INFLUENCES OF TIME, TEMPERATURE, AND QUANTITY ON NEXT-GENERATION 16S BACTERIAL DNA PROFILES FOR FORENSIC SOIL EVIDENCE ANALYSIS

By

Alyssa Jo Badgley

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Forensic Science—Master of Science

2016

ABSTRACT

INFLUENCES OF TIME, TEMPERATURE, AND QUANTITY ON NEXT-GENERATION 16S BACTERIAL DNA PROFILES FOR FORENSIC SOIL EVIDENCE ANALYSIS

By

Alyssa Jo Badgley

Soil is a common form of trace evidence, although it usually qualifies only as class evidence. Microbiological methods have been used to assess if the microbial makeup, primarily bacterial, of soil might be valuable for forensic identification. However, a shortcoming of previous studies is that microbial DNA was assayed shortly after soil collection or the soils were frozen until processing, which is not a realistic forensic scenario. The bacterial makeup of soil is transient and may be influenced by the length of time soil has been removed from a habitat, the storage temperature of known soils for comparison, and the amount of soil recovered from evidence. In this research, next-generation sequencing was used to generate bacterial profiles from diverse habitat soils that were collected from various evidence items over time, stored at four different temperatures, and processed at different masses. Bacterial abundance charts and nonmetric multidimensional scaling plots provided visual representations of the bacterial profiles, and two supervised classification techniques were used to statistically analyze them. Over time, the bacterial composition of the soil evidence displayed specific, consistent changes, and the soil evidence profiles grouped with, although drifted away from, the habitat of origin in multidimensional space. Storing known soils under the same conditions as the aged soil evidence improved the associations between them. Finally, all soil masses processed, including trace amounts, correctly assigned to the habitat of origin. Ultimately, our understanding of the bacterial changes will allow bacterial profiling of soil evidence to be more individualizing and strengthen the potential associations of a suspect, victim, or evidence item with a crime scene.

ACKNOWLEDGMENTS

Foremost, I would like to express my deepest appreciation to my advisor, Dr. David Foran, for his guidance throughout my graduate career at Michigan State University. I would also like to thank Dr. Christina DeJong and Dr. Jennifer Pechal for serving on my thesis committee and for their thoughtful suggestions and advice. Further thanks is extended to others who facilitated this research, including Dr. Jeff Landgraf who assisted in many of the next-generation sequencing processes and Ellen Jesmok, my dear friend and predecessor, who got me interested in 'dirt' and trained me every step of the way. A very special thanks goes out to other graduates and current members of the Forensic Biology Laboratory (Timothy Antinick, Brianna Bermudez, and Emily Heinz) and my favorite chemist, Alexandria Anstett, for their willingness to help with this research and sincerest companionship. Finally, thank you to my friends and family, especially my parents, Mark and Darlene, for their continual support and encouragement.

I am also grateful to The National Institute of Justice, who supported portions of this research via grant numbers 2013-R2-CX-K010 and 2015-DN-BX-K031. Points of view in this thesis are those of the author and do not necessarily represent the official positions or policies of the U.S. Department of Justice. Additionally, much gratitude goes out to the Michigan State University Graduate School and Forensic Science Program who funded other parts of this project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

KEY TO ABBREVIATIONS

AF	Agricultural Field
CF	Coniferous Forest
DNA	Deoxyribonucleic Acid
DR	Dirt Road
dsDNA	Double-stranded Deoxyribonucleic Acid
EDTA	Ethylene Diamine Tetra-acetic Acid
MDS	Multidimensional Scaling
NMDS	Nonmetric Multidimensional Scaling
OTUs	Operational Taxonomic Units
PCR	Polymerase Chain Reaction
pH	Potential of Hydrogen
rRNA	Ribosomal Ribonucleic Acid
RO	Reverse Osmosis (water)
SVMs	Support Vector Machines
TE	Tris EDTA
T-RFLP	Terminal Restriction Fragment Length Polymorphism
TY	Treated Yard
UV	Ultraviolet

INTRODUCTION

Objective scientific analysis and court admissibility are two critical aspects of forensic evidence. For example, a bloody shirt subjected to DNA profiling generally involves rigorous scientific testing, the techniques of which have undergone the peer-review process and are widely accepted by legal institutions. However, if the shirt was collected without a warrant or otherwise does not overcome all legal hurdles, the DNA results may be inadmissible regardless of their scientific soundness. Of course, forensic analysis goes far beyond straightforward DNA testing, and can encompass an almost unlimited number of elements, which can make both its scientific basis and legal acceptability tenuous. Fortunately, most forensic evidence is physical and tangible, such as a fiber found at the victim's house or a bullet collected next to the deceased body. These items are largely unambiguous and stable, and stringent scientific procedures have been developed and validated to examine them. Some forensic evidence is quite transient (e.g., an odor, a blood alcohol level, or the temperature of the hood of a vehicle), and will change or disappear due to time and/or environmental conditions. Transient evidence can be difficult to accurately measure and record; therefore, understanding and documenting it is particularly problematic.

The highly complicated nature of transient evidence is exemplified by the changes that take place in the body following death. When life ends, a series of post-mortem events commences: blood settles in lower parts of the body (livor mortis), body temperature drops (algor mortis), and muscles stiffen (rigor mortis). These well-documented changes have long been used in an attempt to estimate a post-mortem interval (reviewed by Perper, 1992). In addition, decomposition caused by autolysis, which is the breakdown of tissues by the body's own enzymes, begins shortly after death, as does putrefaction, or the bacterial breakdown of the body. Microorganisms within the gastrointestinal tract aid in the rotting of human tissues and organs, similar to how they facilitate the decay of other biological entities in the environment (reviewed by Dent et al., 2004). The stages of decomposition (bloat, decay, skeletonization) occur in a predictable pattern, which have also been used to estimate a time of death (Perper, 1992). However, the post-mortem changes and decomposition process can be heavily promoted or delayed by several factors, including illness, temperature, humidity, wounds, and burial. Since there is a poor understanding of the interplay between corpse decomposition and these biological and environmental factors by the medico-legal field (Metcalf et al., 2013), an accurate estimation of the post-mortem interval can be extremely difficult, if not impossible, to establish. There is also substantial disagreement among death investigators as to which technique(s) is more accurate, and death estimates have been challenged by other experts in the field (Dr. Joyce deJong, personal communication).

One interesting idea that has been proposed for estimating the transient nature of the post-mortem interval involves the analysis of microbial changes following death (e.g., Metcalf et al., 2013; Pechal et al., 2014; Finley et al., 2015). During each stage of decomposition, consistent shifts in the presence and abundance of microbes occur; therefore, the succession patterns might be used to estimate a time of death. Similarly, reliable microbial changes could be a viable tool for investigating other types of transient evidence, given the ubiquity of microbes. For example, the variation in microorganismal occurrence and abundance has been used for the identification of pollutants in water and sewage (e.g., Shanks et al., 2013; Sassoubre et al., 2015) and infectious strains causing natural or intentional disease outbreaks (e.g., Murch, 2003; Keim et al., 2008). Additionally, the human microbiome itself has been intensely studied, including targeting specific microbes to diagnose or treat illnesses and malnutrition (e.g., Gevers et al., 2014; Kane et al., 2015; Xu and Knight, 2015). At the forensic level, Costello et al. (2009b) examined the human microbiome of several individuals and reported that while intrapersonal variation in bacterial community structure based on body location (e.g., oral cavity, skin, gut) was substantial, far more bacterial variation existed interpersonally. Because of this, the authors proposed that distinct microbial profiles can potentially be generated, and thus may be individualizing. Along these lines, Fierer et al. (2010) reported that individuals could be traced back to the computer they used by examining and comparing skin bacterial profiles. Based on these results, it may be possible that bacterial profiles generated from highly diverse types of biological evidence, such as food, water, and soil, could potentially aid in identifying the origin of forensic evidence.

Soil as Forensic Trace Evidence

Soil is a complex medium composed of assorted minerals, plants, and organic matter, which can be influenced by the climate, environment, and human activity (Ritz et al., 2004). In a forensic context, soil can serve as valuable trace evidence by linking a victim, suspect, or item to a crime scene. One of the earliest accounts of soil aiding in a criminal investigation was in 1856, when a barrel that initially contained silver coins arrived at a railroad station filled with sand. The microscopic properties of the sand in the barrel and the sands from various stations along the route were compared. The railroad station of origin was identified, leading to the eventual capture of the individual responsible for the crime (Scientific American, 1865). In 1904, soils were used in a murder case, where a woman was strangled with a handkerchief in a field. A German scientist, Dr. George Popp, examined the particles and minerals found on the handkerchief and compared those to soils found on a suspect’s pants. Popp concluded the layers of soils on the handkerchief ‘matched’ the soils on the pants, and the suspect later confessed to killing the woman (Keaney et al., 2009).

