pass
0034	2022-06-04	8:56:35 PM	0:02:29	USA	CA	39.617992, -120.491089	Yuba Pass
0035	2022-06-04	9:00:26 PM	0:18:47	USA	CA	39.617992, -120.491089	Yuba Pass
0036	2022-06-04	9:20:00 PM	0:04:15	USA	CA	39.617992, -120.491089	Yuba Pass IRs
0037	2022-06-05	1:34:40 PM	0:15:50	USA	CA	39.557933, -120.762147	Tahoe NF North Yuba River
0038	2022-06-05	1:51:24 PM	0:21:32	USA	CA	39.557933, -120.762147	Tahoe NF North Yuba River
0039	2022-06-05	4:13:24 PM	0:39:21	USA	CA	39.495044, -121.026236	Tahoe NF Joubert Diggins
0040	2022-06-05	8:25:11 PM	0:00:04	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0041	2022-06-05	8:25:26 PM	0:00:08	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0042	2022-06-05	10:40:00 PM	0:32:20	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0043	2022-06-05	11:18:57 PM	0:00:57	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0044	2022-06-05	11:21:50 PM	0:00:55	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0045	2022-06-05	11:30:00 PM	0:05:20	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins IRs
0046	2022-06-06	3:55:12 AM	0:04:47	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0047	2022-06-06	4:00:14 AM	0:11:43	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0048	2022-06-06	4:14:36 AM	0:02:35	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0050	2022-06-06	4:17:35 AM	3:13:32	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0051	2022-06-06	8:08:35 AM	0:07:13	USA	CA	39.495431, -121.026	Tahoe NF Joubert Diggins
0052	2022-06-06	10:13:47 AM	0:13:56	USA	CA	39.226519, -121.53875	Marysville Mathews Ln Crop Duster
0053	2022-06-06	12:49:24 PM	0:42:02	USA	CA	39.60945, -121.561342	North Table Mountain ER Phantom Falls
0054	2022-06-06	2:22:22 PM	0:04:15	USA	CA	39.604164, -121.558997	North Table Mountain ER Ravine
0055	2022-06-06	2:35:46 PM	0:08:09	USA	CA	39.603881, -121.558267	North Table Mountain ER Ravine Falls
0056	2022-06-06	2:44:22 PM	0:01:27	USA	CA	39.603881, -121.558267	North Table Mountain ER Ravine Falls
0057	2022-06-06	2:46:03 PM	0:03:46	USA	CA	39.603881, -121.558267	North Table Mountain ER Ravine IRs
0058	2022-06-06	3:39:24 PM	0:16:19	USA	CA	39.602647, -121.558572	North Table Mountain ER Trailhead
0059	2022-06-06	6:29:06 PM	0:17:08	USA	CA	39.422153, -122.14695	Sacramento NWR Deck 1
0060	2022-06-06	7:03:10 PM	0:01:06	USA	CA	39.422153, -122.14695	Sacramento NWR Deck 1
0061	2022-06-06	7:08:18 PM	0:25:04	USA	CA	39.422153, -122.14695	Sacramento NWR Deck 1
0062	2022-06-07	3:47:07 AM	2:44:07	USA	CA	39.422153, -122.14695	Sacramento NWR Deck 1
0063	2022-06-07	6:41:25 AM	0:30:51	USA	CA	39.422189, -122.148256	Sacramento NWR Deck 2

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0064	2022-06-07	7:12:35 AM	0:00:03	USA	CA	39.422189, -122.148256	Sacramento NWR Deck 2
0065	2022-06-07	7:21:00 AM	0:36:32	USA	CA	39.422189, -122.148256	Sacramento NWR Deck 2
0066	2022-06-07	3:34:21 PM	0:39:05	USA	CA	39.183256, -122.051383	Colusa NWR Bridge
0067	2022-06-07	4:18:48 PM	0:24:32	USA	CA	39.183872, -122.057817	Colusa NWR
0068	2022-06-07	8:36:41 PM	2:40:38	USA	CA	37.205856, -120.790489	San Luis NWR
0069	2022-06-07	11:30:19 PM	0:01:17	USA	CA	37.205856, -120.790489	San Luis NWR
0070	2022-06-08	3:57:11 AM	3:14:33	USA	CA	37.205856, -120.790489	San Luis NWR
0071	2022-06-08	9:13:34 AM	0:16:18	USA	CA	37.170833, -120.626572	Merced NWR
0072	2022-06-08	9:30:13 AM	0:15:37	USA	CA	37.170656, -120.626564	Merced NWR Cattle
0073	2022-06-08	10:27:30 AM	0:46:18	USA	CA	37.167928, -120.611533	Merced NWR
0074	2022-06-08	2:06:43 PM	0:27:09	USA	CA	36.699478, -120.303108	Mendota WA
0075	2022-06-08	2:56:20 PM	0:27:32	USA	CA	36.702308, -120.311561	Mendota WA Reeds
0076	2022-06-08	3:30:19 PM	0:07:35	USA	CA	36.702317, -120.311675	Mendota WA
0077	2022-06-08	7:37:14 PM	0:11:20	USA	CA	35.77205, -119.598302	Kern NWR
0078	2022-06-08	8:06:35 PM	1:10:27	USA	CA	35.760667, -119.600158	Kern NWR
0079	2022-06-08	9:19:54 PM	1:30:32	USA	CA	35.760667, -119.600158	Kern NWR
0080	2022-06-09	3:32:07 AM	3:09:09	USA	CA	35.761936, -119.599725	Kern NWR
0081	2022-06-24	7:14:22 PM	0:17:06	USA	CA	36.518269, -118.759156	Sequoia NP Paradise Creek
0082	2022-06-24	11:00:18 PM	0:40:35	USA	CA	36.5218, -118.76415	Sequoia NP Buckeye Flats

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0083	2022-06-25	4:31:04 AM	2:45:38	USA	CA	36.5218, -118.76415	Sequoia NP Buckeye Flats
0084	2022-06-25	8:34:50 AM	0:13:26	USA	CA	36.5218, -118.76415	Sequoia NP Buckeye Flats
0085	2022-06-25	7:38:32 PM	3:47:05	USA	CA	36.554253, -118.748367	Sequoia NP Crescent Meadow
0086	2022-06-26	4:31:36 AM	0:00:51	USA	CA	36.554253, -118.748367	Sequoia NP Crescent Meadow
0087	2022-06-26	6:20:52 AM	0:46:20	USA	CA	36.554253, -118.748367	Sequoia NP Crescent Meadow
0088	2022-08-20	5:38:19 PM	0:33:58	USA	WA	47.797492, -123.951736	Olympic NP Hoh Rainforest
0089	2022-08-20	7:32:37 PM	1:15:04	USA	WA	47.797467, -123.951728	Olympic NP Hoh Rainforest
0090	2022-08-21	7:01:33 AM	4:14:59	USA	WA	47.797467, -123.951728	Olympic NP Hoh Rainforest
0091	2022-08-21	11:22:04 AM	0:09:49	USA	WA	47.797467, -123.951728	Olympic NP Hoh Rainforest IRs
0092	2022-08-21	1:29:57 PM	0:20:37	USA	WA	47.565414, -124.362153	Olympic NP Kalaloch
0093	2022-08-21	1:50:49 PM	0:03:20	USA	WA	47.565419, -124.362144	Olympic NP Kalaloch
0094	2022-08-21	1:55:37 PM	0:31:28	USA	WA	47.565475, -124.361725	Olympic NP Kalaloch
0095	2022-08-21	2:28:24 PM	0:05:13	USA	WA	47.565475, -124.361725	Olympic NP Kalaloch IRs
0096	2022-09-09	8:04:22 PM	0:40:07	ENG	SE	51.130856, 1.335453	Port of Dover
0097	2022-09-10	4:33:20 PM	0:23:24	ENG	SE	50.818311, -0.136533	Brighton Palace of Fun
0098	2022-09-10	5:00:53 PM	0:42:25	ENG	SE	50.815639, -0.137275	Brighton Palace Pier
0099	2022-09-10	5:43:15 PM	0:29:28	ENG	SE	50.817997, -0.136556	Brighton Palace of Fun
0100	2022-09-10	6:13:59 PM	0:02:40	ENG	SE	50.818181, -0.136417	Brighton Palace of Fun
0101	2022-09-10	6:28:14 PM	0:47:41	ENG	SE	50.818356, -0.136556	Brighton Palace of Fun

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0102	2022-09-10	7:16:38 PM	0:34:33	ENG	SE	50.820331, -0.144767	Brighton Boardwalk
0106	2023-02-23	2:52:30 PM	0:11:01	USA	NY	40.718285, -74.001845	NYC Walker St Rooftop
0107	2023-02-23	3:04:20 PM	0:12:39	USA	NY	40.718285, -74.001845	NYC Walker St Rooftop
0108	2023-06-26	2:21:25 PM	0:26:33	USA	CA	33.108836, -115.579742	Calipatria Kalin Rd
0109	2023-06-26	3:11:18 PM	0:05:59	USA	CA	33.176933, -115.615861	Sonny Bono Salton Sea NWR
0110	2023-06-26	3:53:46 PM	0:41:22	USA	CA	33.176942, -115.615853	Sonny Bono Salton Sea NWR Quails
0111	2023-06-26	4:47:05 PM	0:25:17	USA	CA	33.176986, -115.615928	Sonny Bono Salton Sea NWR
0112	2023-06-26	5:34:36 PM	0:18:38	USA	CA	33.200847, -115.577928	Old Mud Pots
0113	2023-06-26	5:54:59 PM	0:14:35	USA	CA	33.200836, -115.57785	Old Mud Pots
0114	2023-06-26	6:12:43 PM	0:01:42	USA	CA	33.200936, -115.578011	Old Mud Pots
0115	2023-06-26	6:15:43 PM	0:17:49	USA	CA	33.200936, -115.578011	Old Mud Pots
0116	2023-06-26	6:54:05 PM	0:18:26	USA	CA	33.181283, -115.597375	Elmore Geothermal Facility
0117	2023-06-26	10:49:11 PM	0:11:28	USA	AZ	33.0307, -114.202347	Kofa NWR
0118	2023-06-27	4:30:15 AM	1:21:24	USA	AZ	33.030619, -114.202508	Kofa NWR
0119	2023-06-27	7:15:44 AM	0:38:30	USA	AZ	32.829975, -114.448303	Mittry Lake WA
0120	2023-06-27	8:09:09 AM	0:18:19	USA	AZ	32.820275, -114.469733	Mittry Lake WA
0121	2023-06-27	8:33:14 AM	0:08:41	USA	AZ	32.819031, -114.470489	Mittry Lake WA
0122	2023-06-27	9:39:55 AM	0:33:15	USA	AZ	32.982942, -114.467339	Imperial NWR
0123	2023-06-27	10:23:16 AM	0:25:18	USA	AZ	33.008706, -114.49105	Imperial NWR

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0124	2023-06-27	6:54:50 PM	0:26:33	USA	AZ	33.008481, -114.491378	Imperial NWR
0125	2023-06-27	7:21:39 PM	1:15:04	USA	AZ	33.008481, -114.491378	Imperial NWR
0126	2023-06-27	10:23:59 PM	0:24:24	USA	AZ	33.008481, -114.491378	Imperial NWR
0127	2023-06-28	4:12:45 AM	1:50:14	USA	AZ	33.008481, -114.491378	Imperial NWR
0128	2023-06-28	7:00:40 AM	0:35:15	USA	AZ	32.816094, -114.46	Mittry Lake WA
0129	2023-06-28	10:14:23 AM	0:18:52	USA	AZ	33.360661, -114.698533	Cibola NWR
0130	2023-06-28	11:11:42 AM	0:16:28	USA	AZ	33.298558, -114.693047	Cibola NWR
0131	2023-06-28	11:31:23 AM	0:27:05	USA	AZ	33.299625, -114.692939	Cibola NWR
0132	2023-06-28	12:12:01 PM	0:24:51	USA	AZ	33.288692, -114.691497	Cibola NWR
0133	2023-06-28	2:20:09 PM	0:36:30	USA	CA	33.691281, -114.517158	Palo Verde ER
0134	2023-06-28	5:35:48 PM	0:29:27	USA	CA	33.725669, -114.508019	Palo Verde ER
0135	2023-06-28	6:15:13 PM	0:22:06	USA	CA	33.725106, -114.510672	Palo Verde ER Tow Truck
0136	2023-06-28	7:13:58 PM	1:53:07	USA	CA	33.691114, -114.517433	Palo Verde ER
0137	2023-06-29	3:58:10 AM	3:11:01	USA	CA	33.691217, -114.51715	Palo Verde ER
0138	2023-06-29	9:24:39 AM	0:23:30	USA	AZ	34.29155, -114.085372	Bill Williams River NWR
0139	2023-06-29	11:12:03 AM	1:10:12	USA	AZ	34.742428, -114.487481	Havas NWR Catfish Paradise
0140	2023-06-29	12:32:09 PM	0:43:10	USA	AZ	34.742547, -114.487372	Havas NWR Catfish Paradise
0141	2023-06-29	3:28:57 PM	0:25:13	USA	NV	36.017339, -114.743308	Hoover Dam Power Substation
0142	2023-06-29	8:09:45 PM	0:19:11	USA	UT	37.142364, -114.022469	Lytle Ranch Preserve

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0143	2023-06-29	9:11:37 PM	3:06:24	USA	UT	37.143939, -114.024475	Lytle Ranch Preserve Beaver Dam Wash
0144	2023-06-30	1:18:50 AM	0:27:25	USA	UT	37.143933, -114.024392	Lytle Ranch Preserve Beaver Dam Wash
0145	2023-06-30	4:52:03 AM	2:43:18	USA	UT	37.143914, -114.024483	Lytle Ranch Preserve Beaver Dam Wash
0146	2023-06-30	8:17:15 PM	1:57:23	USA	UT	37.2906, -112.94738	Zion NP Virgin River
0147	2023-06-30	10:49:03 PM	0:23:13	USA	UT	37.29135, -112.94742	Zion NP Virgin River
0148	2023-06-30	11:12:32 PM	0:00:03	USA	UT	37.29135, -112.94742	Zion NP Virgin River
0149	2023-06-30	11:33:19 PM	0:25:20	USA	UT	37.29021, -112.94797	Zion NP Virgin River
0150	2023-07-01	12:14:59 AM	0:25:25	USA	UT	37.28963, -112.94772	Zion NP Virgin River
0151	2023-07-01	1:07:19 AM	0:37:11	USA	UT	37.28925, -112.94734	Zion NP Virgin River
0152	2023-07-01	2:46:43 AM	4:07:05	USA	UT	37.28924, -112.94731	Zion NP Virgin River
0153	2023-07-01	7:57:37 PM	1:15:04	USA	UT	37.792131, -112.788192	Dixie NF
0154	2023-07-02	5:51:56 AM	0:52:20	USA	UT	37.792075, -112.788269	Dixie NF
0155	2023-07-02	10:03:18 AM	0:33:00	USA	UT	38.905894, -112.371253	Fillmore Halfway Hill WMA
0156	2023-07-02	10:55:12 AM	0:47:50	USA	UT	38.896297, -112.355828	Fillmore Halfway Hill WMA
0157	2023-07-02	12:03:54 PM	0:20:25	USA	UT	38.935281, -112.361489	Fillmore I-15 Frontage Rd
0158	2023-07-02	1:02:22 PM	0:30:41	USA	UT	38.939322, -112.268578	Fillmore Cemetery WMA
0159	2023-07-02	2:27:43 PM	0:03:59	USA	UT	39.022647, -112.28505	Fillmore Circus Hollow WMA
0160	2023-07-02	2:06:41 PM	0:27:26	USA	UT	39.022647, -112.28505	Fillmore Circus Hollow WMA
0161	2023-07-02	2:54:25 PM	0:31:48	USA	UT	39.077656, -112.254708	Fillmore Bennett Field WMA

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0162	2023-07-02	4:38:39 PM	0:26:07	USA	UT	39.567703, -112.838456	Fumarole Butte
0163	2023-07-02	6:45:42 PM	0:34:27	USA	UT	39.853, -113.369842	Fish Springs NWR
0164	2023-07-02	7:30:30 PM	0:28:14	USA	UT	39.867, -113.369094	Fish Springs NWR
0165	2023-07-02	8:18:50 PM	0:25:03	USA	UT	39.865817, -113.359917	Fish Springs NWR
0166	2023-07-03	4:33:25 AM	6:15:16	USA	UT	39.865617, -113.358794	Fish Springs NWR
0167	2023-07-03	11:53:05 AM	0:52:32	USA	UT	39.853419, -113.370164	Fish Springs NWR
0168	2023-07-03	4:10:56 PM	0:08:20	USA	UT	40.614014, -112.708406	Horseshoe Springs WMA
0169	2023-07-03	4:21:08 PM	0:11:31	USA	UT	40.614186, -112.7089	Horseshoe Springs WMA
0170	2023-07-03	4:33:33 PM	0:50:03	USA	UT	40.614186, -112.7089	Horseshoe Springs WMA Storm
0171	2023-07-03	5:35:33 PM	0:24:57	USA	UT	40.614003, -112.708367	Horseshoe Springs WMA
0172	2023-07-03	7:40:07 PM	0:21:02	USA	UT	41.486331, -112.134353	Bear River MBR
0173	2023-07-03	8:16:39 PM	0:07:28	USA	UT	41.479744, -112.267044	Bear River MBR
0174	2023-07-03	8:41:39 PM	0:17:04	USA	UT	41.479806, -112.267114	Bear River MBR
0175	2023-07-04	4:51:42 AM	1:15:04	USA	UT	41.486819, -112.1333	Bear River MBR
0176	2023-07-04	12:20:22 PM	1:02:57	USA	UT	41.341972, -112.098311	Harold S Crane WMA
0177	2023-08-31	7:03:13 PM	0:25:03	USA	CA	32.763369, -117.134597	San Diego Oregon St Crows
0178	2023-09-08	6:56:09 PM	0:34:31	MEX	BCN	32.533744, -117.038056	Tijuana Pasaje Rodriguez
0179	2023-09-29	6:32:24 AM	0:44:47	USA	CA	34.3525, -118.530669	Oak Canyon Equestrian Center
0180	2023-09-29	5:37:15 PM	0:39:52	USA	CA	34.3525, -118.530669	Oak Canyon Equestrian Center