The forensic examination of soils is dependent upon the collection of known and questioned samples. Known soil samples are generally taken as close as possible to where the crime is thought to have occurred, and enough samples are collected as to be representative of the entire area (Murray and Solebello, 2002). Sampling strategies (e.g., diagonal, grid, quadrant-based) act as a guide in investigations to ensure the natural variation of soil is accounted for in downstream processes (Pye, 2007). On the other hand, questioned samples have the potential to be more problematic. A variety of evidence items can be submitted for forensic soil analysis, the most common of which are footwear, clothing, shovels, and carpets or mats (Pye, 2007). These substrates could themselves have an effect on the soil. Further, the amount of soil on an evidence item may often be limited. Finally, soils from different locations may be present on the submitted evidence item (Murray, 1982), creating a mixture of different soil types.

Traditionally, forensic chemists analyze the physical and chemical characteristics of soil, such as color, particle size, pH, and elemental composition (e.g., Sugita and Marumo, 1996; Murray and Solebello, 2002; Kubic and Petraco, 2005), in an attempt to associate evidentiary soil with its source. However, the characteristics chosen for analysis depend on the nature of the case. For example, if known samples are collected after a heavy rainfall, comparing certain transient properties (e.g., color or moisture content) to the questioned evidence would be pointless. Additionally, many of these traditional methods for analyzing soil are based on visual comparisons, which are not necessarily objective or definitive. Finally, the basic physical and chemical properties of a soil sample are class characteristics, which are not uniquely identifiable to a particular source.

The subjective interpretation of all types of trace evidence, including soil, was criticized in the National Academy of Sciences report published in 2009, as the associations between questioned and known samples are based on expert opinion, generally with no statistical support. The committee stated the expert-based comparative sciences often lack peer-reviewed, reliable protocols, and DNA analysis is the only discipline that can consistently, and with a high level of statistical certainty, connect evidence to a source. The forensic examination of soil as currently practiced is not excluded from these criticisms. A fully standardized procedure for soil analysis, explicitly detailing when and which analysis method(s) to use, does not exist. Further, the discriminatory power of soil is limited by its class characteristics. Given the problematic nature of current forensic soil analysis methods, which do not statistically associate known and questioned samples, it is possible that soil is actually an underutilized form of trace evidence (Fitzpatrick, 2016). Consequently, DNA analysis of microorganisms has been proposed as a method that might produce a distinct 'microbial fingerprint' for a soil sample (e.g., Heath and Saunders, 2006; Jesmok et al., 2016), allowing for its potential individualization and forensic application.

Microbial Profiling

Microbiologists commonly utilize the ribosomal RNA (rRNA) genes as molecular markers in taxonomic and evolutionary studies (reviewed by Paissé, 2010). These genes are useful because they are universal and contain highly conserved regions, which allow them to be targeted in all microbial species (Fox et al., 1977). An ideal molecular marker must also contain highly variable regions that allow for differentiation of species or other taxonomic levels (Gutell et al., 1993). Microbial profiling targeting the 16S rRNA gene (Woese and Fox, 1977) is widely used by microbiologists and ecologists to assay microbial communities (e.g., Parkes et al., 2014; Douglas et al., 2016). The 16S rRNA gene is approximately fifteen hundred base pairs long, and includes highly conserved and variable regions (Figure 1), making it an ideal molecular marker for bacterial profiling. Although the variable regions mutate, mutations can become fixed within a lineage over time, allowing researchers to identify bacteria at a variety of taxonomic levels, such as phylum and class, down to species or strain (Woese 1987; Clarridge, 2004). Once the locus is sequenced across the variable regions, the results can be compared to known bacterial sequences in a database, or used to identify phylogenetic relationships among samples.

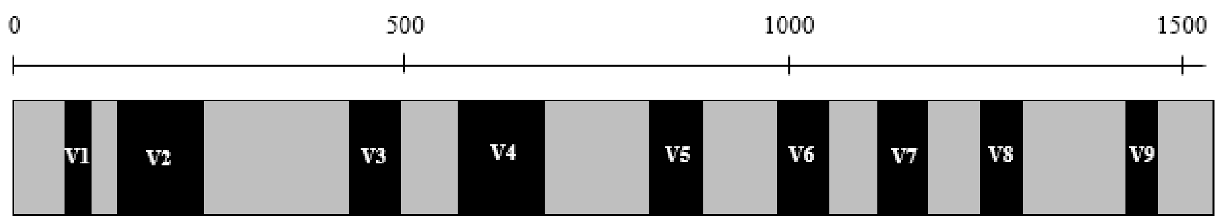


Figure 1. Schematic of the 1540 base pair 16S rRNA gene, which consists of nine hypervariable regions (black) flanked by universally conserved regions (gray). The variable regions span nucleotides 69 – 99, 137 – 142, 433 – 497, 576 – 682, 822 – 879, 986 – 1043, 1117 – 1173, 1243 – 1294, and 1435 – 1465 (Brosius et al., 1978).

Overview of Microbial Profiling Methods

Microbiologists interested in bacterial evolution and phylogeny have long utilized molecular markers. For example, Fox et al. (1977) used ribonuclease T_1 to digest radiolabeled 16S rRNA into pieces, followed by RNA sequencing of the small fragments. The derived 16S rRNA fragment sequences were compared, which resulted in the discernment of the phylogenetic relationship among ten bacterial species. The 16S rRNA gene became more widely targeted following the advent of DNA cloning, and the subsequent arrival of the polymerase chain reaction (PCR), where much more complicated samples, containing multiple bacterial species, could be assayed. During PCR, synthetic primers complimentary to the conserved regions within the gene are used to generate small DNA fragments across one or a few variable regions (Nübel et al., 1997), generating a 'library' of 16S rRNA gene fragments. These fragments are then sequenced and compared to a 16S rRNA database prepared from known bacteria, allowing for identification of the bacterial species in a sample. However, typical methods for generating such libraries result in a limited number of sequences; therefore, only a small portion of the microbial diversity may be obtained (Dunbar et al., 2002). Owing to this, the strategy is not adequate for the analysis of complex microbial communities, such as those found in the human gut or in environmental samples like soil.

Examinations of natural, complex microbial communities require library-independent methods. An example is terminal restriction fragment length polymorphism (T-RFLP) analysis, which results in a profile, or 'fingerprint', of the microbial community based on the PCR amplification of a target region using a fluorescently labeled primer, followed by digestion with a restriction enzyme(s). The fragments are separated via capillary electrophoresis, and the labeled terminal fragments are detected in an electropherogram (e.g., Figure 2). T-RFLP allows for the analysis of microbial diversity by comparing the number and position of fragment peaks among profiles from multiple samples (Liu et al., 1997). For instance, Fierer and Jackson (2006) utilized T-RFLP analysis via 16S rRNA gene amplification to compare soils from different ecosystems across North and South America. They found that bacterial diversity and structure were related to soil type, mainly soil pH, but not temperature or latitude, which, as noted by the authors, are two variables that are usually good predictors of plant or animal diversity.

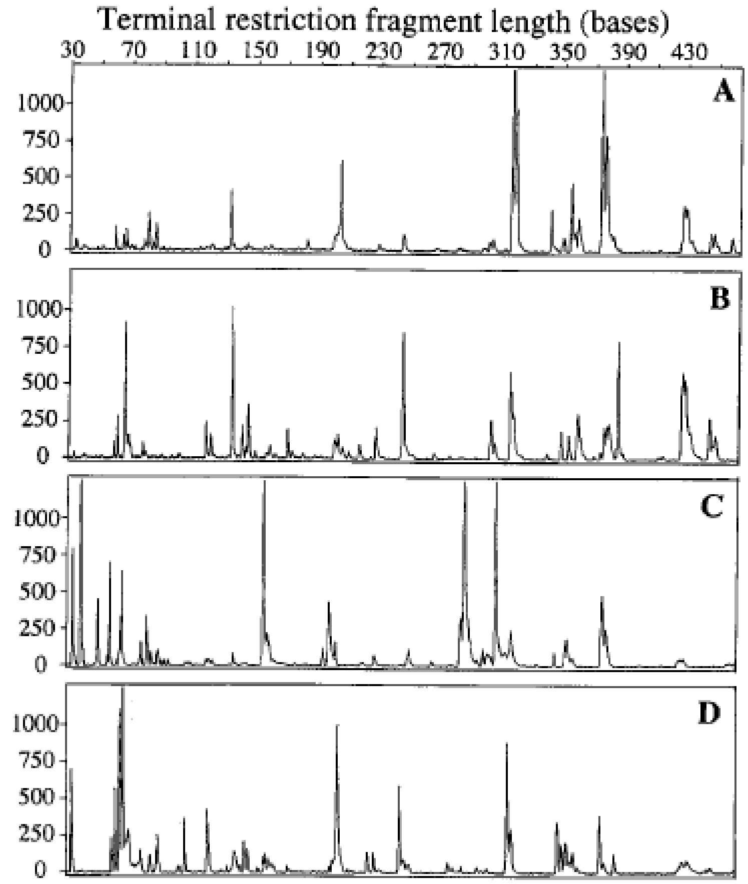


Figure 2. T-RFLP electropherograms of 16S rRNA amplicons from four unrelated samples (A – D). Modified from Liu et al. (1997).

Although T-RFLP is a robust technique for microbial diversity analysis, it does not provide taxonomic information about the peaks and is limited by the number of peaks (taxa) that can be resolved. This oversimplification of the actual microbial diversity has been noted (e.g., Osborn et al., 2000; Anderson and Cairney, 2004; Bent and Forney, 2008), along with the lack of sequence data and the inability to identify specific organisms. Surveys of microbial diversity and community structure in complex samples became more thorough upon the advent of next-generation sequencing (NGS) techniques, as NGS's high resolving power lends itself to the identification of microorganisms at the species or strain level. One recent advancement in NGS is the ability to process a large number of samples in a single run. Further, because a given region of DNA is sequenced repetitively, it is possible to detect microbes in low abundance, facilitating environmental and biodiversity research previously not feasible with older sequencing methods. For instance, microbial NGS data from human gut and environmental samples have been used in a range of applications, including the assessment of a meat-rich diet and its effects on human gut microbiome composition (e.g., Amato et al., 2015) and soil microbial composition shifts in different climates (e.g., Luo et al., 2014).

NGS chemistry and base-detection methods differ among the commercially available platforms; however, they can be divided into two main strategies: a single DNA molecule is sequenced or the DNA is amplified during the sequencing process (reviewed by Metzker, 2010). The more common amplification-based platforms include the Roche 454, Illumina HiSeq and MiSeq, and Thermo Fisher Ion Torrent sequencers. The Illumina platforms are frequently used by soil microbiologists, including those at Michigan State University. These platforms use so called ‘solid phase bridge amplification’ (Figure 3) on the surface of a flow cell to generate hundreds of thousands of sequences per sample. A flow cell is composed of bound oligonucleotides that are complementary to synthetic DNA fragments (‘barcoded adaptors’) incorporated into the DNA during PCR. Many samples can be sequenced together, using the barcoded adaptors to identify individual samples during downstream analyses. Once the barcoded adaptors hybridize to the synthetic oligonucleotides that are bound to the flow cell, DNA polymerase generates a complimentary strand, followed by denaturation and removal of the unbound original template strand. The new, bound strand is clonally amplified by ‘folding over’ to form a bridge-like structure as the adaptor region hybridizes to a second oligonucleotide bound to the flow cell. DNA polymerase generates a complimentary strand, followed by denaturation, resulting in two, bound single-stranded copies. The process is repeated multiple times, such that each individual strand of input DNA becomes a cluster of identical DNAs ready for sequencing. Cluster formation occurs throughout the flow cell, resulting in tens or hundreds of thousands of sequencing targets for each barcoded soil sample (Shokralla et al., 2012).

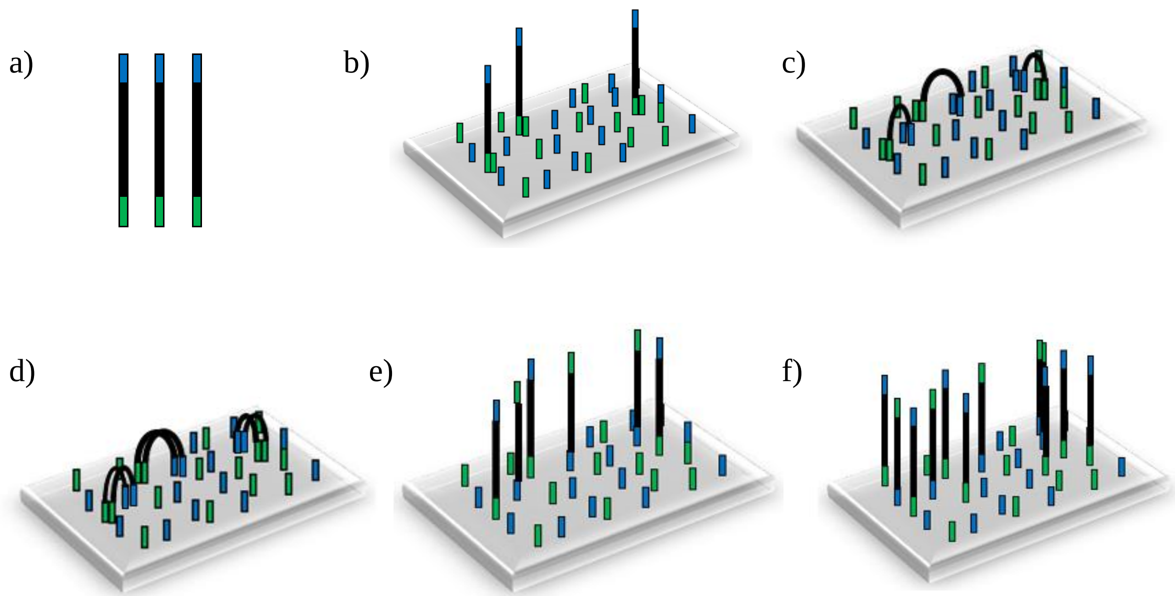


Figure 3. Illumina solid-phase bridge amplification platform resulting in the formation of three clusters. a) DNAs from soil samples (black) and barcoded adaptors (blue and green) that were incorporated during PCR. b) DNA strands bind to synthetic oligonucleotides bound to the flow cell at one end (green). c) After DNA polymerase generates a complimentary strand and the original template strand is washed away, the new bound strand 'folds over', and the second adaptor region (blue) binds to another synthetic oligonucleotide bound to the flow cell. d) DNA polymerase generates the complimentary strand, forming a bridge-like structure. e) The strands are denatured, forming two, bound single-stranded copies. f) The process is repeated multiple times to form clusters of each barcoded sample on the flow cell.

Once amplification is complete, the fragments are sequenced by adding forward sequencing primers, DNA polymerase, and four fluorescently labeled nucleotides that each contain a different dye. These nucleotides are modified so that DNA synthesis is terminated once a nucleotide is added, ensuring only one nucleotide is incorporated during each cycle. The fluorescently labeled nucleotide is detected by an imaging device after it is added, and a base call is determined, with all DNA clusters being read simultaneously by the computer. The modified nucleotides are washed away, and the newly attached nucleotide is unblocked, so another labeled nucleotide can be incorporated during the next cycle (reviewed by Metzker, 2010). The number of cycles determines the length of the sequencing read, which can be up to about 300 bases. The other end of the fragment can be sequenced using a second, reverse primer, a process termed paired-end sequencing. This is accomplished by the opposite end 'folding over' and binding another synthetic nucleotide bound to the flow cell. DNA polymerase forms a double-stranded 'bridge' followed by strand denaturation. The original, forward strand is cleaved and washed away, and a second primer binds to the reverse strand. Sequencing of the reverse strand is conducted as described above, and the overall result can be 500 or more base pairs of sequence per cluster. Up to 15 gigabases of output data can be generated from one sequencing run (www.Illumina.com).

Analyzing Soil Microbial Profiles

The goal of microbial profiling for the forensic examination of soil is to associate known and questioned samples and to exclude those that are dissimilar, both with a statistical level of certainty. Statistical approaches assessing the relative similarity among soil samples have traditionally included pairwise comparisons, cluster analyses, and ordination methods (reviewed by Sensabaugh, 2009), each treating the complex soil microbial data differently. A gram of soil can contain millions or billions of bacteria (Daniel, 2005), meaning that bacterial diversity and abundance can vary widely in soils from different habitats. A desirable statistical strategy for the forensic analysis of soil bacterial profiles, which may include a combination of approaches, can measure this vast amount of variability and produce objective associations.

Similarity Coefficients and Multidimensional Scaling

Analysis of microbial profiles generally begins with the computation of dis/similarity between profiles. Common coefficients used in ecological or microbiological research to quantify microbial diversity are the Jaccard index (Jaccard, 1901), the Bray-Curtis index (Bray and Curtis, 1957), and the Sørensen-Dice coefficient (Dice, 1945; Sørensen, 1948), which are calculated based on the presence/absence and/or the abundance of sequences between samples. The Jaccard and Sørensen-Dice indices only use presence/absence data to compare the similarity of two samples, with Sørensen-Dice giving twice as much weight to shared sequences. The Bray-Curtis index measures what sequences are shared between two samples along with any differences in abundance for each shared sequence. Similarity indices are bound between zero and one, where a value of zero indicates the two samples are completely different, and a value of one indicates they have the same composition.