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0181	2023-09-29	6:33:09 PM	0:55:20	USA	CA	34.3525, -118.530669	Oak Canyon Equestrian Center
0182	2023-09-29	11:32:01 PM	0:50:03	USA	CA	34.352469, -118.530778	Oak Canyon Equestrian Center
0183	2023-09-30	4:16:38 AM	0:50:04	USA	CA	34.352469, -118.530778	Oak Canyon Equestrian Center
0184	2023-09-30	11:15:02 PM	0:56:27	USA	CA	34.352667, -118.530903	Oak Canyon Equestrian Center
0185	2023-10-01	5:29:46 AM	3:05:32	USA	CA	34.352661, -118.530769	Oak Canyon Equestrian Center
0186	2023-12-20	4:41:34 PM	0:12:36	USA	NM	35.854544, -106.4915	Valles Caldera National Preserve
0187	2023-12-21	3:59:04 PM	0:14:03	USA	CO	37.749553, -105.534019	Great Sand Dunes National Preserve
0188	2023-12-21	4:16:26 PM	0:27:52	USA	CO	37.749408, -105.534042	Great Sand Dunes National Preserve IRs
0189	2023-12-22	2:02:59 PM	0:34:11	USA	NM	36.469281, -105.732544	Río Grande Gorge West Rim
0190	2024-03-23	5:26:32 PM	0:11:02	USA	TX	33.2557, -97.045686	Clear Creek Natural Heritage Center
0191	2024-03-23	5:41:25 PM	0:23:21	USA	TX	33.256686, -97.045569	Clear Creek Natural Heritage Center
0192	2024-03-24	6:18:59 AM	1:48:07	USA	TX	33.256775, -97.045639	Clear Creek Natural Heritage Center
0193	2024-03-24	12:05:40 PM	0:29:47	USA	OK	34.192203, -96.643272	Tishomingo NWR
0194	2024-03-24	12:51:25 PM	0:13:09	USA	OK	34.189293, -96.653844	Tishomingo NWR
0195	2024-03-24	1:11:02 PM	0:27:24	USA	OK	34.192322, -96.643478	Tishomingo NWR
0206	2024-04-07	9:12:30 PM	0:50:03	USA	TX	32.278806, -96.199997	Llama Land Ranch
0207	2024-04-08	3:15:49 AM	0:01:52	USA	TX	32.278806, -96.199997	Llama Land Ranch
0208	2024-04-08	3:18:54 AM	1:06:29	USA	TX	32.278806, -96.199997	Llama Land Ranch
0209	2024-04-08	4:29:05 AM	0:07:05	USA	TX	32.278806, -96.199997	Llama Land Ranch

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0210	2024-04-08	6:03:27 AM	2:18:16	USA	TX	32.281578, -96.200517	Llama Land Ranch
0211	2024-04-08	8:36:39 AM	0:44:54	USA	TX	32.278797, -96.201119	Llama Land Ranch
0212	2024-04-08	9:25:01 AM	0:14:13	USA	TX	32.2795, -96.20114	Llama Land Ranch
0213	2024-04-08	12:13:24 PM	3:06:15	USA	TX	32.278133, -96.200928	Llama Land Ranch Eclipse
0214	2024-04-08	3:45:19 PM	0:10:28	USA	TX	32.27925, -96.2006	Llama Land Ranch
0215	2024-04-09	4:01:36 AM	0:37:48	USA	TX	32.916858, -96.768242	Dallas Richardson Studio 6
0218	2024-05-26	11:54:07 AM	0:23:26	USA	IL	38.479075, -89.875481	Belleville Deerwood Estates
0220	2024-05-26	12:55:40 PM	0:22:30	USA	IL	38.475833, -89.884536	Knobeloch Woods
0221	2024-05-26	4:39:13 PM	0:18:09	USA	IL	37.686203, -89.406556	Shawnee NF Little Grand Canyon
0222	2024-05-26	5:06:42 PM	0:29:38	USA	IL	37.685122, -89.405664	Shawnee NF Little Grand Canyon
0223	2024-05-26	6:36:27 PM	0:14:47	USA	IL	37.481792, -89.3593	Trail of Tears SF
0224	2024-05-26	8:12:31 PM	0:17:13	USA	IL	37.358283, -88.917494	Cache River Todd Fink Heron Pond Trail
0225	2024-05-27	4:27:40 AM	0:50:03	USA	IL	37.358342, -88.917739	Cache River Todd Fink Heron Pond Trail
0226	2024-05-27	8:48:24 AM	0:43:29	USA	IL	37.358342, -88.917739	Cache River Todd Fink Heron Pond Trail
0227	2024-05-27	10:16:38 AM	0:42:32	USA	IL	37.357344, -88.914886	Cache River Todd Fink Heron Pond Bridge
0228	2024-05-27	11:05:36 AM	0:22:41	USA	IL	37.357253, -88.916969	Cache River Todd Fink Heron Pond Trail
0229	2024-05-27	12:53:02 PM	0:21:23	USA	IL	37.291539, -89.118933	Cypress Creek NWR Bellrose Reserve
0230	2024-05-27	1:48:26 PM	0:16:13	USA	IL	37.201047, -89.058967	Chestnut Hills Calvin Cemetery
0231	2024-05-27	2:55:14 PM	0:14:23	USA	IL	37.270661, -88.849114	Mermet Lake SFWA

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0232	2024-05-27	3:20:54 PM	0:30:26	USA	IL	37.254647, -88.848808	Mermet Lake SFWA Mermet Swamp
0233	2024-05-27	3:59:38 PM	0:37:16	USA	IL	37.251453, -88.828103	Mermet Lake SFWA Train Idling
0234	2024-05-27	5:04:27 PM	0:22:57	USA	IL	37.22775, -88.750528	Sielbeck Forest SNA
0235	2024-05-27	5:31:18 PM	0:11:54	USA	IL	37.227545, -88.749025	Sielbeck Forest SNA
0236	2024-05-27	5:46:42 PM	0:12:47	USA	IL	37.227622, -88.749756	Sielbeck Forest SNA
0237	2024-05-27	6:31:50 PM	0:20:38	USA	IL	37.198956, -88.529214	Cretaceous Hills
0238	2024-05-27	7:56:29 PM	0:32:43	USA	IL	37.602814, -88.386033	Shawnee NF Garden of the Gods
0239	2024-05-27	8:46:16 PM	0:51:12	USA	IL	37.603761, -88.385803	Shawnee NF Garden of the Gods
0240	2024-05-28	5:03:16 AM	0:56:54	USA	IL	37.603581, -88.385956	Shawnee NF Garden of the Gods
0241	2024-05-28	6:01:57 AM	0:36:15	USA	IL	37.603761, -88.385772	Shawnee NF Garden of the Gods
0242	2024-05-28	6:47:37 AM	0:37:43	USA	IL	37.604053, -88.386314	Shawnee NF Garden of the Gods
0243	2024-05-28	7:55:11 AM	1:13:55	USA	IL	37.601628, -88.377861	Shawnee NF Garden of the Gods Pharaoh
0244	2024-05-28	9:45:39 AM	0:14:36	USA	IL	37.691669, -88.380494	Saline County SFWA
0245	2024-05-28	11:29:27 AM	0:17:24	USA	IN	37.867297, -88.053192	Wabash Lowlands
0246	2024-05-28	11:50:37 AM	0:14:47	USA	IN	37.867256, -88.053192	Wabash Lowlands
0247	2024-05-28	1:34:05 PM	0:12:31	USA	IN	38.330117, -87.767494	Patoka River NWR Cane Ridge WMA
0248	2024-05-28	1:57:47 PM	0:14:49	USA	IN	38.323853, -87.766747	Patoka River NWR Cane Ridge WMA
0249	2024-05-28	3:49:26 PM	0:21:15	USA	IL	38.489711, -88.726264	Miller Shrub Swamp
0250	2024-05-28	4:13:39 PM	0:17:51	USA	IL	38.489733, -88.726683	Miller Shrub Swamp Bridge

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0251	2024-05-28	6:32:41 PM	0:19:03	USA	IL	39.173778, -89.499144	H & B Bremer Wildlife Sanctuary
0252	2024-05-28	6:55:56 PM	0:18:43	USA	IL	39.174769, -89.498931	H & B Bremer Wildlife Sanctuary
0253	2024-05-28	8:13:32 PM	1:07:37	USA	IL	39.629161, -89.455536	Sangchris Lake SP Pheasant Run
0254	2024-05-29	5:00:48 AM	3:32:23	USA	IL	39.643622, -89.465333	Sangchris Lake SP Hickory Point
0255	2024-05-29	9:28:06 AM	2:50:41	USA	IL	39.629147, -89.455497	Sangchris Lake SP Pheasant Run
0256	2024-05-29	12:59:21 PM	0:22:03	USA	IL	39.683353, -89.652642	Springfield Bridgeview Park
0258	2024-05-29	2:00:49 PM	0:14:05	USA	IL	39.759128, -89.589089	Springfield Tom Madonia Park East
0259	2024-05-29	4:59:51 PM	0:17:54	USA	IL	39.697156, -89.704842	Nipper Wildlife Sanctuary
0260	2024-05-29	5:55:11 PM	0:13:27	USA	IL	39.795247, -89.717956	Lewis Park & Trails
0261	2024-05-29	6:43:20 PM	0:28:38	USA	IL	39.917269, -89.744156	Sangamon River SFWA Athens Robin Ln
0262	2024-05-29	8:22:02 PM	0:39:58	USA	IL	39.936489, -90.346808	Shick Shack Sand Pond
0263	2024-05-29	9:39:47 PM	0:59:21	USA	IL	39.856564, -90.467133	Meredosia Hill Prairie
0264	2024-05-29	11:20:11 PM	0:34:22	USA	IL	39.845281, -90.559219	Meredosia NWR
0265	2024-05-30	4:37:18 AM	3:00:15	USA	IL	39.845203, -90.56095	Meredosia NWR
0266	2024-05-30	9:49:17 AM	0:25:56	USA	IL	39.835269, -90.221475	Jacksonville Holt Rd
0267	2024-05-30	11:07:58 AM	0:26:45	USA	IL	40.216489, -90.113092	Matanzas Prairie
0268	2024-05-30	12:02:27 PM	0:29:07	USA	IL	40.353089, -90.085158	Emiquon NWR
0269	2024-05-30	1:44:50 PM	0:24:09	USA	IL	40.364178, -89.997956	Chautauqua NWR
0270	2024-05-30	2:41:57 PM	0:33:58	USA	IL	40.398372, -89.867111	Sand Ridge SF

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0271	2024-05-30	4:46:38 PM	0:16:05	USA	IL	40.859314, -89.602372	Singing Woods
0272	2024-05-30	5:06:06 PM	0:18:23	USA	IL	40.859303, -89.602364	Singing Woods
0273	2024-05-30	8:16:01 PM	2:14:10	USA	IL	41.007125, -87.540267	Kankakee NWR Iroquois Sands
0274	2024-05-31	3:58:51 AM	3:42:20	USA	IL	41.006517, -87.53955	Kankakee NWR Iroquois Sands
0275	2024-05-31	7:52:18 AM	0:25:22	USA	IL	41.009317, -87.541419	Kankakee NWR Iroquois Sands
0276	2024-05-31	8:23:15 AM	0:27:47	USA	IL	41.008267, -87.542206	Kankakee NWR Iroquois Sands
0277	2024-05-31	10:49:34 AM	3:05:13	USA	IL	41.396694, -87.754006	Raccoon Grove
0278	2024-05-31	3:04:55 PM	0:19:23	USA	IL	41.366242, -88.144981	Midewin National Tallgrass Prairie
0279	2024-05-31	4:20:44 PM	0:35:29	USA	IL	41.388642, -88.239119	McKinley Woods FP
0280	2024-05-31	6:45:08 PM	0:20:02	USA	IL	41.444358, -89.886811	Mineral Marsh
0281	2024-05-31	7:07:18 PM	0:24:09	USA	IL	41.445083, -89.88675	Mineral Marsh
0282	2024-05-31	8:51:10 PM	0:08:40	USA	IL	41.139222, -90.955406	Port Louisa NWR
0283	2024-05-31	9:01:04 PM	0:50:03	USA	IL	41.139222, -90.955406	Port Louisa NWR
0284	2024-06-01	12:42:25 AM	0:12:55	USA	IL	41.139222, -90.955406	Port Louisa NWR
0285	2024-06-01	8:06:24 AM	0:54:15	USA	IL	41.139211, -90.955422	Port Louisa NWR
0286	2024-06-01	1:46:24 PM	0:36:49	USA	IL	40.366183, -91.401	Cedar Glen SNA
0287	2024-06-01	2:23:19 PM	0:00:14	USA	IL	40.366183, -91.401	Cedar Glen SNA
0288	2024-06-01	3:52:58 PM	0:38:32	USA	IL	39.441147, -91.007392	Great River NWR Delair Division
0289	2024-06-30	5:59:50 PM	0:13:30	USA	HI	21.328772, -157.822419	O'ahu Round Top FR Nahuina Walking

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0290	2024-07-01	4:40:37 AM	0:40:01	USA	HI	21.323783, -157.819992	O'ahu Round Top FR Makiki Valley Walking
0291	2024-07-01	5:25:05 AM	1:00:11	USA	HI	21.323428, -157.820678	O'ahu Round Top FR Makiki Valley
0292	2024-07-01	6:29:09 AM	0:34:34	USA	HI	21.323428, -157.820678	O'ahu Round Top FR Makiki Valley
0293	2024-07-01	7:07:02 AM	0:36:39	USA	HI	21.323428, -157.820678	O'ahu Round Top FR Makiki Valley
0294	2024-07-01	3:22:40 PM	0:36:37	USA	HI	21.64145, -158.016328	O'ahu Pūpūkea FR Kaunala Walking
0295	2024-07-02	5:10:29 AM	1:15:04	USA	HI	21.641881, -158.015411	O'ahu Pūpūkea FR Kaunala
0296	2024-07-02	6:58:46 AM	1:08:34	USA	HI	21.641881, -158.015411	O'ahu Pūpūkea FR Kaunala
0297	2024-07-02	8:11:55 AM	0:29:21	USA	HI	21.640139, -158.018739	O'ahu Pūpūkea FR Kaunala Walking
0298	2024-07-02	6:37:26 PM	0:25:03	USA	HI	21.4031, -157.755967	O'ahu Kawainui Marsh Bike Trail Walking
0299	2024-07-02	7:50:46 PM	0:03:30	USA	HI	21.40511, -157.75534	O'ahu Kawainui Marsh Kaha Park
0300	2024-07-04	5:26:08 AM	0:25:52	USA	HI	21.281981, -157.677108	O'ahu Halona Beach Cove
0301	2024-07-04	5:57:28 AM	0:15:26	USA	HI	21.285847, -157.673814	O'ahu Halona Beach Cove Tunnel
0302	2024-07-04	1:38:41 PM	1:33:25	USA	HI	21.271811, -157.822083	O'ahu Park Shore Waikiki Hotel
0303	2024-07-04	3:34:37 PM	0:22:03	USA	HI	21.271811, -157.822083	O'ahu Park Shore Waikiki Hotel
0304	2024-07-04	4:07:58 PM	0:33:15	USA	HI	21.271811, -157.822083	O'ahu Park Shore Waikiki Hotel
0305	2024-07-04	4:42:39 PM	4:29:31	USA	HI	21.271811, -157.822083	O'ahu Park Shore Waikiki Hotel
0306	2024-07-04	9:14:39 PM	0:25:03	USA	HI	21.271811, -157.822083	O'ahu Park Shore Waikiki Hotel
0307	2024-07-05	5:13:11 AM	1:08:17	USA	HI	21.405889, -157.756408	O'ahu Kawainui Marsh Bike Trail
0308	2024-07-05	7:47:56 AM	1:47:46	USA	HI	21.391878, -157.762894	O'ahu Kawainui Marsh Sanctuary

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0309	2024-07-05	12:20:07 PM	4:20:24	USA	HI	21.271681, -157.82225	O'ahu Park Shore Waikiki Hotel
0310	2024-07-05	4:45:29 PM	4:33:38	USA	HI	21.271681, -157.82225	O'ahu Park Shore Waikiki Hotel
0311	2024-07-05	9:32:18 PM	6:56:05	USA	HI	21.271681, -157.82225	O'ahu Park Shore Waikiki Hotel
0312	2024-07-06	5:13:24 AM	2:04:04	USA	HI	21.268111, -157.821228	O'ahu Kapi'olani Regional Park
0313	2024-08-17	6:04:01 PM	0:26:37	USA	CA	32.763369, -117.134597	San Diego Oregon St Police Helicopter
0314	2024-09-15	8:15:57 PM	0:25:13	USA	WY	41.097253, -104.956244	Cheyenne Otto Rd Wind Turbine
0315	2024-09-16	6:02:25 AM	0:50:04	USA	CO	40.674269, -106.318328	Arapaho NWR
0316	2024-09-16	8:34:51 AM	0:24:41	USA	CO	40.668975, -106.331147	Arapaho NWR Prairie Dogs
0317	2024-09-16	11:39:49 AM	3:37:07	USA	CO	40.498256, -105.8665	State Forest State Park
0318	2024-09-16	9:43:51 PM	0:23:30	USA	WY	41.093544, -104.951553	Cheyenne Otto Rd Wind Turbine
0319	2024-09-16	10:09:09 PM	0:43:31	USA	WY	41.093544, -104.951553	Cheyenne Otto Rd Wind Turbine
0320	2024-09-17	7:10:53 PM	0:31:16	USA	CA	40.467919, -121.517892	Lassen NP Emerald Lake
0321	2024-09-17	8:00:18 PM	0:19:00	USA	CA	40.449444, -121.534675	Lassen NP Sulphur Works
0322	2024-09-18	5:33:31 AM	1:40:04	USA	CA	40.465336, -121.514389	Lassen NP Bumpass Hell Trailhead
0323	2024-09-18	8:45:05 AM	0:20:32	USA	CA	40.457425, -121.501792	Lassen NP Bumpass Hell Fumaroles
0324	2024-09-18	9:07:59 AM	0:25:43	USA	CA	40.457161, -121.501206	Lassen NP Bumpass Hell Fumaroles
0325	2024-09-18	9:51:49 AM	0:26:44	USA	CA	40.458406, -121.505133	Lassen NP Bumpass Hell Fumaroles
0326	2024-09-18	2:22:55 PM	0:44:48	USA	CA	41.931206, -122.441428	Klamath River Iron Gate Dam
0327	2024-09-18	3:35:06 PM	0:14:30	USA	CA	41.972722, -122.43885	Klamath River Wild Horses