Sørensen similarity indices were utilized by Horswell et al. (2002) to compare soils collected from mock evidence (a shoe impression and a shoe outsole) to soils from their site of origin, as well as other habitats. The authors reported that T-RFLP bacterial profiles from samples at the same habitat were more similar than samples from different habitats. Additionally, the similarity value decreased when the bacterial profile from the shoe outsole was compared to the profile generated from soil collected at the site of origin eight months later, suggesting that the bacterial composition of the soil evidence changed over time. Heath and Saunders (2006) compared T-RFLP bacterial profiles from soils of three different ecosystems using Jaccard indices. Replicate soil profiles from within one ecosystem were more similar to each other than those from another ecosystem, and profiles generated from soil samples collected over a year later from two of the ecosystems (the third was not examined) were more similar to their site of origin than the other ecosystem. Based on this, the authors hypothesized that although bacterial species abundance within a habitat may change seasonally, the same bacterial species should always be present at some level, and thus should be detectable by T-RFLP analysis. If this is the case, the authors predicted that similarity index values should not vary temporally. In contrast, Meyers and Foran (2008) examined temporal variation of bacterial communities in five diverse habitats using similarity index values generated from T-RFLP profiles. They found that bacterial composition changed temporally, as month-to-month similarity indices fluctuated across all habitats, indicating it is critical that temporal fluctuations be considered when profiling soil samples.

Dis/similarity indices can be used to develop a matrix, such that each sample is compared to all others in a pairwise manner. This matrix can then be utilized for visual ordination techniques such as multidimensional scaling (MDS [normal data]), and nonmetric multidimensional scaling (NMDS [non-normal data]), which display the relative levels of similarity among samples in a dataset. For instance, bacterial profiles can be compared to form associations among soil samples (e.g., Figure 4). Macdonald et al. (2011) used NMDS plots to differentiate T-RFLP bacterial profiles from soils collected at ten diverse locations across nine square miles. Replicate samples from a location did not always group closest to each other in multidimensional space, and most profiles from the ten locations were intermingled, illustrating either a high degree of similarity among the locations or that T-RFLP did not have the resolving power to differentiate the habitats. A different approach was taken by Lenz and Foran (2010) to examine five diverse habitats in multidimensional space using T-RFLP analysis of the recombination A protein gene, which is specific to the nitrogen-fixing bacteria rhizobia. When bacterial profiles were compared in multidimensional space, two of the five habitats could be differentiated, while the remaining three habitats clustered together. Further, the bacterial profiles from soils collected quarterly did not always group with the original habitat. More current comparisons of soil samples using NMDS have improved with NGS microbial data. For example, Jesmok et al. (2016) successfully differentiated diverse and very similar habitats (deciduous woodlots), and Young et al. (2015) associated mock soil evidence to its location of origin.

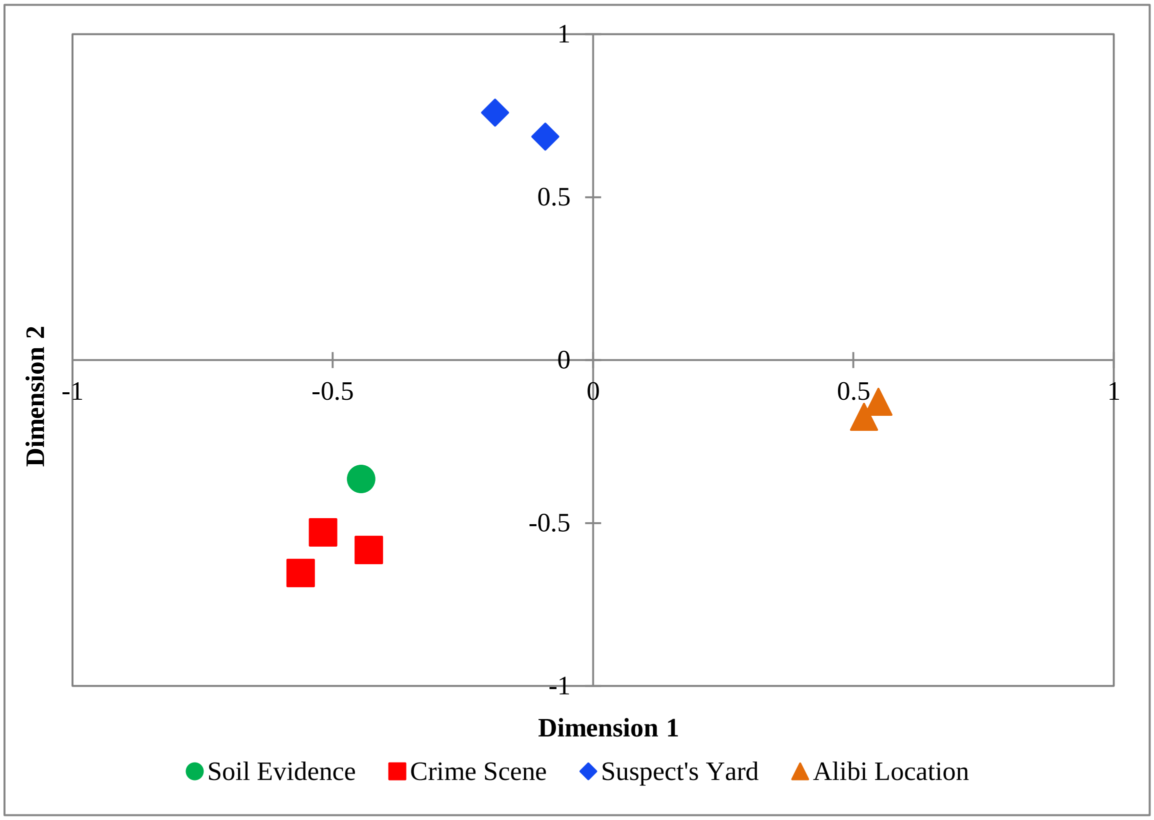


Figure 4. Exemplary N/MDS plot comparing hypothetical bacterial profiles from soil evidence, a crime scene, a suspect's yard, and an alibi location. The soil collected from the evidence is more similar to the crime scene, and thus, closer to the replicate samples from the crime scene than the other two locations in multidimensional space.

NMDS makes few assumptions about the data (e.g., that it is linear), and it does not ordinate data such that the axes explain the greatest amount of variance, which is unlike other ordination methods. As a result, the placement of a sample on a NMDS plot is arbitrary; it is the relative position of one sample to another that is important, and therefore, the more dissimilar a sample is when compared to another, the more separated they are in multidimensional space (Holland, 2008). Kruskal (1964) proposed a formula for a goodness-of-fit measure, termed stress, which expresses how well the data are represented by the NMDS model (i.e., reflect the dis/similarity among the samples), and values near zero indicate the model has perfectly separated the data. Stress can be affected by the number of samples included in the model, and if one or more samples are highly different than all the others, it can force even dissimilar samples to group together in multidimensional space (Holland, 2008). Stress can also be influenced by the number of dimensions, and is generally reduced as dimensions are added, although, extra dimensions do not always lower the stress value or resolve the ordination of similar samples (e.g., Hopkins, 2014). A scree diagram (Figure 5), which plots stress versus the number of dimensions, can help identify a point where adding dimensions results in relatively little improvement of stress.

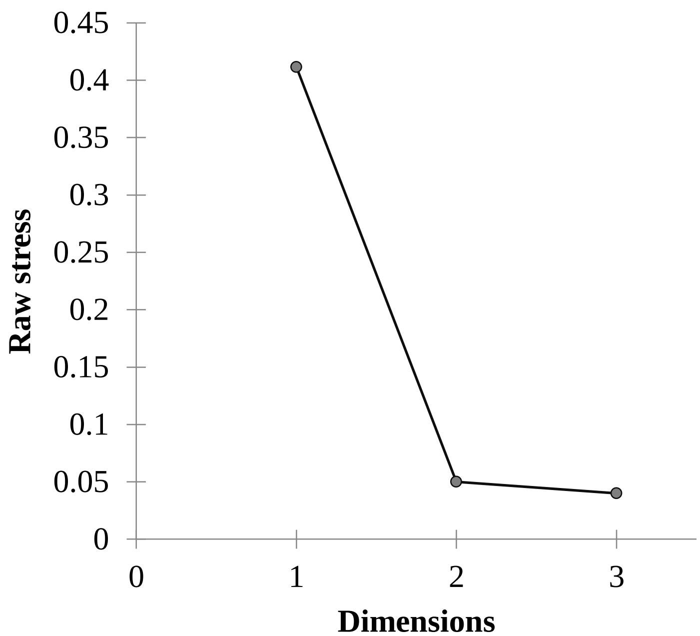


Figure 5. A scree diagram illustrating the stress level at three dimensions. Kruskal's stress value decreases to approximately 0.05 in two dimensions and is not considerably lowered with the addition of another dimension, thus two dimensions is considered suitable for ordination.

Supervised Classification Techniques

The highly complex datasets generated from NGS microbial data result from the very large numbers of taxa identified, wherein not only are common bacterial groups readily detected, but so are far rarer ones that earlier profiling methods missed (Knights et al., 2011). Complex patterns existing in these large datasets can be identified using supervised classification techniques, which can provide likelihood probabilities and objectively associate samples based on various algorithms (reviewed by Libbrecht and Noble, 2015). Supervised classification approaches build models using known samples, referred to as a training set. The unknown samples (test set) are then compared to the training set and classified based on the model. Yang et al. (2006) classified soil samples by ecosystem using bacterial profiles generated from four 16S rRNA hypervariable regions (V1, V2, V3, and V9). When only one hypervariable region was used for classification, the average accuracy was around 90%. The highest average classification accuracy (approximately 97%) occurred when profiles from several hypervariable regions were combined. Although that research did not use NGS bacterial data, which may classify soil samples more accurately, it underscores the ability of supervised classification algorithms to identify distinguishing patterns within complex microbial data.

Categorical data are generally required to analyze known samples and make predictions about the unknown samples in supervised classification. Owing to this, the application of supervised classification to next-generation microbial DNA data commonly involves operational taxonomic units (OTUs), which bin bacteria based on 16S rRNA sequence similarity (reviewed by Achtman and Wagner, 2008). Generally, microbiologists bin OTUs at a 97% similarity threshold (Schloss and Westcott, 2011), meaning if two sequences vary by more than 3% than each is deemed a different OTU. Differences in the number of OTUs can be used to measure within-sample and between-sample diversity (Knights et al., 2011), or OTUs themselves can represent categorical data in a variety of supervised classification techniques.

Decision Trees Using Random Forests

A decision tree is one of the simplest supervised learning algorithms, which uses sequential, binary tests to form a tree-like structure of decisions (exemplified in Figure 6). Once a decision tree is trained using known samples, it classifies the test set by following the output decisions on the tree from the beginning point (root node) down to the last point (leaf node). Decision trees can be constructed with varying numbers of decisions at each node (branches). Increasing the number of branches can lead to a more discriminatory decision tree (Hastie, 2009a); however, a tree with too many branches may no longer correctly classify the test set based on the model trained from the known data (Geurts et al., 2009), a phenomenon known as overfitting the data. Overfit models make poor predictions about the test set, and even small fluctuations within the test set can cause the data to misclassify.

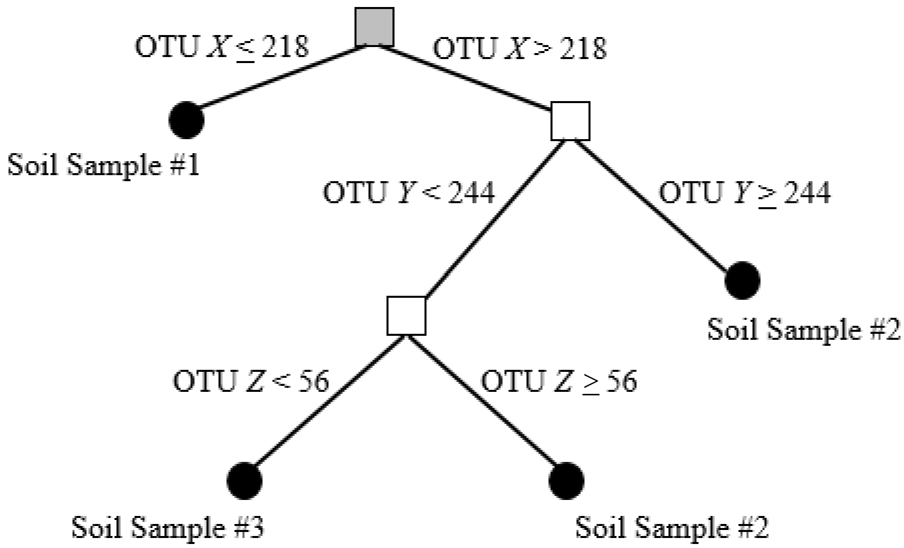


Figure 6. Exemplary decision tree model with sequential, binary tests, forming a tree-like structure to differentiate three soil samples using OTUs (*X*, *Y*, and *Z*). Decisions start at the root node (gray square) and continue down to leaf nodes (black circles). The inner nodes (white squares) differentiate soil sample #2 and #3. Soil sample #1 is classified by containing less than or equal to 218 sequences with OTU *X*. Soil sample #2 and #3 have more than 218 sequences for OTU *X*; however, sample #2 has 244 or more sequences for OTU *Y* and sample #3 has less than 244 sequences. OTU *Z* further discriminates soil sample #2 and #3, as sample #3 contains less than 56 sequences.

An effective way to prevent misclassification because of overfitting is to combine different decisions trees generated from the training set to a reach a final, consensus decision (Geurts et al., 2009). Trees constructed using this approach are referred to as 'bagged' trees, due to its bagging (or bootstrap aggregating) strategy (Hastie, 2009b). A random forests algorithm (Breiman, 2001) is a modification of bagging, which splits the nodes by randomly selecting data points within the training set and determining the subset of data that best discriminates between the two decisions at that node. Although bagged trees are more computationally intensive relative to a simple decision tree, they generally improve classification accuracy, especially for complex microbial data (Knights et al., 2011).[1]

Support Vector Machines

Support vector machines (SVMs) are based on decision planes, separating data by boundaries and into groups (exemplified in Figure 7). The boundary line separating the groups, or hyperplane, is decided (supported) by data points (vectors) that are closest to that line. Vectors are separated in dimensional space, and a hyperplane is identified that maximizes the space between the groups (Cortes and Vapnik, 1995). SVMs allow the user to set different kernel functions (i.e., patterns of similarity such as Gaussian, cubic, or linear as in Figure 7 [Hastie, 2009c]) within the data.[2] When SVMs are computed using a given kernel function, the space between the vectors, termed the margin, is modified based on the function. This flexibility in margin manipulation allows for a wide variety of data types to be used in generating a model (Knights et al., 2011).

---

[1] Decision trees were used in preliminary analysis of the data presented here. A majority of the soil samples did not accurately classify to their location of origin; therefore, only bagged trees were used.

[2] Linear, Gaussian and cubic kernel functions were examined in preliminary analysis of the data presented here. Gaussian and cubic kernel functions had relatively low validation accuracies (70 – 80%); therefore, only the linear kernel function was used.

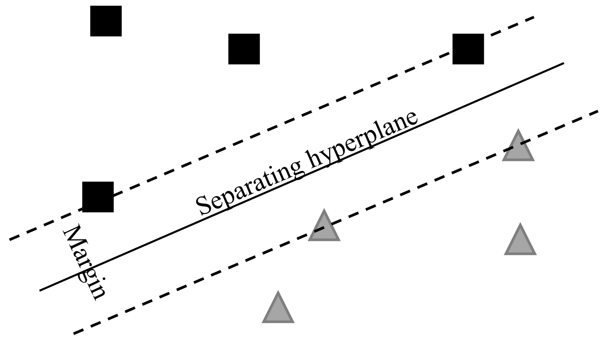


Figure 7. SVM model using a linear kernel function. The support vectors are the data points on the two boundary lines (dotted), creating a margin between the two groups (black squares and gray triangles). The hyperplane can be modified based on a given kernel function.

Aims of the Current Research

Bacterial profiling using NGS can potentially strengthen the associations between or among forensic soil samples, as the analysis is more individualizing and objective than traditional examination methods. Past soil bacterial profiling studies have focused on the examination of soils *in situ*, in an attempt to differentiate habitats (e.g., Horswell et al., 2002; Meyers and Foran, 2008; Macdonald et al., 2011). In most of these studies, soil was collected directly from a site and analyzed shortly thereafter, which is not analogous to actual forensic evidence or casework. Similar to the microbial changes observed during human decomposition, the bacteria in soil may change, perhaps substantially, over time or as a result of environmental variables such as temperature, humidity, and nutrient availability. If the bacterial composition of a questioned soil sample changes due to the myriad variables inherent to its discovery and subsequent forensic analyses, then definitive conclusions about the evidence may not be plausible.

The gaps in our knowledge about bacterial profiling of soil evidence must be filled if it is to be successfully used for individualizing this common form of trace evidence. The goals of the research presented here were to address: 1) if bacterial profiles from soil evidence that has been removed from a habitat for weeks or months trace back to the habitat of origin; 2) the optimal storage conditions for known soil samples such that they retain their comparative usefulness; and 3) the minimum amount of soil needed to produce a bacterial profile that is consistent with its habitat of origin. Finally, an array of NGS profile data analysis strategies was examined to determine which method or set of methods is most effective in illustrating bacterial composition changes and associating soil evidence to a habitat.

MATERIALS AND METHODS

Sampling of Soils

Soils were collected from four diverse habitats in central Michigan in 2014 and 2015 for all studies. These habitats were an agricultural field, a treated yard, a dirt road, and a coniferous forest. Photographs of the habitats can be found in Appendix A. Two of the habitats, the agricultural field and the treated yard, are located on Michigan State University's campus. The yard is treated biannually with herbicides such as carfentrazone-ethyl and quinclorac (Michigan State University Landscape Services, personal communication). GPS coordinates were recorded for each habitat (Table 1). The location of each habitat is displayed in Figure 8.