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0328	2024-09-18	4:27:53 PM	0:20:50	USA	CA	41.985539, -122.334014	Klamath River Copco Dam
0329	2024-09-18	5:14:30 PM	0:22:57	USA	CA	41.978967, -122.290489	Klamath River Copco Lake
0330	2024-09-18	10:13:53 PM	5:53:03	USA	CA	41.965544, -121.91973	Butte Valley Bed & Breakfast
0331	2024-09-19	5:59:18 AM	1:20:52	USA	CA	41.9332, -121.737931	Lower Klamath NWR
0332	2024-09-19	8:45:38 AM	0:48:05	USA	CA	41.837417, -121.492447	Tule Lake NWR
0333	2024-09-19	10:14:58 AM	0:46:34	USA	CA	41.821908, -121.501808	Lava Beds NM Captain Jack's Stronghold
0334	2024-09-19	2:17:04 PM	0:25:03	USA	CA	41.459897, -120.510436	Modoc NWR
0335	2024-09-19	6:31:48 PM	0:52:32	USA	OR	42.530528, -122.085883	Winema NF Malone Springs
0336	2024-09-19	8:02:58 PM	1:09:14	USA	OR	42.581142, -121.931389	Wood River Wetland
0337	2024-09-19	10:06:15 PM	6:54:37	USA	OR	42.589792, -121.925164	Chiloquin Crater Lake Hwy
0338	2024-09-19	5:01:51 AM	0:00:13	USA	OR	42.589792, -121.925164	Chiloquin Crater Lake Hwy
0339	2024-09-20	5:46:31 AM	4:17:22	USA	OR	42.581061, -121.936731	Wood River Wetland
0340	2024-09-20	8:57:42 PM	7:00:57	USA	OR	42.909867, -122.136964	Crater Lake NP Rim
0341	2024-09-21	4:10:00 AM	0:00:50	USA	OR	42.909867, -122.136964	Crater Lake NP Rim
0342	2024-09-21	4:11:15 AM	0:00:09	USA	OR	42.909867, -122.136964	Crater Lake NP Rim
0343	2024-09-21	4:11:44 AM	3:00:57	USA	OR	42.909867, -122.136964	Crater Lake NP Rim
0344	2024-09-21	11:16:38 AM	0:31:00	USA	OR	42.850433, -122.008103	Crater Lake NP Pinnacles
0345	2024-09-21	12:42:37 PM	3:11:19	USA	OR	42.8814, -122.098664	Crater Lake NP Sun Creek
0346	2024-09-21	6:05:16 PM	9:37:10	USA	OR	42.86925, -122.163308	Crater Lake NP Annie Creek

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0347	2024-09-22	5:17:36 AM	3:34:19	USA	OR	42.869228, -122.163322	Crater Lake NP Annie Creek
0348	2024-09-22	7:40:02 PM	1:03:24	USA	CA	38.6959, -121.5927	Sacramento Airport
0350	2024-10-19	5:51:46 AM	2:05:05	USA	CA	32.878211, -117.2473	La Jolla Farms Rd Black's Beach Trail
0351	2024-10-21	6:12:54 AM	4:57:23	USA	CA	32.878175, -117.247314	La Jolla Farms Rd Black's Beach Trail
0354	2024-11-12	6:13:05 AM	0:00:15	USA	MN	44.56535, -92.497628	Colvill Park
0355	2024-11-12	6:14:40 AM	0:30:14	USA	MN	44.56535, -92.497628	Colvill Park
0356	2024-11-12	7:05:00 AM	0:00:11	USA	MN	44.56535, -92.497628	Colvill Park
0387	2024-11-12	3:42:32 PM	1:13:48	USA	MN	45.487031, -93.699211	Sherburne NWR
0388	2024-11-28	1:02:40 PM	5:51:21	USA	MI	42.205069, -84.416061	Jackson Malvern Dr Thanksgiving
0389	2024-11-29	7:01:33 AM	1:07:01	USA	MI	42.306472, -84.305694	Leoni Township Smith Rd Cranes
0390	2024-11-29	8:35:55 AM	0:15:34	USA	MI	42.312664, -84.358575	Leoni Township Dalton Rd
0391	2024-11-29	3:36:26 PM	1:46:01	USA	MI	42.322136, -84.287467	Haehnle Sanctuary
0392	2024-11-30	7:22:43 AM	1:22:31	USA	MI	42.080631, -84.463425	Grand River Fen Preserve
0393	2024-11-30	1:15:36 PM	0:03:01	USA	MI	42.205125, -84.416144	Jackson Malvern Dr Wind Chimes
0394	2024-11-30	1:29:50 PM	0:25:03	USA	MI	42.205125, -84.416144	Jackson Malvern Dr Wind Chimes
0395	2024-12-15	3:31:16 AM	0:00:12	CHL	MA G	-53.147075, -71.005858	Reserva Nacional Magallanes Test
0396	2024-12-15	3:31:47 PM	0:36:09	CHL	MA G	-53.148625, -71.009133	Reserva Nacional Magallanes Walking
0397	2024-12-15	4:39:32 PM	0:34:55	CHL	MA G	-53.147311, -71.006622	Reserva Nacional Magallanes Overlook
0398	2024-12-15	6:05:29 PM	0:33:57	CHL	MA G	-53.147094, -71.005844	Reserva Nacional Magallanes Trailhead

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0399	2024-12-16	9:10:44 PM	0:35:56	CHL	MA G	-53.398389, -71.244592	Reserva Nacional Laguna Parrillar Gate
0400	2024-12-16	9:52:01 PM	2:30:05	CHL	MA G	-53.398389, -71.244592	Reserva Nacional Laguna Parrillar Gate
0401	2024-12-17	6:12:32 AM	0:26:50	CHL	MA G	-51.726711, -72.506073	Puerto Natales Plaza de Armas Arturo Prat
0402	2024-12-17	11:35:37 AM	0:01:55	CHL	MA G	-51.420814, -73.101661	Parque Nacional Bernardo O'Higgins
0403	2024-12-17	11:37:43 AM	0:15:48	CHL	MA G	-51.420814, -73.101661	Parque Nacional Bernardo O'Higgins
0404	2024-12-17	9:13:59 PM	0:23:40	CHL	MA G	-50.975097, -72.730294	Torres del Paine Laguna Amarga
0405	2024-12-18	1:33:09 PM	0:09:08	CHL	MA G	-51.005794, -73.180983	Torres del Paine Refugio Grey
0406	2024-12-21	4:38:47 AM	3:37:39	CHL	MA G	-51.122269, -73.130433	Torres del Paine Lago Grey
0407	2024-12-21	8:17:45 AM	0:35:37	CHL	MA G	-51.122269, -73.130433	Torres del Paine Lago Grey
0408	2024-12-21	8:56:45 AM	4:03:48	CHL	MA G	-51.122967, -73.130081	Torres del Paine Lago Grey
0410	2024-12-21	2:07:43 PM	1:39:49	CHL	MA G	-51.159108, -72.95375	Torres del Paine Y-150
0411	2024-12-21	4:50:16 PM	0:17:40	CHL	MA G	-51.433136, -72.766861	Torres del Paine Y-290 Ibises
0412	2024-12-21	5:08:06 PM	0:02:19	CHL	MA G	-51.433136, -72.766861	Torres del Paine Y-290
0413	2024-12-21	6:26:52 PM	0:29:23	CHL	MA G	-51.57565, -72.622186	Cueva del Milodon
0414	2024-12-22	5:21:50 AM	1:12:44	CHL	MA G	-53.743847, -70.969628	Punta Arenas Fin de Camino
0415	2024-12-22	6:48:14 AM	0:36:19	CHL	MA G	-53.745914, -70.970611	Punta Arenas Fin de Camino
0416	2024-12-22	11:19:01 AM	0:07:10	CHL	MA G	-52.917286, -70.568961	Isla Magdalena Walking
0417	2024-12-22	11:26:19 AM	0:17:56	CHL	MA G	-52.918686, -70.570236	Isla Magdalena Walking
0418	2024-12-22	11:44:28 PM	0:34:48	CHL	MA G	-52.918322, -70.575006	Isla Magdalena Walking

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0419	2024-12-26	7:49:47 AM	1:06:19	USA	KY	37.773053, -83.685167	Natural Bridge SRP
0420	2024-12-26	9:30:58 AM	0:25:03	USA	KY	37.77575, -83.678017	Natural Bridge SRP
0421	2025-01-11	4:38:48 PM	0:34:01	USA	CA	37.795861, -122.397308	Maritime Plaza Park
0425	2025-03-07	5:47:08 PM	2:02:37	USA	CA	32.623147, -116.932267	Lower Otay Reservoir
0426	2025-03-08	4:44:11 AM	4:57:43	USA	CA	32.623161, -116.93225	Lower Otay Reservoir
0428	2025-03-23	2:35:42 AM	8:16:20	USA	AK	64.915336, -147.563522	Steele Creek Lois Ln
0429	2025-03-23	2:20:38 PM	0:37:32	USA	AK	65.277703, -146.647492	Steese Highway Cripple Creek
0430	2025-03-23	5:03:37 PM	20:31:34	USA	AK	64.907883, -147.932342	Peat Ponds WA
0431	2025-03-24	4:53:21 PM	0:50:04	USA	AK	64.867325, -147.742797	Creamer's Field Seasonal Wetlands
0432	2025-03-25	4:28:12 PM	0:49:38	USA	AK	65.0524, -146.060014	Chena Hot Springs
0433	2025-03-25	7:44:48 PM	17:29:53	USA	AK	64.867272, -147.742828	Creamer's Field Seasonal Wetlands
0434	2025-03-26	9:17:48 PM	14:10:29	USA	AK	62.746169, -150.126969	Denali SP Byers Lake
0435	2025-03-27	7:49:29 PM	15:21:55	USA	AK	63.887058, -149.097642	Healy Stampede Rd
0436	2025-03-27	10:29:32 PM	4:08:33	USA	AK	63.880447, -149.179	Healy Stampede Rd Mushers Cabin
0437	2025-03-28	3:59:26 PM	0:14:18	USA	AK	64.869719, -147.737031	Creamer's Field Boreal Forest
0438	2025-03-28	4:19:04 PM	17:30:18	USA	AK	64.869147, -147.735367	Creamer's Field Boreal Forest
0439	2025-04-18	6:34:36 PM	19:09:00	USA	CA	37.253597, -122.219247	Portola Redwoods Iverson Trail
0440	2025-04-22	2:11:58 PM	1:15:04	USA	CA	37.275292, -122.224511	Portola Redwoods Coyote Ridge
0441	2025-04-23	10:34:26 PM	14:53:52	USA	CA	37.272458, -122.224036	Portola Redwoods Coyote Ridge

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0442	2025-04-24	2:21:52 PM	0:29:22	USA	CA	37.277336, -122.224061	Pescadero Creek Pomponio Rd
0443	2025-04-24	3:00:00 PM	1:05:47	USA	CA	37.277833, -122.225844	Pescadero Creek Tarwater Trail
0444	2025-04-24	5:52:11 PM	0:42:21	USA	CA	37.501644, -122.228181	Don Edwards San Francisco Bay NWR
0445	2025-04-25	2:20:42 PM	0:48:35	USA	CA	37.613864, -122.129822	Eden Landing ER Salt Ponds
0446	2025-04-25	3:10:06 PM	0:36:12	USA	CA	37.614922, -122.128717	Eden Landing ER Walking
0447	2025-04-25	4:58:21 PM	1:05:23	USA	CA	37.430211, -121.979125	Alviso Marina County Park
0448	2025-04-26	5:31:53 AM	1:26:26	USA	CA	37.430217, -121.979064	Alviso Marina County Park
0449	2025-05-11	11:14:14 AM	0:25:52	USA	CA	33.431861, -117.746903	Ocean Institute Sea Explorer Dolphins
0450	2025-05-11	11:40:19 AM	0:25:36	USA	CA	33.454614, -117.720528	Ocean Institute Sea Explorer Sea Lions
0451	2025-05-11	9:54:22 PM	9:03:21	USA	CA	32.763519, -117.134583	San Diego Oregon St Window East
0452	2025-08-02	11:10:26 PM	1:18:25	USA	CA	32.763333, -117.134575	San Diego Oregon St Reference Test
0453	2025-08-03	12:37:08 AM	0:58:42	USA	CA	32.763333, -117.134575	San Diego Oregon St Reference Test
0464	2025-09-05	7:18:36 PM	16:12:39	USA	CA	37.663697, -118.827697	Inyo NF Hot Creek Geologic Site
0465	2025-09-06	11:47:10 AM	0:20:04	USA	CA	37.660994, -118.828711	Inyo NF Hot Creek Geologic Site
0466	2025-09-06	6:27:08 PM	5:50:08	USA	CA	37.681953, -119.083886	Inyo NF Agnew Meadows
0467	2025-09-07	8:27:18 AM	0:00:39	USA	CA	37.663261, -119.074256	Inyo NF Starkweather Lake
0468	2025-09-07	8:28:24 AM	0:25:03	USA	CA	37.663261, -119.074256	Inyo NF Starkweather Lake
0469	2025-09-07	5:26:11 PM	0:48:16	USA	CA	37.379211, -118.165931	Inyo NF Ancient Bristlecone Pine Forest
0470	2025-09-07	6:20:53 PM	20:59:10	USA	CA	37.379058, -118.166122	Inyo NF Ancient Bristlecone Pine Forest

ID	Date	Start Time	Length	Country	State	Coordinates	Name
0473	2025-09-07	11:32:13 PM	0:27:00	USA	CA	37.240106, -118.197967	Inyo NF Big Pine Crickets
0474	2025-09-07	12:04:40 AM	0:29:03	USA	CA	37.240106, -118.197967	Inyo NF Big Pine Crickets
0475	2025-09-08	7:12:39 AM	1:04:10	USA	CA	37.383908, -118.179611	Inyo NF Ancient Bristlecone Pine Forest
0476	2025-09-16	6:53:33 AM	0:30:44	USA	CA	32.763428, -117.1351	San Diego Oregon St Bees
0477	2025-09-25	7:17:14 PM	13:18:51	USA	AZ	32.736656, -110.233544	Aravaipa Creek Tent
0478	2025-09-26	9:59:28 AM	24:22:23	USA	AZ	32.7366, -110.232139	Aravaipa Creek Porch

Appendix D: Ecoregions and biomes of soundscape sites in *Ambisonic Earth*.