Table 1. The location and coordinates of the four habitats used to collect soils for all studies. Soil pH was estimated using EMD Millipore colorpHast® pH indicator strips.

Habitat (Location)	Abbreviation	GPS Coordinates	Soil pH
Agricultural field (Michigan State University, East Lansing, Michigan)	AF	42°42'33.1"N 84°28'16.7"W	5.5
Treated yard (Michigan State University, East Lansing, Michigan)	TY	42°43'21.2"N 84°28'06.1"W	6.0
Dirt road (Hoyt Avenue, Lansing, Michigan)	DR	42°41'57.9"N 84°31'27.9"W	5.0
Coniferous forest (Woldumar Nature Center, Lansing, Michigan)	CF	42°41'13.8"N 84°81'0.46"W	4.0

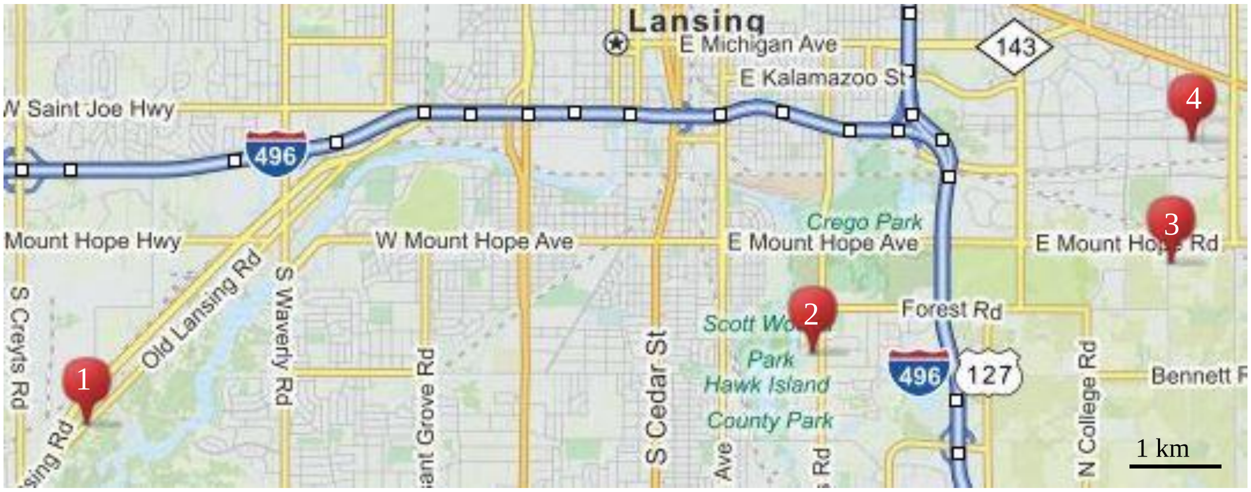


Figure 8. Map of soil sampling habitats for all studies. The numbered locations are as follows: (1) coniferous forest, (2) dirt road, (3) agricultural field, and (4) treated yard.

Collection of Soils for the Aged Soil Evidence Study

New, white cotton Hanes® (Winston-Salem, NC) t-shirts were exposed to soil from each habitat in September 2014. The front and the back of one t-shirt were rubbed in the soil from a 3x3 foot area per habitat while wearing synthetic exam gloves. Each t-shirt was placed in a separate, appropriately labeled brown paper bag and stored in an incubator (24°C) in the laboratory for the duration of the study. On day zero and monthly for one year, except December 2014, a small (approximately 2 cm^2) soil-covered portion of each t-shirt was cut using scissors, placed in labeled plastic Whirl-Pak® bags (Nasco, Fort Atkinson, WI), and stored at -20°C. A small cutting was also taken from a white cotton Hanes® t-shirt not exposed to soil on day zero. Scissors were cleaned with 70% ethanol between each cutting.

Steel hand shovels, sneakers, and sections (approximately 8x10 inches) cut from a pair of jeans were exposed to soil from each habitat in May 2015. Prior to soil exposure, the hand shovels were rinsed with 70% ethanol and the gently-worn sneakers and jeans were laundered. Similar to the t-shirts, each item was rubbed on the soil surface from a 3x3 foot area of each habitat until the item was almost fully covered. Each item was placed in a separate, appropriately labeled brown paper bag and stored at ambient temperature in an office at Giltner Hall. Soil was collected from each item on day zero, daily for one week, weekly for two months, and monthly up to six months. Small cuttings (approximately 2 cm^2) were taken from soil-covered areas of the jeans, using scissors that were cleaned with 70% ethanol between each cutting. Soils were scraped from the hand shovels and sneakers using a stainless steel micro spatula into 3.5 square inch weigh boats. The micro spatula was cleaned with 70% ethanol between each collection. Cuttings and scrapings were placed in labeled Whirl-Pak® bags and stored at -20°C. The ambient temperature was recorded at each collection time. Photographs of evidence items are shown in Appendix A.

Collection of Soils for the Storage Temperature Study

Approximately 30 grams of soil were collected directly from each habitat in August 2015 using a garden spade, which was cleaned with reverse osmosis (RO) water (approximately 10 MΩ) prior to and between each collection. Three soil samples were collected from the surface, several inches apart, and homogenized (Baker et al., 2009) in labeled Whirl-Pak® bags at the center point, 5' east, 10' north, 15' west, and 20' south, at the agricultural field, treated yard, and coniferous forest. Dirt road soils were collected parallel to the road—5' and 15' east and 10' and 20' west of the center point. Soil from each of the distances, including the center point, were divided into fourths at the laboratory, placed into separate, labeled Whirl-Pak® bags, and stored at room temperature, 4°C, -20°C, and -80°C. Soil was collected for DNA extraction (described in the next section) from the center point on the initial sampling day and after samples were stored for one day, one week, one month, and two months at each of the storage temperatures. Room temperature soils were removed from the Whirl-Pak® bags and placed in labeled 3.5 square inch weigh boats in January 2016 and collected again after one day, one week, one month, and two months of storage.

Collection of Soils for the Sensitivity Study

Different masses (250, 100, 50, 25, 10, 5, and 1 mg) of soil samples from each habitat in the April 2015 collection (below) were weighed on a toploader balance. Soils were weighed in November 2015 and January 2016, using the 20' west bag from the agricultural field and dirt road, the 10' south bag from the coniferous forest, and the 10' north bag from the treated yard.

Collection of Training Set Soils for Supervised Classification

A garden spade, cleaned with RO water prior to and between each collection, was used to collect soils directly from each habitat in April 2015. Three homogenized, surface soil samples were collected in labeled Whirl-Pak® bags from a center point and 5', 10', and 20' in each of the four cardinal directions. Each bag contained about 20 grams of soil. Soils were transported back to the laboratory within one hour of collection and stored at -20°C for the remainder of the study.

In addition, soils stored at -80°C and room temperature were collected from the center point and each of the distances for DNA extraction in December 2015 and March 2016, respectively.

DNA Extraction

Pipettes, pipette tips, and tubes were UV irradiated in a Spectrolinker XL-1500 UV Crosslinker (Spectronic Corporation, Lincoln, NE) for 300 s (approximately 2.5 J/cm^2). A PowerSoil® DNA Isolation Kit (MoBio, Carlsbad, CA) was used to extract DNA from the soil samples. The manufacturer's protocol was followed with two minor modifications: the supernatant was added to 1100 µL of Solution C4 in step 14, and Solution C6 was heated at 55°C in an incubator prior to DNA elution. Additionally, soil-covered t-shirt and pant cuttings were placed directly into the tubes with beads in step 1 and received 100 µL of solution C1. A reagent blank was processed with each extraction.

Amplification of 16S rRNA Hypervariable Regions 3 and 4

Reagents appropriate for UV irradiation, pipettes, pipette tips, a 1.5 mL microcentrifuge tube, and PCR tubes were UV irradiated for cycles of 300 s (approximately 2.5 J/cm^2). DNAs were amplified in a final volume of 15 µL. The PCR master mix contained 1X PCR Buffer II (Life Technologies, Carlsbad, CA), 2.5 mM magnesium chloride (Life Technologies), 0.2 mM nucleotide triphosphates, 0.4 µg/µL bovine serum albumin, and 1U AmpliTaq Gold® DNA Polymerase (Life Technologies). Thirteen microliters of master mix were aliquoted per PCR tube. One microliter of premixed, 10 µM barcoded primers was added to each tube. The 357F primer (Liu et al., 2007) and 806R primer (Caporaso et al., 2011) were used to amplify the 16S rRNA gene hypervariable regions 3 and 4, which contain one of ninety-six barcodes (Caporaso et al., 2012). One microliter of DNA extract was added to each aliquot. However, soil samples that initially did not generate enough sequences were re-amplified with 2 µL. Two microliters of DNA was added for all soils weighing less than 250 mg. In addition, 1 µL and 5 µL of DNA were added for soils weighing 10, 5, and 1 mg. DNAs were amplified on an Applied Biosystems® 2720 thermal cycler (Life Technologies), using the parameters specified in Table 2. Four microliters of each PCR product were electrophoresed on an ethidium bromide stained 1.5% agarose gel; DNA amplicons were visualized under UV light.

Table 2. Soil PCR amplification parameters.

Step	Temperature (°C)	Time (s)	Number of Cycles
Initial Denaturation	94	600	1
Denaturation	94	30	
Annealing	60	45	35
Extension	72	60	
Final Extension	72	600	1
Hold	4	∞	1

DNA Quantitation, Pooling, and Purification

The amplified DNA concentration of each sample was determined using a Quant-iT PicoGreen dsDNA Assay Kit (Life Technologies) following the manufacturer's protocol. Fluorescence intensity was measured on a FLUOstar OPTIMA microplate reader (BMG LABTECH, Offenburg, Germany). Ninety-six bacterial DNA samples were pooled so that each sample was at an equimolar concentration of 6 ng/µL, with a final volume of 200 µL.

DNAs were purified via Agencourt® AMPure® XP (Beckman Coulter, Brea, CA) beads. The AMPure® bottle was vortexed thoroughly to resuspend the beads, and 120 µL of solution was added to the 1.5 mL microcentrifuge tube containing pooled DNAs. This mixed solution was vortexed for 15 s, incubated at room temperature for 15 min, and placed in a MagnaRack® (Life Technologies) for 5 min. The supernatant was aspirated, making sure to not disturb the beads, and discarded. The bound beads were washed with 500 µL of 70% ethanol. The supernatant was aspirated after the pellet resettled (approximately 30 s) and discarded. The ethanol wash step was repeated. The MagnaRack®, with the open tube, was placed in an incubator at 37°C and dried for roughly 30 min. The tube was removed from the rack, and DNA was eluted from the beads by adding 50 µL of TE (10 mM Tris, 1 mM EDTA) at pH 7.5 and vortexing for 10 s. The tube was placed in the rack for 5 min, and the supernatant was transferred to a new, labeled 1.5 mL microcentrifuge tube.

Purified PCR Product Sequencing

Bacterial profiles were generated at the Michigan State University Genomics Core Facility on an Illumina MiSeq (Illumina, San Diego, CA) by loading the purified, pooled bacterial DNAs on a flow cell and 500 cycle reagent cartridge. The 341F and 806R sequencing primers (Illumina) were added, and sequencing was performed using a paired-end 250 bp v2 Reagent Kit (Illumina). Base calling and quality scoring was performed by Illumina Real Time Analysis software v1.18.54 at the Genomics Core Facility. The output data were demultiplexed, and BCL files were converted to standard FASTQ file format via Illumina bcl2fastq Conversion Software v1.8.4.

Data Processing of Bacterial Sequences

Sequencing data were processed via an open-source software called mothur (Schloss et al., 2009; www.mothur.org). The mothur standard operating procedure for the MiSeq platform using paired-end reads (Kozich et al., 2013) was followed. The mothur commands used to process sequencing data can be found in Appendix B. Bacterial sequences were subsampled to 3000 sequences per soil sample, which is a necessary when managing enormous amounts of NGS data.[3] Samples with less than 3000 sequences were noted. A 97% sequence similarity threshold was used to bin sequences into OTUs, which were recorded for each bacterial profile.

[3] Jesmok (2015) found that subsampling to 3000 sequences had minimal effect on bacterial profile composition and analysis.

Analysis of Bacterial Sequence Data

Processed sequences were aligned and OTUs were classified via the SILVA bacterial reference alignment (Quast et al., 2013), a database of aligned ribosomal RNA sequences. Abundance charts were created in Microsoft Excel (Redmond, WA), which ranks taxonomic data from most to least abundant based on the percentage of the profile that each taxon contributes throughout the dataset. Charts can be created at any taxonomic level; however, taxonomic data considering more groups are more difficult to interpret (e.g., Marlow et al., 2014; Jansson and Tas, 2014; Jesmok et al., 2016). Figure 9 shows an abundance chart created at the taxonomic class level and includes all bacterial classes found in soil bacterial profiles from three different habitats. In the research presented here, abundance charts were created at the taxonomic class level using the 16 most abundant classes existing throughout the dataset as a way to simplify data visualization (exemplified in Figure 10).[4]

Sørensen-Dice dissimilarity indices were calculated via OTUs within mothur and were used to construct a square symmetric dissimilarity matrix in Microsoft Excel. XLSTAT Pro (Addinsoft®, New York, NY) was utilized to create nonmetric multidimensional scaling plots via the dissimilarity matrix.

---

[4] Bacterial classes and the corresponding abundance value can be identified by hovering over a given color in a Microsoft Word document.

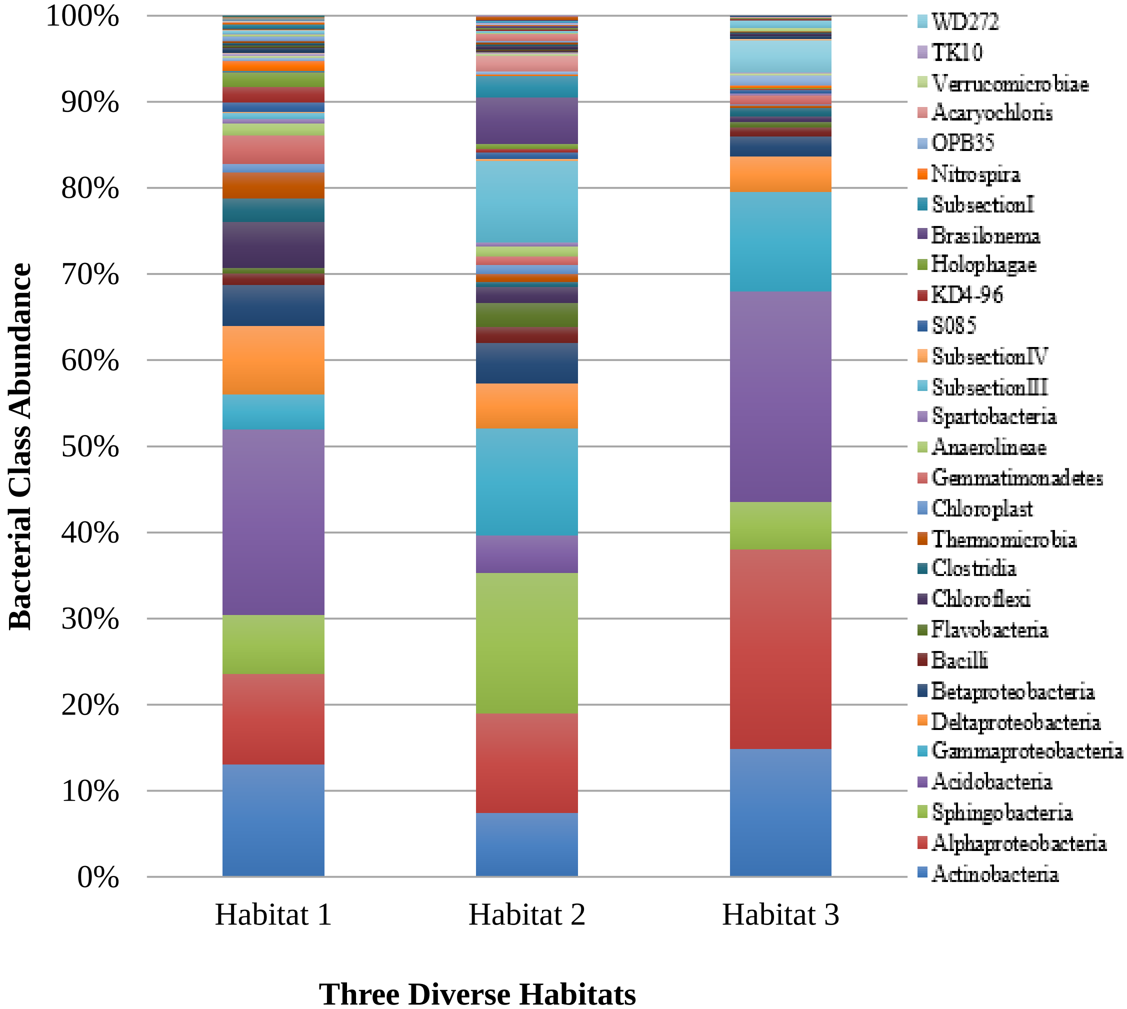


Figure 9. Relative bacterial abundance chart created at the taxonomic class level from soil bacterial profiles from three habitats. Class data are in ascending order from most overall abundant to least overall abundant based on the percentage of the profile each taxon contributes throughout the entire dataset. Seventy-nine bacterial classes are represented; the 29 most abundant are shown in the legend.