ID	Name	Ecoregion	Biome
0002	Idyllwild Regional Park	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0003	Idyllwild Regional Park	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0004	Idyllwild Regional Park	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0005	Idyllwild Regional Park	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0006	Idyllwild-Pine Cove Marian View Dr	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0007	Idyllwild-Pine Cove Marian View Dr	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0008	Idyllwild-Pine Cove Marian View Dr	California montane chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0011	San Diego Oregon St Living Room	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0012	San Diego Oregon St Window South	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0014	San Diego Oregon St Window East	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0015	San Diego Oregon St Window East	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0016	San Diego Oregon St Window East	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0021	Sierra Valley Marble Hot Springs Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands
0022	Sierra Valley Marble Hot Springs Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands
0023	Sierra Valley Marble Hot Springs Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands
0024	Sierra Valley Marble Hot Springs Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands
0025	Sierra Valley Marble Hot Springs Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands

ID	Name	Ecoregion	Biome
0026	Sierra Valley Marble Hot Springs Bridge	Great Basin shrub steppe	Deserts & Xeric Shrublands
0027	Sierra Valley Marble Hot Springs Bridge	Great Basin shrub steppe	Deserts & Xeric Shrublands
0028	Carman Valley Pond	Sierra Nevada forests	Temperate Conifer Forests
0029	Carman Valley Pond	Sierra Nevada forests	Temperate Conifer Forests
0030	Carman Valley Pond	Sierra Nevada forests	Temperate Conifer Forests
0031	Carman Valley Meadow	Sierra Nevada forests	Temperate Conifer Forests
0032	Carman Valley Meadow	Sierra Nevada forests	Temperate Conifer Forests
0033	Yuba Pass	Sierra Nevada forests	Temperate Conifer Forests
0034	Yuba Pass	Sierra Nevada forests	Temperate Conifer Forests
0035	Yuba Pass	Sierra Nevada forests	Temperate Conifer Forests
0036	Yuba Pass IRs	Sierra Nevada forests	Temperate Conifer Forests
0037	Tahoe NF North Yuba River	Sierra Nevada forests	Temperate Conifer Forests
0038	Tahoe NF North Yuba River	Sierra Nevada forests	Temperate Conifer Forests
0039	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0040	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0041	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0042	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0043	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0044	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0045	Tahoe NF Joubert Diggins IRs	Sierra Nevada forests	Temperate Conifer Forests
0046	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0047	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0048	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0050	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0051	Tahoe NF Joubert Diggins	Sierra Nevada forests	Temperate Conifer Forests
0052	Marysville Mathews Ln Crop Duster	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0053	North Table Mountain ER Phantom Falls	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0054	North Table Mountain ER Ravine	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub

ID	Name	Ecoregion	Biome
0055	North Table Mountain ER Ravine Falls	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0056	North Table Mountain ER Ravine Falls	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0057	North Table Mountain ER Ravine IRs	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0058	North Table Mountain ER Trailhead	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0059	Sacramento NWR Deck 1	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0060	Sacramento NWR Deck 1	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0061	Sacramento NWR Deck 1	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0062	Sacramento NWR Deck 1	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0063	Sacramento NWR Deck 2	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0064	Sacramento NWR Deck 2	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0065	Sacramento NWR Deck 2	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0066	Colusa NWR Bridge	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0067	Colusa NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0068	San Luis NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0069	San Luis NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0070	San Luis NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0071	Merced NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0072	Merced NWR Cattle	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0073	Merced NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0074	Mendota WA	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0075	Mendota WA Reeds	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0076	Mendota WA	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0077	Kern NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0078	Kern NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0079	Kern NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0080	Kern NWR	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0081	Sequoia NP Paradise Creek	Sierra Nevada forests	Temperate Conifer Forests
0082	Sequoia NP Buckeye Flats	Sierra Nevada forests	Temperate Conifer Forests
0083	Sequoia NP Buckeye Flats	Sierra Nevada forests	Temperate Conifer Forests
0084	Sequoia NP Buckeye Flats	Sierra Nevada forests	Temperate Conifer Forests
0085	Sequoia NP Crescent Meadow	Sierra Nevada forests	Temperate Conifer Forests
0086	Sequoia NP Crescent Meadow	Sierra Nevada forests	Temperate Conifer Forests
0087	Sequoia NP Crescent Meadow	Sierra Nevada forests	Temperate Conifer Forests
0088	Olympic NP Hoh Rainforest	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0089	Olympic NP Hoh Rainforest	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0090	Olympic NP Hoh Rainforest	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0091	Olympic NP Hoh Rainforest IRs	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0092	Olympic NP Kalaloch	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0093	Olympic NP Kalaloch	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0094	Olympic NP Kalaloch	Central Pacific Northwest coastal forests	Temperate Conifer Forests
0095	Olympic NP Kalaloch IRs	Central Pacific Northwest coastal forests	Temperate Conifer Forests

ID	Name	Ecoregion	Biome
0096	Port of Dover	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0097	Brighton Palace of Fun	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0098	Brighton Palace Pier	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0099	Brighton Palace of Fun	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0100	Brighton Palace of Fun	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0101	Brighton Palace of Fun	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0102	Brighton Boardwalk	English Lowlands beech forests	Temperate Broadleaf & Mixed Forests
0106	NYC Walker St Rooftop	Northeast US Coastal forests	Temperate Broadleaf & Mixed Forests
0107	NYC Walker St Rooftop	Northeast US Coastal forests	Temperate Broadleaf & Mixed Forests
0108	Calipatria Kalin Rd	Sonoran desert	Deserts & Xeric Shrublands
0109	Sonny Bono Salton Sea NWR	Sonoran desert	Deserts & Xeric Shrublands
0110	Sonny Bono Salton Sea NWR Quails	Sonoran desert	Deserts & Xeric Shrublands
0111	Sonny Bono Salton Sea NWR	Sonoran desert	Deserts & Xeric Shrublands
0112	Old Mud Pots	Sonoran desert	Deserts & Xeric Shrublands
0113	Old Mud Pots	Sonoran desert	Deserts & Xeric Shrublands
0114	Old Mud Pots	Sonoran desert	Deserts & Xeric Shrublands
0115	Old Mud Pots	Sonoran desert	Deserts & Xeric Shrublands
0116	Elmore Geothermal Facility	Sonoran desert	Deserts & Xeric Shrublands
0117	Kofa NWR	Sonoran desert	Deserts & Xeric Shrublands
0118	Kofa NWR	Sonoran desert	Deserts & Xeric Shrublands
0119	Mittry Lake WA	Sonoran desert	Deserts & Xeric Shrublands
0120	Mittry Lake WA	Sonoran desert	Deserts & Xeric Shrublands
0121	Mittry Lake WA	Sonoran desert	Deserts & Xeric Shrublands
0122	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands
0123	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands

ID	Name	Ecoregion	Biome
0124	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands
0125	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands
0126	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands
0127	Imperial NWR	Sonoran desert	Deserts & Xeric Shrublands
0128	Mittry Lake WA	Sonoran desert	Deserts & Xeric Shrublands
0129	Cibola NWR	Sonoran desert	Deserts & Xeric Shrublands
0130	Cibola NWR	Sonoran desert	Deserts & Xeric Shrublands
0131	Cibola NWR	Sonoran desert	Deserts & Xeric Shrublands
0132	Cibola NWR	Sonoran desert	Deserts & Xeric Shrublands
0133	Palo Verde ER	Sonoran desert	Deserts & Xeric Shrublands
0134	Palo Verde ER	Sonoran desert	Deserts & Xeric Shrublands
0135	Palo Verde ER Tow Truck	Sonoran desert	Deserts & Xeric Shrublands
0136	Palo Verde ER	Sonoran desert	Deserts & Xeric Shrublands
0137	Palo Verde ER	Sonoran desert	Deserts & Xeric Shrublands
0138	Bill Williams River NWR	Sonoran desert	Deserts & Xeric Shrublands
0139	Havasus NWR Catfish Paradise	Mojave desert	Deserts & Xeric Shrublands
0140	Havasus NWR Catfish Paradise	Mojave desert	Deserts & Xeric Shrublands
0141	Hoover Dam Power Substation	Mojave desert	Deserts & Xeric Shrublands
0142	Lytle Ranch Preserve	Mojave desert	Deserts & Xeric Shrublands
0143	Lytle Ranch Preserve Beaver Dam Wash	Mojave desert	Deserts & Xeric Shrublands
0144	Lytle Ranch Preserve Beaver Dam Wash	Mojave desert	Deserts & Xeric Shrublands
0145	Lytle Ranch Preserve Beaver Dam Wash	Mojave desert	Deserts & Xeric Shrublands
0146	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0147	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0148	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0149	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0150	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0151	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0152	Zion NP Virgin River	Colorado Plateau shrublands	Deserts & Xeric Shrublands

ID	Name	Ecoregion	Biome
0153	Dixie NF	Wasatch and Uinta montane forests	Temperate Conifer Forests
0154	Dixie NF	Wasatch and Uinta montane forests	Temperate Conifer Forests
0155	Fillmore Halfway Hill WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0156	Fillmore Halfway Hill WMA	Wasatch and Uinta montane forests	Temperate Conifer Forests
0157	Fillmore I-15 Frontage Rd	Great Basin shrub steppe	Deserts & Xeric Shrublands
0158	Fillmore Cemetery WMA	Wasatch and Uinta montane forests	Temperate Conifer Forests
0159	Fillmore Circus Hollow WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0160	Fillmore Circus Hollow WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0161	Fillmore Bennett Field WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0162	Fumarole Butte	Great Basin shrub steppe	Deserts & Xeric Shrublands
0163	Fish Springs NWR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0164	Fish Springs NWR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0165	Fish Springs NWR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0166	Fish Springs NWR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0167	Fish Springs NWR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0168	Horseshoe Springs WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0169	Horseshoe Springs WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0170	Horseshoe Springs WMA Storm	Great Basin shrub steppe	Deserts & Xeric Shrublands
0171	Horseshoe Springs WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0172	Bear River MBR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0173	Bear River MBR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0174	Bear River MBR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0175	Bear River MBR	Great Basin shrub steppe	Deserts & Xeric Shrublands
0176	Harold S Crane WMA	Great Basin shrub steppe	Deserts & Xeric Shrublands
0177	San Diego Oregon St Crows	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0178	Tijuana Pasaje Rodriguez	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0179	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub

ID	Name	Ecoregion	Biome
0180	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0181	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0182	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0183	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0184	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0185	Oak Canyon Equestrian Center	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0186	Valles Caldera National Preserve	Colorado Rockies forests	Temperate Conifer Forests
0187	Great Sand Dunes National Preserve	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0188	Great Sand Dunes National Preserve IRs	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0189	Río Grande Gorge West Rim	Colorado Plateau shrublands	Deserts & Xeric Shrublands
0190	Clear Creek Natural Heritage Center	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0191	Clear Creek Natural Heritage Center	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0192	Clear Creek Natural Heritage Center	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0193	Tishomingo NWR	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0194	Tishomingo NWR	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0195	Tishomingo NWR	Cross-Timbers savanna-woodland	Temperate Grasslands, Savannas & Shrublands
0206	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0207	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0208	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests

ID	Name	Ecoregion	Biome
0209	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0210	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0211	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0212	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0213	Llama Land Ranch Eclipse	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0214	Llama Land Ranch	East Central Texas forests	Temperate Broadleaf & Mixed Forests
0215	Dallas Richardson Studio 6	Texas blackland prairies	Temperate Grasslands, Savannas & Shrublands
0218	Belleville Deerwood Estates	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0220	Knobeloch Woods	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0221	Shawnee NF Little Grand Canyon	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0222	Shawnee NF Little Grand Canyon	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0223	Trail of Tears SF	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0224	Cache River Todd Fink Heron Pond Trail	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0225	Cache River Todd Fink Heron Pond Trail	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0226	Cache River Todd Fink Heron Pond Trail	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0227	Cache River Todd Fink Heron Pond Bridge	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0228	Cache River Todd Fink Heron Pond Trail	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0229	Cypress Creek NWR Bellrose Reserve	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0230	Chestnut Hills Calvin Cemetery	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0231	Mermet Lake SFWA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0232	Mermet Lake SFWA Mermet Swamp	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0233	Mermet Lake SFWA Train Idling	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0234	Sielbeck Forest SNA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0235	Sielbeck Forest SNA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0236	Sielbeck Forest SNA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0237	Cretaceous Hills	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0238	Shawnee NF Garden of the Gods	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0239	Shawnee NF Garden of the Gods	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0240	Shawnee NF Garden of the Gods	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0241	Shawnee NF Garden of the Gods	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0242	Shawnee NF Garden of the Gods	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0243	Shawnee NF Garden of the Gods Pharaoh	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0244	Saline County SFWA	Interior Plateau US Hardwood Forests	Temperate Broadleaf & Mixed Forests
0245	Wabash Lowlands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0246	Wabash Lowlands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0247	Patoka River NWR Cane Ridge WMA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0248	Patoka River NWR Cane Ridge WMA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0249	Miller Shrub Swamp	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0250	Miller Shrub Swamp Bridge	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0251	H & B Bremer Wildlife Sanctuary	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0252	H & B Bremer Wildlife Sanctuary	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0253	Sangchris Lake SP Pheasant Run	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0254	Sangchris Lake SP Hickory Point	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0255	Sangchris Lake SP Pheasant Run	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0256	Springfield Bridgeview Park	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0258	Springfield Tom Madonia Park East	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0259	Nipper Wildlife Sanctuary	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0260	Lewis Park & Trails	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0261	Sangamon River SFWA Athens Robin Ln	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0262	Shick Shack Sand Pond	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0263	Meredosia Hill Prairie	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0264	Meredosia NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0265	Meredosia NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0266	Jacksonville Holt Rd	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0267	Matanzas Prairie	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0268	Emiquon NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0269	Chautauqua NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0270	Sand Ridge SF	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0271	Singing Woods	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0272	Singing Woods	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0273	Kankakee NWR Iroquois Sands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0274	Kankakee NWR Iroquois Sands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0275	Kankakee NWR Iroquois Sands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0276	Kankakee NWR Iroquois Sands	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0277	Raccoon Grove	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0278	Midewin National Tallgrass Prairie	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0279	McKinley Woods FP	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0280	Mineral Marsh	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0281	Mineral Marsh	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0282	Port Louisa NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0283	Port Louisa NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0284	Port Louisa NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0285	Port Louisa NWR	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0286	Cedar Glen SNA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0287	Cedar Glen SNA	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands
0288	Great River NWR Delair Division	Central US forest-grasslands transition	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0289	O'ahu Round Top FR Nahuina Walking	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0290	O'ahu Round Top FR Makiki Valley Walking	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0291	O'ahu Round Top FR Makiki Valley	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0292	O'ahu Round Top FR Makiki Valley	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0293	O'ahu Round Top FR Makiki Valley	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0294	O'ahu Pūpūkea FR Kaunala Walking	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0295	O'ahu Pūpūkea FR Kaunala	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0296	O'ahu Pūpūkea FR Kaunala	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0297	O'ahu Pūpūkea FR Kaunala Walking	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0298	O'ahu Kawainui Marsh Bike Trail Walking	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0299	O'ahu Kawainui Marsh Kaha Park	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0300	O'ahu Halona Beach Cove	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0301	O'ahu Halona Beach Cove Tunnel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0302	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0303	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0304	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0305	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0306	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0307	O'ahu Kawainui Marsh Bike Trail	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0308	O'ahu Kawainui Marsh Sanctuary	Hawai'i tropical moist forests	Tropical & Subtropical Moist Broadleaf Forests
0309	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0310	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0311	O'ahu Park Shore Waikiki Hotel	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0312	O'ahu Kapi'olani Regional Park	Hawai'i tropical low shrublands	Tropical & Subtropical Grasslands, Savannas & Shrublands
0313	San Diego Oregon St Police Helicopter	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0314	Cheyenne Otto Rd Wind Turbine	Western shortgrass prairie	Temperate Grasslands, Savannas & Shrublands
0315	Arapaho NWR	Colorado Rockies forests	Temperate Conifer Forests
0316	Arapaho NWR Prairie Dogs	Colorado Rockies forests	Temperate Conifer Forests
0317	State Forest State Park	Colorado Rockies forests	Temperate Conifer Forests
0318	Cheyenne Otto Rd Wind Turbine	Western shortgrass prairie	Temperate Grasslands, Savannas & Shrublands
0319	Cheyenne Otto Rd Wind Turbine	Western shortgrass prairie	Temperate Grasslands, Savannas & Shrublands
0320	Lassen NP Emerald Lake	Central-Southern Cascades Forests	Temperate Conifer Forests
0321	Lassen NP Sulphur Works	Central-Southern Cascades Forests	Temperate Conifer Forests

ID	Name	Ecoregion	Biome
0322	Lassen NP Bumpass Hell Trailhead	Central-Southern Cascades Forests	Temperate Conifer Forests
0323	Lassen NP Bumpass Hell Fumaroles	Central-Southern Cascades Forests	Temperate Conifer Forests
0324	Lassen NP Bumpass Hell Fumaroles	Central-Southern Cascades Forests	Temperate Conifer Forests
0325	Lassen NP Bumpass Hell Fumaroles	Central-Southern Cascades Forests	Temperate Conifer Forests
0326	Klamath River Iron Gate Dam	Eastern Cascades forests	Temperate Conifer Forests
0327	Klamath River Wild Horses	Eastern Cascades forests	Temperate Conifer Forests
0328	Klamath River Copco Dam	Eastern Cascades forests	Temperate Conifer Forests
0329	Klamath River Copco Lake	Eastern Cascades forests	Temperate Conifer Forests
0330	Butte Valley Bed & Breakfast	Eastern Cascades forests	Temperate Conifer Forests
0331	Lower Klamath NWR	Eastern Cascades forests	Temperate Conifer Forests
0332	Tule Lake NWR	Eastern Cascades forests	Temperate Conifer Forests
0333	Lava Beds NM Captain Jack's Stronghold	Eastern Cascades forests	Temperate Conifer Forests
0334	Modoc NWR	Eastern Cascades forests	Temperate Conifer Forests
0335	Winema NF Malone Springs	Eastern Cascades forests	Temperate Conifer Forests
0336	Wood River Wetland	Eastern Cascades forests	Temperate Conifer Forests
0337	Chiloquin Crater Lake Hwy	Eastern Cascades forests	Temperate Conifer Forests
0338	Chiloquin Crater Lake Hwy	Eastern Cascades forests	Temperate Conifer Forests
0339	Wood River Wetland	Eastern Cascades forests	Temperate Conifer Forests
0340	Crater Lake NP Rim	Central-Southern Cascades Forests	Temperate Conifer Forests
0341	Crater Lake NP Rim	Central-Southern Cascades Forests	Temperate Conifer Forests
0342	Crater Lake NP Rim	Central-Southern Cascades Forests	Temperate Conifer Forests
0343	Crater Lake NP Rim	Central-Southern Cascades Forests	Temperate Conifer Forests
0344	Crater Lake NP Pinnacles	Central-Southern Cascades Forests	Temperate Conifer Forests
0345	Crater Lake NP Sun Creek	Central-Southern Cascades Forests	Temperate Conifer Forests

ID	Name	Ecoregion	Biome
0346	Crater Lake NP Annie Creek	Central-Southern Cascades Forests	Temperate Conifer Forests
0347	Crater Lake NP Annie Creek	Central-Southern Cascades Forests	Temperate Conifer Forests
0348	Sacramento Airport	California Central Valley grasslands	Temperate Grasslands, Savannas & Shrublands
0350	La Jolla Farms Rd Black's Beach Trail	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0351	La Jolla Farms Rd Black's Beach Trail	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0354	Colvill Park	Upper Midwest US forest-savanna transition	Temperate Broadleaf & Mixed Forests
0355	Colvill Park	Upper Midwest US forest-savanna transition	Temperate Broadleaf & Mixed Forests
0356	Colvill Park	Upper Midwest US forest-savanna transition	Temperate Broadleaf & Mixed Forests
0387	Sherburne NWR	Upper Midwest US forest-savanna transition	Temperate Broadleaf & Mixed Forests
0388	Jackson Malvern Dr Thanksgiving	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0389	Leoni Township Smith Rd Cranes	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0390	Leoni Township Dalton Rd	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0391	Haehnle Sanctuary	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0392	Grand River Fen Preserve	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0393	Jackson Malvern Dr Wind Chimes	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0394	Jackson Malvern Dr Wind Chimes	Southern Great Lakes forests	Temperate Broadleaf & Mixed Forests
0395	Reserva Nacional Magallanes Test	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0396	Reserva Nacional Magallanes Walking	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0397	Reserva Nacional Magallanes Overlook	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests

ID	Name	Ecoregion	Biome
0398	Reserva Nacional Magallanes Trailhead	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0399	Reserva Nacional Laguna Parrillar Gate	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0400	Reserva Nacional Laguna Parrillar Gate	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0401	Puerto Natales Plaza de Armas Arturo Prat	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0402	Parque Nacional Bernardo O'Higgins	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0403	Parque Nacional Bernardo O'Higgins	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0404	Torres del Paine Laguna Amarga	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0405	Torres del Paine Refugio Grey	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0406	Torres del Paine Lago Grey	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0407	Torres del Paine Lago Grey	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0408	Torres del Paine Lago Grey	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0410	Torres del Paine Y-150	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0411	Torres del Paine Y-290 Ibises	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0412	Torres del Paine Y-290	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0413	Cueva del Milodon	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0414	Punta Arenas Fin de Camino	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0415	Punta Arenas Fin de Camino	Magellanic subpolar forests	Temperate Broadleaf & Mixed Forests
0416	Isla Magdalena Walking	Patagonian steppe	Temperate Grasslands, Savannas & Shrublands
0417	Isla Magdalena Walking	Patagonian steppe	Temperate Grasslands, Savannas & Shrublands

ID	Name	Ecoregion	Biome
0418	Isla Magdalena Walking	Patagonian steppe	Temperate Grasslands, Savannas & Shrublands
0419	Natural Bridge SRP	Appalachian mixed mesophytic forests	Temperate Broadleaf & Mixed Forests
0420	Natural Bridge SRP	Appalachian mixed mesophytic forests	Temperate Broadleaf & Mixed Forests
0421	Maritime Plaza Park	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0425	Lower Otay Reservoir	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0426	Lower Otay Reservoir	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0428	Steele Creek Lois Ln	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0429	Steese Highway Cripple Creek	Interior Yukon-Alaska alpine tundra	Tundra
0430	Peat Ponds WA	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0431	Creamer's Field Seasonal Wetlands	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0432	Chena Hot Springs	Interior Yukon-Alaska alpine tundra	Tundra
0433	Creamer's Field Seasonal Wetlands	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0434	Denali SP Byers Lake	Cook Inlet taiga	Boreal Forests/Taiga
0435	Healy Stampede Rd	Alaska-St. Elias Range tundra	Tundra
0436	Healy Stampede Rd Musers Cabin	Alaska-St. Elias Range tundra	Tundra
0437	Creamer's Field Boreal Forest	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0438	Creamer's Field Boreal Forest	Interior Alaska-Yukon lowland taiga	Boreal Forests/Taiga
0439	Portola Redwoods Iverson Trail	Northern California coastal forests	Temperate Conifer Forests
0440	Portola Redwoods Coyote Ridge	Northern California coastal forests	Temperate Conifer Forests
0441	Portola Redwoods Coyote Ridge	Northern California coastal forests	Temperate Conifer Forests

ID	Name	Ecoregion	Biome
0442	Pescadero Creek Pomponio Rd	Northern California coastal forests	Temperate Conifer Forests
0443	Pescadero Creek Tarwater Trail	Northern California coastal forests	Temperate Conifer Forests
0444	Don Edwards San Francisco Bay NWR	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0445	Eden Landing ER Salt Ponds	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0446	Eden Landing ER Walking	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0447	Alviso Marina County Park	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0448	Alviso Marina County Park	California interior chaparral and woodlands	Mediterranean Forests, Woodlands & Scrub
0449	Ocean Institute Sea Explorer Dolphins	-	-
0450	Ocean Institute Sea Explorer Sea Lions	-	-
0451	San Diego Oregon St Window East	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0452	San Diego Oregon St Reference Test	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0453	San Diego Oregon St Reference Test	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0464	Inyo NF Hot Creek Geologic Site	Great Basin shrub steppe	Deserts & Xeric Shrublands
0465	Inyo NF Hot Creek Geologic Site	Great Basin shrub steppe	Deserts & Xeric Shrublands
0466	Inyo NF Agnew Meadows	Sierra Nevada forests	Temperate Conifer Forests
0467	Inyo NF Starkweather Lake	Sierra Nevada forests	Temperate Conifer Forests
0468	Inyo NF Starkweather Lake	Sierra Nevada forests	Temperate Conifer Forests
0469	Inyo NF Ancient Bristlecone Pine Forest	Great Basin montane forests	Temperate Conifer Forests
0470	Inyo NF Ancient Bristlecone Pine Forest	Great Basin montane forests	Temperate Conifer Forests
0473	Inyo NF Big Pine Crickets	Great Basin shrub steppe	Deserts & Xeric Shrublands
0474	Inyo NF Big Pine Crickets	Great Basin shrub steppe	Deserts & Xeric Shrublands

ID	Name	Ecoregion	Biome
0475	Inyo NF Ancient Bristlecone Pine Forest	Great Basin montane forests	Temperate Conifer Forests
0476	San Diego Oregon St Bees	California coastal sage and chaparral	Mediterranean Forests, Woodlands & Scrub
0477	Aravaipa Creek Tent	Chihuahuan desert	Deserts & Xeric Shrublands
0478	Aravaipa Creek Porch	Chihuahuan desert	Deserts & Xeric Shrublands

Appendix E: Protected status of soundscape sites in *Ambisonic Earth*.

Abbreviations in the headings of this appendix:

WDPA	World Database on Protected Areas
WHS	UNESCO World Heritage Site
BR	UNESCO Biosphere Reserve
RW	Ramsar wetland
KBA	Key Biodiversity Area
NWR	U.S. National Wildlife Refuge
NP	National Park
NF	National Forest
NM	National designation (Miscellaneous)

* indicates recordings captured just outside the official boundaries of a protected area, within one kilometer and in a similar ecological setting.

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0002	Idyllwild Regional Park	-	-	-	-	-	-	-	-	-
0003	Idyllwild Regional Park	-	-	-	-	-	-	-	-	-
0004	Idyllwild Regional Park	-	-	-	-	-	-	-	-	-
0005	Idyllwild Regional Park	-	-	-	-	-	-	-	-	-
0006	Idyllwild-Pine Cove Marian View Dr	-	-	-	-	-	-	-	-	-
0007	Idyllwild-Pine Cove Marian View Dr	-	-	-	-	-	-	-	-	-
0008	Idyllwild-Pine Cove Marian View Dr	-	-	-	-	-	-	-	-	-
0011	San Diego Oregon St Living Room	-	-	-	-	-	-	-	-	-
0012	San Diego Oregon St Window South	-	-	-	-	-	-	-	-	-
0014	San Diego Oregon St Window East	-	-	-	-	-	-	-	-	-
0015	San Diego Oregon St Window East	-	-	-	-	-	-	-	-	-
0016	San Diego Oregon St Window East	-	-	-	-	-	-	-	-	-
0021	Sierra Valley Marble Hot Springs Rd	-	-	-	-	-	-	-	-	-
0022	Sierra Valley Marble Hot Springs Rd	-	-	-	-	-	-	-	-	-
0023	Sierra Valley Marble Hot Springs Rd	-	-	-	-	-	-	-	-	-
0024	Sierra Valley Marble Hot Springs Rd	-	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0025	Sierra Valley Marble Hot Springs Rd	-	-	-	-	-	-	-	-	-
0026	Sierra Valley Marble Hot Springs Bridge	-	-	-	-	-	-	-	-	-
0027	Sierra Valley Marble Hot Springs Bridge	-	-	-	-	-	-	-	-	-
0028	Carman Valley Pond	-	-	-	-	-	-	-	1	-
0029	Carman Valley Pond	-	-	-	-	-	-	-	1	-
0030	Carman Valley Pond	-	-	-	-	-	-	-	1	-
0031	Carman Valley Meadow	-	-	-	-	-	-	-	1	-
0032	Carman Valley Meadow	-	-	-	-	-	-	-	1	-
0033	Yuba Pass	-	-	-	-	-	-	-	1	-
0034	Yuba Pass	-	-	-	-	-	-	-	1	-
0035	Yuba Pass	-	-	-	-	-	-	-	1	-
0036	Yuba Pass IRs	-	-	-	-	-	-	-	1	-
0037	Tahoe NF North Yuba River	-	-	-	-	-	-	-	1	-
0038	Tahoe NF North Yuba River	-	-	-	-	-	-	-	1	-
0039	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0040	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0041	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0042	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0043	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0044	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0045	Tahoe NF Joubert Diggins IRs	-	-	-	-	-	-	-	1	-
0046	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0047	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0048	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0050	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0051	Tahoe NF Joubert Diggins	-	-	-	-	-	-	-	1	-
0052	Marysville Mathews Ln Crop Duster	-	-	-	-	-	-	-	-	-
0053	North Table Mountain ER Phantom Falls	1	-	-	-	-	-	-	-	-
0054	North Table Mountain ER Ravine	1	-	-	-	-	-	-	-	-
0055	North Table Mountain ER Ravine Falls	1	-	-	-	-	-	-	-	-
0056	North Table Mountain ER Ravine Falls	1	-	-	-	-	-	-	-	-
0057	North Table Mountain ER Ravine IRs	1	-	-	-	-	-	-	-	-
0058	North Table Mountain ER Trailhead	1	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0059	Sacramento NWR Deck 1	1	-	-	-	-	1	-	-	-
0060	Sacramento NWR Deck 1	1	-	-	-	-	1	-	-	-
0061	Sacramento NWR Deck 1	1	-	-	-	-	1	-	-	-
0062	Sacramento NWR Deck 1	1	-	-	-	-	1	-	-	-
0063	Sacramento NWR Deck 2	1	-	-	-	-	1	-	-	-
0064	Sacramento NWR Deck 2	1	-	-	-	-	1	-	-	-
0065	Sacramento NWR Deck 2	1	-	-	-	-	1	-	-	-
0066	Colusa NWR Bridge	1	-	-	-	-	1	-	-	-
0067	Colusa NWR	1	-	-	-	-	1	-	-	-
0068	San Luis NWR	1	-	-	1	1	1	-	-	-
0069	San Luis NWR	1	-	-	1	1	1	-	-	-
0070	San Luis NWR	1	-	-	1	1	1	-	-	-
0071	Merced NWR	1	-	-	-	-	1	-	-	-
0072	Merced NWR Cattle	1	-	-	-	-	1	-	-	-
0073	Merced NWR	1	-	-	-	-	1	-	-	-
0074	Mendota WA	1	-	-	-	-	-	-	-	-
0075	Mendota WA Reeds	1	-	-	-	-	-	-	-	-
0076	Mendota WA	1	-	-	-	-	-	-	-	-
0077	Kern NWR	1	-	-	-	1	1	-	-	-
0078	Kern NWR	1	-	-	-	1	1	-	-	-
0079	Kern NWR	1	-	-	-	1	1	-	-	-
0080	Kern NWR	1	-	-	-	1	1	-	-	-
0081	Sequoia NP Paradise Creek	1	-	-	-	-	-	1	-	-
0082	Sequoia NP Buckeye Flats	1	-	-	-	-	-	1	-	-
0083	Sequoia NP Buckeye Flats	1	-	-	-	-	-	1	-	-
0084	Sequoia NP Buckeye Flats	1	-	-	-	-	-	1	-	-
0085	Sequoia NP Crescent Meadow	1	-	-	-	-	-	1	-	-
0086	Sequoia NP Crescent Meadow	1	-	-	-	-	-	1	-	-
0087	Sequoia NP Crescent Meadow	1	-	-	-	-	-	1	-	-
0088	Olympic NP Hoh Rainforest	-	1*	1*	-	-	-	1*	-	-
0089	Olympic NP Hoh Rainforest	-	1*	1*	-	-	-	1*	-	-
0090	Olympic NP Hoh Rainforest	-	1*	1*	-	-	-	1*	-	-
0091	Olympic NP Hoh Rainforest IRs	-	1*	1*	-	-	-	1*	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0092	Olympic NP Kalaloch	1	1*	1*	-	1	-	1	-	-
0093	Olympic NP Kalaloch	1	1*	1*	-	1	-	1	-	-
0094	Olympic NP Kalaloch	1	1*	1*	-	1	-	1	-	-
0095	Olympic NP Kalaloch IRs	1	1*	1*	-	1	-	1	-	-
0096	Port of Dover	1	-	-	-	-	-	-	-	-
0097	Brighton Palace of Fun	-	-	-	-	-	-	-	-	-
0098	Brighton Palace Pier	-	-	-	-	-	-	-	-	-
0099	Brighton Palace of Fun	-	-	-	-	-	-	-	-	-
0100	Brighton Palace of Fun	-	-	-	-	-	-	-	-	-
0101	Brighton Palace of Fun	-	-	-	-	-	-	-	-	-
0102	Brighton Boardwalk	-	-	-	-	-	-	-	-	-
0106	NYC Walker St Rooftop	-	-	-	-	-	-	-	-	-
0107	NYC Walker St Rooftop	-	-	-	-	-	-	-	-	-
0108	Calipatria Kalin Rd	-	-	-	-	1	-	-	-	-
0109	Sonny Bono Salton Sea NWR	1	-	-	-	1	1	-	-	-
0110	Sonny Bono Salton Sea NWR Quails	1	-	-	-	1	1	-	-	-
0111	Sonny Bono Salton Sea NWR	1	-	-	-	1	1	-	-	-
0112	Old Mud Pots	-	-	-	-	1	-	-	-	-
0113	Old Mud Pots	-	-	-	-	1	-	-	-	-
0114	Old Mud Pots	-	-	-	-	1	-	-	-	-
0115	Old Mud Pots	-	-	-	-	1	-	-	-	-
0116	Elmore Geothermal Facility	-	-	-	-	1	-	-	-	-
0117	Kofa NWR	1	-	-	-	-	1	-	-	-
0118	Kofa NWR	1	-	-	-	-	1	-	-	-
0119	Mittry Lake WA	-	-	-	-	1	-	-	-	-
0120	Mittry Lake WA	-	-	-	-	1	-	-	-	-
0121	Mittry Lake WA	-	-	-	-	1	-	-	-	-
0122	Imperial NWR	-	-	-	-	-	1	-	-	-
0123	Imperial NWR	-	-	-	-	1	1	-	-	-
0124	Imperial NWR	-	-	-	-	1	1	-	-	-
0125	Imperial NWR	-	-	-	-	1	1	-	-	-
0126	Imperial NWR	-	-	-	-	1	1	-	-	-
0127	Imperial NWR	-	-	-	-	1	1	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0128	Mittry Lake WA	-	-	-	-	1	-	-	-	-
0129	Cibola NWR	1	-	-	-	-	1	-	-	-
0130	Cibola NWR	1	-	-	-	1	1	-	-	-
0131	Cibola NWR	1	-	-	-	1	1	-	-	-
0132	Cibola NWR	1	-	-	-	1	1	-	-	-
0133	Palo Verde ER	1	-	-	-	-	-	-	-	-
0134	Palo Verde ER	1	-	-	-	-	-	-	-	-
0135	Palo Verde ER Tow Truck	-	-	-	-	-	-	-	-	-
0136	Palo Verde ER	1	-	-	-	-	-	-	-	-
0137	Palo Verde ER	1	-	-	-	-	-	-	-	-
0138	Bill Williams River NWR	1	-	-	-	1	1	-	-	-
0139	Havasu NWR Catfish Paradise	1	-	-	-	1	1	-	-	-
0140	Havasu NWR Catfish Paradise	1	-	-	-	1	1	-	-	-
0141	Hoover Dam Power Substation	-	-	-	-	-	-	-	-	-
0142	Lytle Ranch Preserve	1	-	-	-	-	-	-	-	1
0143	Lytle Ranch Preserve Beaver Dam Wash	1	-	-	-	-	-	-	-	1
0144	Lytle Ranch Preserve Beaver Dam Wash	1	-	-	-	-	-	-	-	1
0145	Lytle Ranch Preserve Beaver Dam Wash	1	-	-	-	-	-	-	-	1
0146	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0147	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0148	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0149	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0150	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0151	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0152	Zion NP Virgin River	1	-	-	-	1	-	1	-	-
0153	Dixie NF	-	-	-	-	-	-	-	1	-
0154	Dixie NF	-	-	-	-	-	-	-	1	-
0155	Fillmore Halfway Hill WMA	-	-	-	-	-	-	-	-	-
0156	Fillmore Halfway Hill WMA	-	-	-	-	-	-	-	-	-
0157	Fillmore I-15 Frontage Rd	-	-	-	-	-	-	-	-	-
0158	Fillmore Cemetery WMA	-	-	-	-	-	-	-	1	-
0159	Fillmore Circus Hollow WMA	-	-	-	-	-	-	-	-	-
0160	Fillmore Circus Hollow WMA	-	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0161	Fillmore Bennett Field WMA	-	-	-	-	-	-	-	-	-
0162	Fumarole Butte	-	-	-	-	-	-	-	-	-
0163	Fish Springs NWR	1	-	-	-	-	1	-	-	-
0164	Fish Springs NWR	1	-	-	-	-	1	-	-	-
0165	Fish Springs NWR	1	-	-	-	-	1	-	-	-
0166	Fish Springs NWR	1	-	-	-	-	1	-	-	-
0167	Fish Springs NWR	1	-	-	-	-	1	-	-	-
0168	Horseshoe Springs WMA	-	-	-	-	-	-	-	-	-
0169	Horseshoe Springs WMA	-	-	-	-	-	-	-	-	-
0170	Horseshoe Springs WMA Storm	-	-	-	-	-	-	-	-	-
0171	Horseshoe Springs WMA	-	-	-	-	-	-	-	-	-
0172	Bear River MBR	-	-	-	-	1	-	-	-	-
0173	Bear River MBR	1	-	-	-	1	-	-	-	-
0174	Bear River MBR	1	-	-	-	1	-	-	-	-
0175	Bear River MBR	-	-	-	-	1	-	-	-	-
0176	Harold S Crane WMA	-	-	-	-	-	-	-	-	-
0177	San Diego Oregon St Crows	-	-	-	-	-	-	-	-	-
0178	Tijuana Pasaje Rodriguez	-	-	-	-	-	-	-	-	-
0179	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0180	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0181	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0182	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0183	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0184	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0185	Oak Canyon Equestrian Center	-	-	-	-	-	-	-	-	-
0186	Valles Caldera National Preserve	1	-	-	-	-	-	-	-	1
0187	Great Sand Dunes National Preserve	1	-	-	-	-	-	-	-	1
0188	Great Sand Dunes National Preserve IRs	1	-	-	-	-	-	-	-	1
0189	Río Grande Gorge West Rim	1	-	-	-	-	-	-	-	1
0190	Clear Creek Natural Heritage Center	-	-	-	-	-	-	-	-	-
0191	Clear Creek Natural Heritage Center	-	-	-	-	-	-	-	-	-
0192	Clear Creek Natural Heritage Center	-	-	-	-	-	-	-	-	-
0193	Tishomingo NWR	-	-	-	-	-	1	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0194	Tishomingo NWR	-	-	-	-	-	1	-	-	-
0195	Tishomingo NWR	-	-	-	-	-	1	-	-	-
0206	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0207	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0208	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0209	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0210	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0211	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0212	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0213	Llama Land Ranch Eclipse	-	-	-	-	-	-	-	-	-
0214	Llama Land Ranch	-	-	-	-	-	-	-	-	-
0215	Dallas Richardson Studio 6	-	-	-	-	-	-	-	-	-
0218	Belleville Deerwood Estates	-	-	-	-	-	-	-	-	-
0220	Knobeloch Woods	1	-	-	-	-	-	-	-	-
0221	Shawnee NF Little Grand Canyon	-	-	-	-	-	-	-	1	-
0222	Shawnee NF Little Grand Canyon	-	-	-	-	-	-	-	1	-
0223	Trail of Tears SF	-	-	-	-	-	-	-	-	-
0224	Cache River Todd Fink Heron Pond Trail	1	-	-	1	1	-	-	-	-
0225	Cache River Todd Fink Heron Pond Trail	1	-	-	1	1	-	-	-	-
0226	Cache River Todd Fink Heron Pond Trail	1	-	-	1	1	-	-	-	-
0227	Cache River Todd Fink Heron Pond Bridge	1	-	-	1	1	-	-	-	-
0228	Cache River Todd Fink Heron Pond Trail	1	-	-	1	1	-	-	-	-
0229	Cypress Creek NWR Bellrose Reserve	1	-	-	1	1	1	-	-	-
0230	Chestnut Hills Calvin Cemetery	1	-	-	-	1	-	-	-	-
0231	Mermet Lake SFWA	1	-	-	-	-	-	-	-	-
0232	Mermet Lake SFWA Mermet Swamp	1	-	-	-	-	-	-	-	-
0233	Mermet Lake SFWA Train Idling	1	-	-	-	-	-	-	-	-
0234	Sielbeck Forest SNA	-	-	-	-	-	-	-	-	-
0235	Sielbeck Forest SNA	-	-	-	-	-	-	-	-	-
0236	Sielbeck Forest SNA	-	-	-	-	-	-	-	-	-
0237	Cretaceous Hills	-	-	-	-	-	-	-	1	-
0238	Shawnee NF Garden of the Gods	-	-	-	-	-	-	-	1	-
0239	Shawnee NF Garden of the Gods	-	-	-	-	-	-	-	1	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0240	Shawnee NF Garden of the Gods	-	-	-	-	-	-	-	1	-
0241	Shawnee NF Garden of the Gods	-	-	-	-	-	-	-	1	-
0242	Shawnee NF Garden of the Gods	-	-	-	-	-	-	-	1	-
0243	Shawnee NF Garden of the Gods Pharaoh	-	-	-	-	-	-	-	1	-
0244	Saline County SFWA	1	-	-	-	-	-	-	-	-
0245	Wabash Lowlands	1	-	-	-	-	-	-	-	-
0246	Wabash Lowlands	1	-	-	-	-	-	-	-	-
0247	Patoka River NWR Cane Ridge WMA	1	-	-	-	-	1*	-	-	-
0248	Patoka River NWR Cane Ridge WMA	1	-	-	-	-	1*	-	-	-
0249	Miller Shrub Swamp	-	-	-	-	-	-	-	-	-
0250	Miller Shrub Swamp Bridge	-	-	-	-	-	-	-	-	-
0251	H & B Bremer Wildlife Sanctuary	1	-	-	-	-	-	-	-	-
0252	H & B Bremer Wildlife Sanctuary	1	-	-	-	-	-	-	-	-
0253	Sangchris Lake SP Pheasant Run	-	-	-	-	-	-	-	-	-
0254	Sangchris Lake SP Hickory Point	-	-	-	-	-	-	-	-	-
0255	Sangchris Lake SP Pheasant Run	-	-	-	-	-	-	-	-	-
0256	Springfield Bridgeview Park	-	-	-	-	-	-	-	-	-
0258	Springfield Tom Madonia Park East	-	-	-	-	-	-	-	-	-
0259	Nipper Wildlife Sanctuary	-	-	-	-	-	-	-	-	-
0260	Lewis Park & Trails	-	-	-	-	-	-	-	-	-
0261	Sangamon River SFWA Athens Robin Ln	-	-	-	-	-	-	-	-	-
0262	Shick Shack Sand Pond	-	-	-	-	-	-	-	-	-
0263	Meredosia Hill Prairie	-	-	-	-	-	-	-	-	-
0264	Meredosia NWR	1	-	-	-	-	1	-	-	-
0265	Meredosia NWR	1	-	-	-	-	1	-	-	-
0266	Jacksonville Holt Rd	-	-	-	-	-	-	-	-	-
0267	Matanzas Prairie	-	-	-	-	-	-	-	-	-
0268	Emiquon NWR	1	-	-	1	-	1	-	-	-
0269	Chautauqua NWR	1	-	-	1	-	1	-	-	-
0270	Sand Ridge SF	1	-	-	-	-	-	-	-	-
0271	Singing Woods	1	-	-	-	-	-	-	-	-
0272	Singing Woods	1	-	-	-	-	-	-	-	-
0273	Kankakee NWR Iroquois Sands	1	-	-	-	1*	1	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0274	Kankakee NWR Iroquois Sands	1	-	-	-	1*	1	-	-	-
0275	Kankakee NWR Iroquois Sands	1	-	-	-	1*	1	-	-	-
0276	Kankakee NWR Iroquois Sands	1	-	-	-	1*	1	-	-	-
0277	Raccoon Grove	1	-	-	-	-	-	-	-	-
0278	Midewin National Tallgrass Prairie	-	-	-	-	1	-	-	-	1
0279	McKinley Woods FP	1	-	-	-	-	-	-	-	-
0280	Mineral Marsh	-	-	-	-	-	-	-	-	-
0281	Mineral Marsh	-	-	-	-	-	-	-	-	-
0282	Port Louisa NWR	-	-	-	-	-	1*	-	-	-
0283	Port Louisa NWR	-	-	-	-	-	1*	-	-	-
0284	Port Louisa NWR	-	-	-	-	-	1*	-	-	-
0285	Port Louisa NWR	-	-	-	-	-	1*	-	-	-
0286	Cedar Glen SNA	1	-	-	-	-	-	-	-	-
0287	Cedar Glen SNA	1	-	-	-	-	-	-	-	-
0288	Great River NWR Delair Division	-	-	-	-	-	1	-	-	-
0289	O'ahu Round Top FR Nahuina Walking	-	-	-	-	1*	-	-	-	-
0290	O'ahu Round Top FR Makiki Valley Walking	-	-	-	-	1*	-	-	-	-
0291	O'ahu Round Top FR Makiki Valley	-	-	-	-	1*	-	-	-	-
0292	O'ahu Round Top FR Makiki Valley	-	-	-	-	1*	-	-	-	-
0293	O'ahu Round Top FR Makiki Valley	-	-	-	-	1*	-	-	-	-
0294	O'ahu Pūpūkea FR Kaunala Walking	-	-	-	-	1	-	-	-	-
0295	O'ahu Pūpūkea FR Kaunala	-	-	-	-	1	-	-	-	-
0296	O'ahu Pūpūkea FR Kaunala	-	-	-	-	1	-	-	-	-
0297	O'ahu Pūpūkea FR Kaunala Walking	-	-	-	-	1	-	-	-	-
0298	O'ahu Kawainui Marsh Bike Trail Walking	1	-	-	1	-	-	-	-	-
0299	O'ahu Kawainui Marsh Kaha Park	-	-	-	1	-	-	-	-	-
0300	O'ahu Halona Beach Cove	-	-	-	-	-	-	-	-	-
0301	O'ahu Halona Beach Cove Tunnel	-	-	-	-	-	-	-	-	-
0302	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0303	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0304	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0305	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0306	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0307	O'ahu Kawainui Marsh Bike Trail	-	-	-	1	-	-	-	-	-
0308	O'ahu Kawainui Marsh Sanctuary	1	-	-	1	-	-	-	-	-
0309	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0310	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0311	O'ahu Park Shore Waikiki Hotel	-	-	-	-	-	-	-	-	-
0312	O'ahu Kapi'olani Regional Park	-	-	-	-	-	-	-	-	-
0313	San Diego Oregon St Police Helicopter	-	-	-	-	-	-	-	-	-
0314	Cheyenne Otto Rd Wind Turbine	-	-	-	-	-	-	-	-	-
0315	Arapaho NWR	1	-	-	-	-	1	-	-	-
0316	Arapaho NWR Prairie Dogs	1	-	-	-	-	1	-	-	-
0317	State Forest State Park	-	-	-	-	-	-	-	-	-
0318	Cheyenne Otto Rd Wind Turbine	-	-	-	-	-	-	-	-	-
0319	Cheyenne Otto Rd Wind Turbine	-	-	-	-	-	-	-	-	-
0320	Lassen NP Emerald Lake	1	-	-	-	-	-	1	-	-
0321	Lassen NP Sulphur Works	1	-	-	-	-	-	1	-	-
0322	Lassen NP Bumpass Hell Trailhead	1	-	-	-	-	-	1	-	-
0323	Lassen NP Bumpass Hell Fumaroles	1	-	-	-	-	-	1	-	-
0324	Lassen NP Bumpass Hell Fumaroles	1	-	-	-	-	-	1	-	-
0325	Lassen NP Bumpass Hell Fumaroles	1	-	-	-	-	-	1	-	-
0326	Klamath River Iron Gate Dam	-	-	-	-	-	-	-	-	-
0327	Klamath River Wild Horses	-	-	-	-	-	-	-	-	-
0328	Klamath River Copco Dam	-	-	-	-	-	-	-	-	-
0329	Klamath River Copco Lake	-	-	-	-	-	-	-	-	-
0330	Butte Valley Bed & Breakfast	-	-	-	-	-	-	-	-	-
0331	Lower Klamath NWR	1	-	-	-	-	1	-	-	-
0332	Tule Lake NWR	1	-	-	-	-	1	-	-	-
0333	Lava Beds NM Captain Jack's Stronghold	1	-	-	-	-	-	-	-	1
0334	Modoc NWR	1	-	-	-	-	1	-	-	-
0335	Winema NF Malone Springs	-	-	-	-	-	-	-	1	-
0336	Wood River Wetland	-	-	-	-	-	-	-	-	-
0337	Chiloquin Crater Lake Hwy	-	-	-	-	-	-	-	-	-
0338	Chiloquin Crater Lake Hwy	-	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0339	Wood River Wetland	-	-	-	-	-	-	-	-	-
0340	Crater Lake NP Rim	1	-	-	-	-	-	1	-	-
0341	Crater Lake NP Rim	1	-	-	-	-	-	1	-	-
0342	Crater Lake NP Rim	1	-	-	-	-	-	1	-	-
0343	Crater Lake NP Rim	1	-	-	-	-	-	1	-	-
0344	Crater Lake NP Pinnacles	1	-	-	-	-	-	1	-	-
0345	Crater Lake NP Sun Creek	1	-	-	-	-	-	1	-	-
0346	Crater Lake NP Annie Creek	1	-	-	-	-	-	1	-	-
0347	Crater Lake NP Annie Creek	1	-	-	-	-	-	1	-	-
0348	Sacramento Airport	-	-	-	-	-	-	-	-	-
0350	La Jolla Farms Rd Black's Beach Trail	1	-	-	-	-	-	-	-	-
0351	La Jolla Farms Rd Black's Beach Trail	1	-	-	-	-	-	-	-	-
0354	Colvill Park	-	-	-	-	-	-	-	-	-
0355	Colvill Park	-	-	-	-	-	-	-	-	-
0356	Colvill Park	-	-	-	-	-	-	-	-	-
0387	Sherburne NWR	1	-	-	-	-	1	-	-	-
0388	Jackson Malvern Dr Thanksgiving	-	-	-	-	-	-	-	-	-
0389	Leoni Township Smith Rd Cranes	-	-	-	-	1*	-	-	-	-
0390	Leoni Township Dalton Rd	-	-	-	-	-	-	-	-	-
0391	Haehnle Sanctuary	1	-	-	-	1*	-	-	-	-
0392	Grand River Fen Preserve	1	-	-	-	-	-	-	-	-
0393	Jackson Malvern Dr Wind Chimes	-	-	-	-	-	-	-	-	-
0394	Jackson Malvern Dr Wind Chimes	-	-	-	-	-	-	-	-	-
0395	Reserva Nacional Magallanes Test	1	-	-	-	-	-	-	-	1
0396	Reserva Nacional Magallanes Walking	1	-	-	-	-	-	-	-	1
0397	Reserva Nacional Magallanes Overlook	1	-	-	-	-	-	-	-	1
0398	Reserva Nacional Magallanes Trailhead	1	-	-	-	-	-	-	-	1
0399	Reserva Nacional Laguna Parrillar Gate	1	-	-	-	-	-	-	-	1*
0400	Reserva Nacional Laguna Parrillar Gate	1	-	-	-	-	-	-	-	1*
0401	Puerto Natales Plaza de Armas Arturo Prat	1	-	-	-	-	-	-	-	-
0402	Parque Nacional Bernardo O'Higgins	1	-	1	-	-	-	1	-	-
0403	Parque Nacional Bernardo O'Higgins	1	-	1	-	-	-	1	-	-
0404	Torres del Paine Laguna Amarga	1	-	1	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0405	Torres del Paine Refugio Grey	1	-	1	-	1	-	1	-	-
0406	Torres del Paine Lago Grey	1	-	1	-	1	-	1	-	-
0407	Torres del Paine Lago Grey	1	-	1	-	1	-	1	-	-
0408	Torres del Paine Lago Grey	1	-	1	-	1	-	1	-	-
0410	Torres del Paine Y-150	1	-	1	-	1	-	1	-	-
0411	Torres del Paine Y-290 Ibises	1	-	1	-	-	-	-	-	-
0412	Torres del Paine Y-290	1	-	1	-	-	-	-	-	-
0413	Cueva del Milodon	1	-	1	-	-	-	-	-	-
0414	Punta Arenas Fin de Camino	-	-	-	-	-	-	-	-	-
0415	Punta Arenas Fin de Camino	-	-	-	-	-	-	-	-	-
0416	Isla Magdalena Walking	1	-	-	-	-	-	-	-	1
0417	Isla Magdalena Walking	1	-	-	-	-	-	-	-	1
0418	Isla Magdalena Walking	1	-	-	-	-	-	-	-	1
0419	Natural Bridge SRP	1	-	-	-	-	-	-	-	-
0420	Natural Bridge SRP	-	-	-	-	-	-	-	-	-
0421	Maritime Plaza Park	-	-	-	-	-	-	-	-	-
0425	Lower Otay Reservoir	-	-	-	-	-	-	-	-	-
0426	Lower Otay Reservoir	-	-	-	-	-	-	-	-	-
0428	Steele Creek Lois Ln	-	-	-	-	-	-	-	-	-
0429	Steese Highway Cripple Creek	-	-	-	-	-	-	-	-	-
0430	Peat Ponds WA	-	-	-	-	-	-	-	-	-
0431	Creamer's Field Seasonal Wetlands	1	-	-	-	-	-	-	-	-
0432	Chena Hot Springs	-	-	-	-	-	-	-	-	-
0433	Creamer's Field Seasonal Wetlands	1	-	-	-	-	-	-	-	-
0434	Denali SP Byers Lake	-	-	-	-	-	-	-	-	-
0435	Healy Stampede Rd	-	-	-	-	-	-	-	-	-
0436	Healy Stampede Rd Musher's Cabin	-	-	-	-	-	-	-	-	-
0437	Creamer's Field Boreal Forest	1	-	-	-	-	-	-	-	-
0438	Creamer's Field Boreal Forest	1	-	-	-	-	-	-	-	-
0439	Portola Redwoods Iverson Trail	-	-	-	-	-	-	-	-	-
0440	Portola Redwoods Coyote Ridge	-	-	-	-	-	-	-	-	-
0441	Portola Redwoods Coyote Ridge	-	-	-	-	-	-	-	-	-
0442	Pescadero Creek Pomponio Rd	-	-	-	-	-	-	-	-	-

ID	Name	WDPA	WHS	BR	RW	KBA	NWR	NP	NF	NM
0443	Pescadero Creek Tarwater Trail	-	-	-	-	-	-	-	-	-
0444	Don Edwards San Francisco Bay NWR	1	-	-	-	-	1	-	-	-
0445	Eden Landing ER Salt Ponds	1	-	-	-	-	-	-	-	-
0446	Eden Landing ER Walking	-	-	-	-	-	-	-	-	-
0447	Alviso Marina County Park	-	-	-	-	-	-	-	-	-
0448	Alviso Marina County Park	-	-	-	-	-	-	-	-	-
0449	Ocean Institute Sea Explorer Dolphins	-	-	-	-	-	-	-	-	-
0450	Ocean Institute Sea Explorer Sea Lions	-	-	-	-	-	-	-	-	-
0451	San Diego Oregon St Window East	-	-	-	-	-	-	-	-	-
0452	San Diego Oregon St Reference Test	-	-	-	-	-	-	-	-	-
0453	San Diego Oregon St Reference Test	-	-	-	-	-	-	-	-	-
0464	Inyo NF Hot Creek Geologic Site	1	-	-	-	1	-	-	1	-
0465	Inyo NF Hot Creek Geologic Site	1	-	-	-	1	-	-	1	-
0466	Inyo NF Agnew Meadows	-	-	-	-	-	-	-	1	-
0467	Inyo NF Starkweather Lake	-	-	-	-	-	-	-	1	-
0468	Inyo NF Starkweather Lake	-	-	-	-	-	-	-	1	-
0469	Inyo NF Ancient Bristlecone Pine Forest	1	-	-	-	-	-	-	1	-
0470	Inyo NF Ancient Bristlecone Pine Forest	1	-	-	-	-	-	-	1	-
0473	Inyo NF Big Pine Crickets	-	-	-	-	-	-	-	1	-
0474	Inyo NF Big Pine Crickets	-	-	-	-	-	-	-	1	-
0475	Inyo NF Ancient Bristlecone Pine Forest	1	-	-	-	-	-	-	1	-
0476	San Diego Oregon St Bees	-	-	-	-	-	-	-	-	-
0477	Aravaipa Creek Tent	-	-	-	-	-	-	-	-	-
0478	Aravaipa Creek Porch	-	-	-	-	-	-	-	-	-

Appendix F: Indigenous territories represented by soundscape sites in *Ambisonic Earth*.

ID	Name	Indigenous Territories (Native Land Digital)
0002	Idyllwild Regional Park	ʔíviluwenetem Meytémak (Cahuilla)
0003	Idyllwild Regional Park	ʔíviluwenetem Meytémak (Cahuilla)
0004	Idyllwild Regional Park	ʔíviluwenetem Meytémak (Cahuilla)
0005	Idyllwild Regional Park	ʔíviluwenetem Meytémak (Cahuilla)
0006	Idyllwild-Pine Cove Marian View Dr	ʔíviluwenetem Meytémak (Cahuilla)
0007	Idyllwild-Pine Cove Marian View Dr	ʔíviluwenetem Meytémak (Cahuilla)
0008	Idyllwild-Pine Cove Marian View Dr	ʔíviluwenetem Meytémak (Cahuilla)
0011	San Diego Oregon St Living Room	Kumeyaay/Kumiais
0012	San Diego Oregon St Window South	Kumeyaay/Kumiais
0014	San Diego Oregon St Window East	Kumeyaay/Kumiais
0015	San Diego Oregon St Window East	Kumeyaay/Kumiais
0016	San Diego Oregon St Window East	Kumeyaay/Kumiais
0021	Sierra Valley Marble Hot Springs Rd	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0022	Sierra Valley Marble Hot Springs Rd	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0023	Sierra Valley Marble Hot Springs Rd	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0024	Sierra Valley Marble Hot Springs Rd	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0025	Sierra Valley Marble Hot Springs Rd	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0026	Sierra Valley Marble Hot Springs Bridge	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0027	Sierra Valley Marble Hot Springs Bridge	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0028	Carman Valley Pond	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0029	Carman Valley Pond	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)
0030	Carman Valley Pond	Cayuse, Umatilla and Walla Walla Wašišiw ʔítde? (Washoe)

ID	Name	Indigenous Territories (Native Land Digital)
0031	Carman Valley Meadow	Cayuse, Umatilla and Walla Walla Wašišiw ʔitde? (Washoe)
0032	Carman Valley Meadow	Cayuse, Umatilla and Walla Walla Wašišiw ʔitde? (Washoe)
0033	Yuba Pass	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0034	Yuba Pass	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0035	Yuba Pass	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0036	Yuba Pass IRs	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0037	Tahoe NF North Yuba River	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0038	Tahoe NF North Yuba River	Cayuse, Umatilla and Walla Walla Nisenan Wašišiw ʔitde? (Washoe)
0039	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0040	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0041	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0042	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0043	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0044	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0045	Tahoe NF Joubert Diggins IRs	Cayuse, Umatilla and Walla Walla Nisenan
0046	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0047	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0048	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0050	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0051	Tahoe NF Joubert Diggins	Cayuse, Umatilla and Walla Walla Nisenan
0052	Marysville Mathews Ln Crop Duster	Cayuse, Umatilla and Walla Walla Nisenan
0053	North Table Mountain ER Phantom Falls	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)
0054	North Table Mountain ER Ravine	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)
0055	North Table Mountain ER Ravine Falls	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)
0056	North Table Mountain ER Ravine Falls	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)

ID	Name	Indigenous Territories (Native Land Digital)
0057	North Table Mountain ER Ravine IRs	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)
0058	North Table Mountain ER Trailhead	Cayuse, Umatilla and Walla Walla Kojomk'awi (Konkow)
0059	Sacramento NWR Deck 1	Cayuse, Umatilla and Walla Walla Patwin
0060	Sacramento NWR Deck 1	Cayuse, Umatilla and Walla Walla Patwin
0061	Sacramento NWR Deck 1	Cayuse, Umatilla and Walla Walla Patwin
0062	Sacramento NWR Deck 1	Cayuse, Umatilla and Walla Walla Patwin
0063	Sacramento NWR Deck 2	Cayuse, Umatilla and Walla Walla Patwin
0064	Sacramento NWR Deck 2	Cayuse, Umatilla and Walla Walla Patwin
0065	Sacramento NWR Deck 2	Cayuse, Umatilla and Walla Walla Patwin
0066	Colusa NWR Bridge	Cayuse, Umatilla and Walla Walla Patwin
0067	Colusa NWR	Cayuse, Umatilla and Walla Walla Patwin
0068	San Luis NWR	Yokuts
0069	San Luis NWR	Yokuts
0070	San Luis NWR	Yokuts
0071	Merced NWR	Yokuts
0072	Merced NWR Cattle	Yokuts
0073	Merced NWR	Yokuts
0074	Mendota WA	Yokuts
0075	Mendota WA Reeds	Yokuts
0076	Mendota WA	Yokuts
0077	Kern NWR	Yokuts
0078	Kern NWR	Yokuts
0079	Kern NWR	Yokuts
0080	Kern NWR	Yokuts
0081	Sequoia NP Paradise Creek	Nyyhmy (Western Mono/Monache)
0082	Sequoia NP Buckeye Flats	Nyyhmy (Western Mono/Monache)
0083	Sequoia NP Buckeye Flats	Nyyhmy (Western Mono/Monache)
0084	Sequoia NP Buckeye Flats	Nyyhmy (Western Mono/Monache)
0085	Sequoia NP Crescent Meadow	Nyyhmy (Western Mono/Monache)
0086	Sequoia NP Crescent Meadow	Nyyhmy (Western Mono/Monache)
0087	Sequoia NP Crescent Meadow	Nyyhmy (Western Mono/Monache)
0088	Olympic NP Hoh Rainforest	Quileute ChalAt'i'lo t'sikAti (Chalat') Cayuse, Umatilla and Walla Walla

ID	Name	Indigenous Territories (Native Land Digital)
0089	Olympic NP Hoh Rainforest	Quileute ChalAt'i'lo t'sikAti (Chalat') Cayuse, Umatilla and Walla Walla
0090	Olympic NP Hoh Rainforest	Quileute ChalAt'i'lo t'sikAti (Chalat') Cayuse, Umatilla and Walla Walla
0091	Olympic NP Hoh Rainforest IRs	Quileute ChalAt'i'lo t'sikAti (Chalat') Cayuse, Umatilla and Walla Walla
0092	Olympic NP Kalaloch	Cayuse, Umatilla and Walla Walla Queets Quinault
0093	Olympic NP Kalaloch	Cayuse, Umatilla and Walla Walla Queets Quinault
0094	Olympic NP Kalaloch	Cayuse, Umatilla and Walla Walla Queets Quinault
0095	Olympic NP Kalaloch IRs	Cayuse, Umatilla and Walla Walla Queets Quinault
0096	Port of Dover	-
0097	Brighton Palace of Fun	-
0098	Brighton Palace Pier	-
0099	Brighton Palace of Fun	-
0100	Brighton Palace of Fun	-
0101	Brighton Palace of Fun	-
0102	Brighton Boardwalk	-
0106	NYC Walker St Rooftop	Munsee Lenape Mohican
0107	NYC Walker St Rooftop	Munsee Lenape Mohican
0108	Calipatria Kalin Rd	Xawiłł kwñchawaay (Cocopah) Kumeyaay/Kumiais
0109	Sonny Bono Salton Sea NWR	Xawiłł kwñchawaay (Cocopah) Kumeyaay/Kumiais
0110	Sonny Bono Salton Sea NWR Quails	Xawiłł kwñchawaay (Cocopah) Kumeyaay/Kumiais
0111	Sonny Bono Salton Sea NWR	Xawiłł kwñchawaay (Cocopah) Kumeyaay/Kumiais
0112	Old Mud Pots	Xawiłł kwñchawaay (Cocopah)
0113	Old Mud Pots	Xawiłł kwñchawaay (Cocopah)
0114	Old Mud Pots	Xawiłł kwñchawaay (Cocopah)
0115	Old Mud Pots	Xawiłł kwñchawaay (Cocopah)
0116	Elmore Geothermal Facility	Xawiłł kwñchawaay (Cocopah) Kumeyaay/Kumiais
0117	Kofa NWR	Xawiłł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0118	Kofa NWR	Xawiłł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0119	Mittry Lake WA	Xawiłł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0120	Mittry Lake WA	Xawiłł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache

ID	Name	Indigenous Territories (Native Land Digital)
0121	Mittry Lake WA	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0122	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0123	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0124	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0125	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0126	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0127	Imperial NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0128	Mittry Lake WA	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0129	Cibola NWR	Xawihł kwñchawaay (Cocopah) Nüwüwü (Chemehuevi) Quechan (Kwatsáan) ʔivüluwenetem Meytémak (Cahuilla) Yavapai Apache
0130	Cibola NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0131	Cibola NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0132	Cibola NWR	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Yavapai Apache
0133	Palo Verde ER	Xawihł kwñchawaay (Cocopah) Nüwüwü (Chemehuevi) Quechan (Kwatsáan)
0134	Palo Verde ER	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan)
0135	Palo Verde ER Tow Truck	Xawihł kwñchawaay (Cocopah) Quechan (Kwatsáan) Nuwuvi (Southern Paiute)
0136	Palo Verde ER	Xawihł kwñchawaay (Cocopah) Nüwüwü (Chemehuevi) Quechan (Kwatsáan) Nuwuvi (Southern Paiute)
0137	Palo Verde ER	Xawihł kwñchawaay (Cocopah) Nüwüwü (Chemehuevi) Quechan (Kwatsáan)
0138	Bill Williams River NWR	Xawihł kwñchawaay (Cocopah) Hualapai Yavapai Apache
0139	Havasü NWR Catfish Paradise	Nüwüwü (Chemehuevi) Pipa Aha Macav (Mojave) Hualapai

ID	Name	Indigenous Territories (Native Land Digital)
0140	Havasu NWR Catfish Paradise	Nüwüwü (Chemehuevi) Pipa Aha Macav (Mojave) Hualapai
0141	Hoover Dam Power Substation	Nüwüwü (Chemehuevi) Nuwuvi (Southern Paiute)
0142	Lytle Ranch Preserve	Nuwuvi (Southern Paiute)
0143	Lytle Ranch Preserve Beaver Dam Wash	Nuwuvi (Southern Paiute)
0144	Lytle Ranch Preserve Beaver Dam Wash	Nuwuvi (Southern Paiute)
0145	Lytle Ranch Preserve Beaver Dam Wash	Nuwuvi (Southern Paiute)
0146	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0147	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0148	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0149	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0150	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0151	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0152	Zion NP Virgin River	Pueblos Nuwuvi (Southern Paiute)
0153	Dixie NF	Nuwuvi (Southern Paiute)
0154	Dixie NF	Nuwuvi (Southern Paiute)
0155	Fillmore Halfway Hill WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0156	Fillmore Halfway Hill WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0157	Fillmore I-15 Frontage Rd	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0158	Fillmore Cemetery WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0159	Fillmore Circus Hollow WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0160	Fillmore Circus Hollow WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0161	Fillmore Bennett Field WMA	Nuwuvi (Southern Paiute) Núu-agma-tuvu-pų (Ute) Timpanogos
0162	Fumarole Butte	Goshute Núu-agma-tuvu-pų (Ute) Timpanogos
0163	Fish Springs NWR	Goshute Timpanogos
0164	Fish Springs NWR	Goshute Timpanogos
0165	Fish Springs NWR	Goshute Timpanogos
0166	Fish Springs NWR	Goshute Timpanogos
0167	Fish Springs NWR	Goshute Timpanogos
0168	Horseshoe Springs WMA	Goshute Núu-agma-tuvu-pų (Ute) Timpanogos

ID	Name	Indigenous Territories (Native Land Digital)
0169	Horseshoe Springs WMA	Goshute Núu-agma-tuvu-pu (Ute) Timpanogos
0170	Horseshoe Springs WMA Storm	Goshute Núu-agma-tuvu-pu (Ute) Timpanogos
0171	Horseshoe Springs WMA	Goshute Núu-agma-tuvu-pu (Ute) Timpanogos
0172	Bear River MBR	Núu-agma-tuvu-pu (Ute)
0173	Bear River MBR	Núu-agma-tuvu-pu (Ute)
0174	Bear River MBR	Núu-agma-tuvu-pu (Ute)
0175	Bear River MBR	Núu-agma-tuvu-pu (Ute)
0176	Harold S Crane WMA	Núu-agma-tuvu-pu (Ute)
0177	San Diego Oregon St Crows	Kumeyaay/Kumiais
0178	Tijuana Pasaje Rodriguez	Kumeyaay/Kumiais
0179	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0180	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0181	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0182	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0183	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0184	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0185	Oak Canyon Equestrian Center	Chumash Fernandeno Tataviam
0186	Valles Caldera National Preserve	Pueblos Núu-agma-tuvu-pu (Ute)
0187	Great Sand Dunes National Preserve	Diné Bikéyah Jicarilla Apache Tsésthó'e (Cheyenne) Núu-agma-tuvu-pu (Ute)
0188	Great Sand Dunes National Preserve IRs	Diné Bikéyah Jicarilla Apache Tsésthó'e (Cheyenne) Núu-agma-tuvu-pu (Ute)
0189	Río Grande Gorge West Rim	Pueblos Tigua (Tiwa) Núu-agma-tuvu-pu (Ute)
0190	Clear Creek Natural Heritage Center	Kiikaapoi (Kickapoo) Tawakoni Wichita
0191	Clear Creek Natural Heritage Center	Kiikaapoi (Kickapoo) Tawakoni Wichita
0192	Clear Creek Natural Heritage Center	Kiikaapoi (Kickapoo) Tawakoni Wichita
0193	Tishomingo NWR	Kiikaapoi (Kickapoo) Tawakoni Chickasaw (Oklahoma) ᏍᏏᏉᏍᏏ ᏌᏉᏍᏏ ᏍᏏᏉᏍᏏ (Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Wichita
0194	Tishomingo NWR	Kiikaapoi (Kickapoo) Tawakoni Chickasaw (Oklahoma) ᏍᏏᏉᏍᏏ ᏌᏉᏍᏏ ᏍᏏᏉᏍᏏ (Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Wichita
0195	Tishomingo NWR	Kiikaapoi (Kickapoo) Tawakoni Chickasaw (Oklahoma) ᏍᏏᏉᏍᏏ ᏌᏉᏍᏏ ᏍᏏᏉᏍᏏ (Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Wichita
0206	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0207	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita

ID	Name	Indigenous Territories (Native Land Digital)
0208	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0209	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0210	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0211	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0212	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0213	Llama Land Ranch Eclipse	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0214	Llama Land Ranch	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0215	Dallas Richardson Studio 6	Kiikaapoi (Kickapoo) Tawakoni Jumanos Wichita
0218	Belleville Deerwood Estates	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0220	Knobeloch Woods	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0221	Shawnee NF Little Grand Canyon	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0222	Shawnee NF Little Grand Canyon	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0223	Trail of Tears SF	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0224	Cache River Todd Fink Heron Pond Trail	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0225	Cache River Todd Fink Heron Pond Trail	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0226	Cache River Todd Fink Heron Pond Trail	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0227	Cache River Todd Fink Heron Pond Bridge	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia
0228	Cache River Todd Fink Heron Pond Trail	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՇՈՆ ՇՈՒԱ ԹԼԴՀԼԴ(Osage) O-ga-xpa Ma-zhoⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówiŋ Kaskaskia

ID	Name	Indigenous Territories (Native Land Digital)
0229	Cypress Creek NWR Bellrose Reserve	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0230	Chestnut Hills Calvin Cemetery	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Očhéthi Šakówin Kaskaskia
0231	Mermet Lake SFWA	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0232	Mermet Lake SFWA Mermet Swamp	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0233	Mermet Lake SFWA Train Idling	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0234	Sielbeck Forest SNA	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0235	Sielbeck Forest SNA	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0236	Sielbeck Forest SNA	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Očhéthi Šakówin Kaskaskia
0237	Cretaceous Hills	ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Shawandasse Tula (Shawanwaki/Shawnee) Očhéthi Šakówin Kaskaskia S'atsoyaha (Yuchi)
0238	Shawnee NF Garden of the Gods	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Shawandasse Tula (Shawanwaki/Shawnee) Očhéthi Šakówin Kaskaskia S'atsoyaha (Yuchi)
0239	Shawnee NF Garden of the Gods	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԼՆԴԼԸ(Osage) O-ga-xpa Ma-zho ⁿ (O-ga-xpa) (Quapaw) Myaamia Shawandasse Tula (Shawanwaki/Shawnee) Očhéthi Šakówin Kaskaskia S'atsoyaha (Yuchi)

ID	Name	Indigenous Territories (Native Land Digital)
0249	Miller Shrub Swamp	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԸԸՀԸԸ(Osage) Myaamia Očhéthi Šakówin Kaskaskia
0250	Miller Shrub Swamp Bridge	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԸԸՀԸԸ(Osage) Myaamia Očhéthi Šakówin Kaskaskia
0251	H & B Bremer Wildlife Sanctuary	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԸԸՀԸԸ(Osage) Myaamia Očhéthi Šakówin Kaskaskia
0252	H & B Bremer Wildlife Sanctuary	Kiikaapoi (Kickapoo) ԿԱՀԱՀԱ ԿՕՉՈՆ ՇՈՐԱ ԹԸԸՀԸԸ(Osage) Myaamia Očhéthi Šakówin Kaskaskia
0253	Sangchris Lake SP Pheasant Run	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0254	Sangchris Lake SP Hickory Point	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0255	Sangchris Lake SP Pheasant Run	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0256	Springfield Bridgeview Park	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0258	Springfield Tom Madonia Park East	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0259	Nipper Wildlife Sanctuary	Kiikaapoi (Kickapoo) Peoria Myaamia Očhéthi Šakówin Kaskaskia
0260	Lewis Park & Trails	Kiikaapoi (Kickapoo) Peoria Myaamia o0aakiwaki·hina·ki (Sauk) & Meškwahki-aša·hina (Fox) Očhéthi Šakówin Kaskaskia
0261	Sangamon River SFWA Athens Robin Ln	Kiikaapoi (Kickapoo) Peoria Myaamia o0aakiwaki·hina·ki (Sauk) & Meškwahki-aša·hina (Fox) Očhéthi Šakówin Kaskaskia
0262	Shick Shack Sand Pond	Kiikaapoi (Kickapoo) Peoria Myaamia o0aakiwaki·hina·ki (Sauk) & Meškwahki-aša·hina (Fox) Očhéthi Šakówin Kaskaskia
0263	Meredosia Hill Prairie	Kiikaapoi (Kickapoo) Peoria Myaamia o0aakiwaki·hina·ki (Sauk) & Meškwahki-aša·hina (Fox) Očhéthi Šakówin Kaskaskia
0264	Meredosia NWR	Kiikaapoi (Kickapoo) Peoria Myaamia o0aakiwaki·hina·ki (Sauk) & Meškwahki-aša·hina (Fox) Očhéthi Šakówin Kaskaskia

ID	Name	Indigenous Territories (Native Land Digital)
0265	Meredosia NWR	Kiikaapoi (Kickapoo) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0266	Jacksonville Holt Rd	Kiikaapoi (Kickapoo) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0267	Matanzas Prairie	Kiikaapoi (Kickapoo) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0268	Emiquon NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0269	Chautauqua NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0270	Sand Ridge SF	Kiikaapoi (Kickapoo) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0271	Singing Woods	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0272	Singing Woods	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówinj Kaskaskia
0273	Kankakee NWR Iroquois Sands	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia
0274	Kankakee NWR Iroquois Sands	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia
0275	Kankakee NWR Iroquois Sands	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia
0276	Kankakee NWR Iroquois Sands	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia
0277	Raccoon Grove	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia
0278	Midewin National Tallgrass Prairie	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówinj Kaskaskia

ID	Name	Indigenous Territories (Native Land Digital)
0279	McKinley Woods FP	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia Očhéthi Šakówiŋ Kaskaskia
0280	Mineral Marsh	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0281	Mineral Marsh	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0282	Port Louisa NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0283	Port Louisa NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0284	Port Louisa NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0285	Port Louisa NWR	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) Peoria Myaamia oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0286	Cedar Glen SNA	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) ᖃᓵᓴᓴᓴᓴ ᓵᓴᓴᓴᓴ ᓴᓴᓴᓴ ᓴᓴᓴᓴᓴᓴ (Osage) Peoria oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0287	Cedar Glen SNA	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) ᖃᓵᓴᓴᓴᓴ ᓵᓴᓴᓴᓴ ᓴᓴᓴᓴ ᓴᓴᓴᓴᓴᓴ (Osage) Peoria oθaakiiwaki·hina·ki (Sauk) & Meškwahki·aša·hina (Fox) Očhéthi Šakówiŋ
0288	Great River NWR Delair Division	Kiikaapoi (Kickapoo) Bodwéwadmī (Potawatomi) ᖃᓵᓴᓴᓴᓴ ᓵᓴᓴᓴᓴ ᓴᓴᓴᓴ ᓴᓴᓴᓴᓴᓴ (Osage) Peoria Myaamia Očhéthi Šakówiŋ Kaskaskia
0289	O‘ahu Round Top FR Nahuina Walking	Nā moku ‘ehā
0290	O‘ahu Round Top FR Makiki Valley Walking	Nā moku ‘ehā
0291	O‘ahu Round Top FR Makiki Valley	Nā moku ‘ehā
0292	O‘ahu Round Top FR Makiki Valley	Nā moku ‘ehā
0293	O‘ahu Round Top FR Makiki Valley	Nā moku ‘ehā
0294	O‘ahu Pūpūkea FR Kaunala Walking	Nā moku ‘ehā
0295	O‘ahu Pūpūkea FR Kaunala	Nā moku ‘ehā
0296	O‘ahu Pūpūkea FR Kaunala	Nā moku ‘ehā

ID	Name	Indigenous Territories (Native Land Digital)
0297	O‘ahu Pūpūkea FR Kaunala Walking	Nā moku ‘ehā
0298	O‘ahu Kawainui Marsh Bike Trail Walking	Nā moku ‘ehā
0299	O‘ahu Kawainui Marsh Kaha Park	Nā moku ‘ehā
0300	O‘ahu Halona Beach Cove	Nā moku ‘ehā
0301	O‘ahu Halona Beach Cove Tunnel	Nā moku ‘ehā
0302	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0303	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0304	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0305	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0306	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0307	O‘ahu Kawainui Marsh Bike Trail	Nā moku ‘ehā
0308	O‘ahu Kawainui Marsh Sanctuary	Nā moku ‘ehā
0309	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0310	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0311	O‘ahu Park Shore Waikiki Hotel	Nā moku ‘ehā
0312	O‘ahu Kapi‘olani Regional Park	Nā moku ‘ehā
0313	San Diego Oregon St Police Helicopter	Kumeyaay /Kumiais
0314	Cheyenne Otto Rd Wind Turbine	Ndé Kónitsaaí Gokíyaa (Lipan Apache) Tsésthó‘e (Cheyenne) Očhéthi Šakówin hinono’eino’ biito’owu’ (Arapaho)
0315	Arapaho NWR	Tsésthó‘e (Cheyenne) Newe Sogobia (Eastern Shoshone) Núu-agma-tuvu-pų (Ute)
0316	Arapaho NWR Prairie Dogs	Tsésthó‘e (Cheyenne) Newe Sogobia (Eastern Shoshone) Núu-agma-tuvu-pų (Ute)
0317	State Forest State Park	Tsésthó‘e (Cheyenne) Newe Sogobia (Eastern Shoshone) Núu-agma-tuvu-pų (Ute)
0318	Cheyenne Otto Rd Wind Turbine	Ndé Kónitsaaí Gokíyaa (Lipan Apache) Tsésthó‘e (Cheyenne) Očhéthi Šakówin hinono’eino’ biito’owu’ (Arapaho)
0319	Cheyenne Otto Rd Wind Turbine	Ndé Kónitsaaí Gokíyaa (Lipan Apache) Tsésthó‘e (Cheyenne) Očhéthi Šakówin hinono’eino’ biito’owu’ (Arapaho)
0320	Lassen NP Emerald Lake	Cayuse, Umatilla and Walla Walla Mountain Maidu
0321	Lassen NP Sulphur Works	Cayuse, Umatilla and Walla Walla Mountain Maidu
0322	Lassen NP Bumpass Hell Trailhead	Cayuse, Umatilla and Walla Walla Mountain Maidu
0323	Lassen NP Bumpass Hell Fumaroles	Cayuse, Umatilla and Walla Walla Mountain Maidu
0324	Lassen NP Bumpass Hell Fumaroles	Cayuse, Umatilla and Walla Walla Mountain Maidu

ID	Name	Indigenous Territories (Native Land Digital)
0325	Lassen NP Bumpass Hell Fumaroles	Cayuse, Umatilla and Walla Walla Mountain Maidu
0326	Klamath River Iron Gate Dam	Confederated Tribes of Siletz Indians Shasta Modoc Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde
0327	Klamath River Wild Horses	Confederated Tribes of Siletz Indians Shasta Modoc Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde
0328	Klamath River Copco Dam	Confederated Tribes of Siletz Indians Shasta Modoc Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde
0329	Klamath River Copco Lake	Confederated Tribes of Siletz Indians Shasta Modoc Cayuse, Umatilla and Walla Walla
0330	Butte Valley Bed & Breakfast	Modoc Klamath Cayuse, Umatilla and Walla Walla
0331	Lower Klamath NWR	Modoc Cayuse, Umatilla and Walla Walla
0332	Tule Lake NWR	Modoc Cayuse, Umatilla and Walla Walla
0333	Lava Beds NM Captain Jack's Stronghold	Modoc Cayuse, Umatilla and Walla Walla
0334	Modoc NWR	Pit River Cayuse, Umatilla and Walla Walla Achumawi
0335	Winema NF Malone Springs	Confederated Tribes of Siletz Indians Modoc Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde
0336	Wood River Wetland	Klamath Cayuse, Umatilla and Walla Walla
0337	Chiloquin Crater Lake Hwy	Klamath Cayuse, Umatilla and Walla Walla
0338	Chiloquin Crater Lake Hwy	Klamath Cayuse, Umatilla and Walla Walla
0339	Wood River Wetland	Klamath Cayuse, Umatilla and Walla Walla
0340	Crater Lake NP Rim	Confederated Tribes of Siletz Indians Modoc Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde Molalla
0341	Crater Lake NP Rim	Confederated Tribes of Siletz Indians Modoc Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde Molalla
0342	Crater Lake NP Rim	Confederated Tribes of Siletz Indians Modoc Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde Molalla
0343	Crater Lake NP Rim	Confederated Tribes of Siletz Indians Modoc Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde Molalla
0344	Crater Lake NP Pinnacles	Confederated Tribes of Siletz Indians Klamath Cayuse, Umatilla and Walla Walla Confederated Tribes of Grand Ronde

ID	Name	Indigenous Territories (Native Land Digital)
0398	Reserva Nacional Magallanes Trailhead	Kawashkar
0399	Reserva Nacional Laguna Parrillar Gate	Kawashkar
0400	Reserva Nacional Laguna Parrillar Gate	Kawashkar
0401	Puerto Natales Plaza de Armas Arturo Prat	Aónikenk (Tehuelche)
0402	Parque Nacional Bernardo O'Higgins	Aónikenk (Tehuelche)
0403	Parque Nacional Bernardo O'Higgins	Aónikenk (Tehuelche)
0404	Torres del Paine Laguna Amarga	Aónikenk (Tehuelche)
0405	Torres del Paine Refugio Grey	Aónikenk (Tehuelche)
0406	Torres del Paine Lago Grey	Aónikenk (Tehuelche)
0407	Torres del Paine Lago Grey	Aónikenk (Tehuelche)
0408	Torres del Paine Lago Grey	Aónikenk (Tehuelche)
0410	Torres del Paine Y-150	Aónikenk (Tehuelche)
0411	Torres del Paine Y-290 Ibises	Aónikenk (Tehuelche)
0412	Torres del Paine Y-290	Aónikenk (Tehuelche)
0413	Cueva del Milodon	Aónikenk (Tehuelche)
0414	Punta Arenas Fin de Camino	Selk'nam Kawashkar
0415	Punta Arenas Fin de Camino	Selk'nam Kawashkar
0416	Isla Magdalena Walking	Selk'nam
0417	Isla Magdalena Walking	Selk'nam
0418	Isla Magdalena Walking	Selk'nam
0419	Natural Bridge SRP	Hopewell Culture ἱΛῒΛῒ ἡፀፀ ἕፀፀ ፀፌፌፌ(Osage) Shawandasse Tula (Shawanwaki/Shawnee) ፀፌፌፌ Tsalaguwetiyi (Cherokee, East) Adena Culture S'atsoyaha (Yuchi)
0420	Natural Bridge SRP	Hopewell Culture ἱΛῒΛῒ ἡፀፀ ἕፀፀ ፀፌፌፌ(Osage) Shawandasse Tula (Shawanwaki/Shawnee) ፀፌፌፌ Tsalaguwetiyi (Cherokee, East) Adena Culture S'atsoyaha (Yuchi)
0421	Maritime Plaza Park	Ohlone Ramaytush Muwekma
0425	Lower Otay Reservoir	Kumeyaay/Kumiais
0426	Lower Otay Reservoir	Kumeyaay/Kumiais
0428	Steele Creek Lois Ln	Tanana Dënéndeh
0429	Steese Highway Cripple Creek	Tanana Dënéndeh
0430	Peat Ponds WA	Tanana Dënéndeh
0431	Creamer's Field Seasonal Wetlands	Tanana Dënéndeh
0432	Chena Hot Springs	Tanana Dënéndeh
0433	Creamer's Field Seasonal Wetlands	Tanana Dënéndeh

ID	Name	Indigenous Territories (Native Land Digital)
0434	Denali SP Byers Lake	Ahtna Nenn' Dena'ina Elnena Dënéndeh
0435	Healy Stampede Rd	Tanana Dënéndeh
0436	Healy Stampede Rd Mushers Cabin	Tanana Dënéndeh
0437	Creamer's Field Boreal Forest	Tanana Dënéndeh
0438	Creamer's Field Boreal Forest	Tanana Dënéndeh
0439	Portola Redwoods Iverson Trail	Awawas Ohlone Ramaytush Muwekma
0440	Portola Redwoods Coyote Ridge	Awawas Ohlone Ramaytush Muwekma
0441	Portola Redwoods Coyote Ridge	Awawas Ohlone Ramaytush Muwekma
0442	Pescadero Creek Pomponio Rd	Awawas Ohlone Ramaytush Muwekma
0443	Pescadero Creek Tarwater Trail	Awawas Ohlone Ramaytush Muwekma
0444	Don Edwards San Francisco Bay NWR	Ohlone Ramaytush Muwekma
0445	Eden Landing ER Salt Ponds	Ohlone Confederated Villages of Lisjan Muwekma
0446	Eden Landing ER Walking	Ohlone Confederated Villages of Lisjan Muwekma
0447	Alviso Marina County Park	Tamien Nation Ohlone Muwekma
0448	Alviso Marina County Park	Tamien Nation Ohlone Muwekma
0449	Ocean Institute Sea Explorer Dolphins	Tongva (Gabrieleno) Acjachemen (Juaneño) Payómkawichum (Luiseño)
0450	Ocean Institute Sea Explorer Sea Lions	Tongva (Gabrieleno) Acjachemen (Juaneño) Payómkawichum (Luiseño)
0451	San Diego Oregon St Window East	Kumeyaay/Kumiais
0452	San Diego Oregon St Reference Test	Kumeyaay/Kumiais
0453	San Diego Oregon St Reference Test	Kumeyaay/Kumiais
0464	Inyo NF Hot Creek Geologic Site	Nüümü (Northern Paiute)
0465	Inyo NF Hot Creek Geologic Site	Nüümü (Northern Paiute)
0466	Inyo NF Agnew Meadows	Nyyhmy (Western Mono/Monache) Nüümü (Northern Paiute)
0467	Inyo NF Starkweather Lake	Nyyhmy (Western Mono/Monache) Nüümü (Northern Paiute)
0468	Inyo NF Starkweather Lake	Nyyhmy (Western Mono/Monache) Nüümü (Northern Paiute)
0469	Inyo NF Ancient Bristlecone Pine Forest	Newe Sogobia (Western Shoshone) Nüümü Witü (Eastern Mono/Monache) Nüümü (Northern Paiute)
0470	Inyo NF Ancient Bristlecone Pine Forest	Newe Sogobia (Western Shoshone) Nüümü Witü (Eastern Mono/Monache) Nüümü (Northern Paiute)
0473	Inyo NF Big Pine Crickets	Newe Sogobia (Western Shoshone) Nüümü Witü (Eastern Mono/Monache) Nüümü (Northern Paiute)

ID	Name	Indigenous Territories (Native Land Digital)
0474	Inyo NF Big Pine Crickets	Newe Sogobia (Western Shoshone) Nüümü Witü (Eastern Mono/Monache) Nüümü (Northern Paiute)
0475	Inyo NF Ancient Bristlecone Pine Forest	Newe Sogobia (Western Shoshone) Nüümü Witü (Eastern Mono/Monache) Nüümü (Northern Paiute)
0476	San Diego Oregon St Bees	Kumeyaay/Kumiais
0477	Aravaipa Creek Tent	Ndee/Nnēē: (Western Apache) Hohokam
0478	Aravaipa Creek Porch	Ndee/Nnēē: (Western Apache) Hohokam