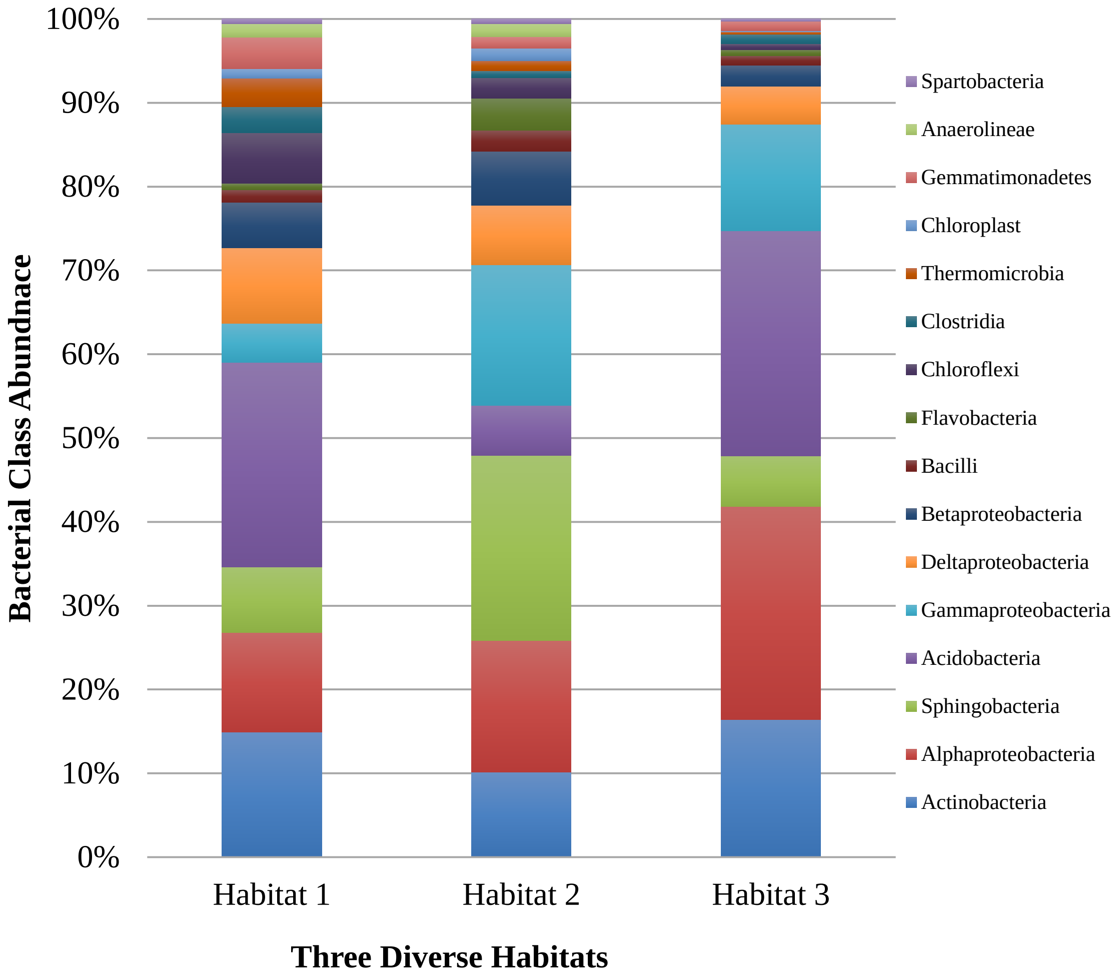


Figure 10. Relative bacterial abundance chart created using the 16 most abundant bacterial classes in the entire dataset from the same three habitats in Figure 9. In the research presented here, bacterial classes will appear in the same order for all charts presented (e.g., Actinobacteria will appear at the bottom, followed by Alphaproteobacteria etc.).

Supervised Classification

Two classification models were selected via the Classification Learner App in MATLAB (R2015b, MathWorks®, Natick, MA): support vector machines and bagged trees using a random forests algorithm (Breiman, 2001). Auxiliary information and parameters set in MATLAB for analysis are given in Appendix C. A training set consisted of either the 100, 200, or 500 most common OTUs from the four diverse habitats. Each test set contained the same number of OTUs as the corresponding training set to classify the soil evidence to a habitat. OTUs (100, 200, and 500) from bacterial profiles of soils collected directly from the four diverse habitats in April 2015[5] and soils stored at room temperature (unbagged) and -80°C were considered to be knowns, which built a trained model based on each classification type. The validation accuracy of each trained model, given as a percentage of how many predicted habitats classified correctly to the true habitats, was recorded. OTUs (100, 200, and 500) from bacterial profiles in the aged soil evidence and sensitivity studies were compared to each trained model and classified to a habitat. Profiles were analyzed in triplicate to assess any variation due to subsampling of the data. The model accuracy was measured by the ability to correctly classify soil evidence to its habitat of origin.

A score for each habitat prediction was calculated, indicating the likelihood that the given classification is correct. The scores for SVMs begin at zero and continue as negative values, where a more negative number indicates a weaker association of an evidence profile with a habitat. Bagged trees using random forests scores range between 0 and 1, which is a ratio of the number of trees that predicted a habitat over the total number of trees generated. For both procedures, evidence 'failed to classify' when the algorithm could not differentiate habitats and resulted in similar scores. 'Misclassified' evidence had a score for an incorrect habitat that was higher than all other habitat scores.

[5] Bacterial profiles from soils collected north and south of the center point at the dirt road in April 2015 were excluded, as the road runs east-west, and these points likely do not represent the bacterial composition of the dirt road.

RESULTS

Amplification and Quantitation of 16S PCR Product

The 16S locus was successfully amplified for all known and evidence soil samples, and PCR products averaged approximately 35 ng/µL. No habitat consistently resulted in the highest yield of 16S product. PCR yields from 50 and 25 mg soils quantified 15 ng/µL higher than those from 250 and 100 mg soils, and 25 ng/µL higher than yields from 10, 5, and 1 mg soils. PCR yields from 10, 5, and 1 mg soils, amplified using 5 µL of input DNA, were lower (approximately 35 ng/µL) than those using 2 or 1 µL of input DNA (approximately 48 and 40 ng/µL, respectively).

DNAs from evidence samples amplified as well as those from the known soils, with the exception of soil on clothing. The soil-covered t-shirt and jean cuttings resulted in less amplified DNA, with yields between 4 and 18 ng/µL. DNAs from the soil-covered t-shirt cuttings in November from the agricultural field, dirt road, and coniferous forest, in January from the coniferous forest, and in June from the dirt road were re-amplified using 2 µL of DNA and re-tested in order to obtain more than 3000 sequences, as were DNAs from a soil-covered jean cutting from the dirt road (Day 2) and treated yard soil on the shovel (Day 6). The DNA from the new, unsoiled t-shirt resulted in enough PCR product for sequencing.

Sequencing of Bacterial DNA

Each sequencing run of 96 samples resulted in an average of approximately 9.9 million sequence reads. Further, each soil sample profile contained from 3,330 – 354,110 sequences (excluding the seven profiles mentioned above). There was no discernable relationship between a habitat or item of evidence and the number of sequences generated.

All input soil masses resulted in 21,000 – 350,000 sequences. There was a strong relationship between the amount of input soil and the number of sequences produced ($r^2 = 0.83$), even though attempts were made to represent all PCR products equally during sequencing reactions. For instance, DNA from 250 mg soils resulted in an average of 211,000 sequences, excluding one outlier that had 350,000. Lower soil inputs averaged 131,000 sequences, and 1 mg of soil averaged 35,000. DNAs from the smallest amounts of input soil (10, 5, and 1 mg) amplified best using 2 µL input DNA, resulting in an average of approximately 81,000 sequences, which was about 28,000 and 17,000 more than the same samples amplified using 1 µL and 5 µL input DNA, respectively.

Each profile contained from 30 – 60 bacterial classes, and 95 classes were identified overall, 16 of which did not exist in the SILVA database (Table 3). The agricultural field and treated yard contained the largest number of classes (average 48), followed by the dirt road (average 42), and the coniferous forest (average 38). The profile generated from the new, unsoiled t-shirt contained 25 bacterial classes, all of which were shared by at least one habitat. The 10 most common classes had between 120 and 350 sequences per bacterial profile. After the 26 most common classes, the maximum number of sequences for a class did not exceed 25 per bacterial profile.

Table 3. The 95 taxonomic bacterial classes identified in this study, 16 of which did not exist in the SILVA reference bacterial database.* Classes are listed in alphabetical order.

	Taxon	
4C0d-2	Gammaproteobacteria	SubsectionIII
Acaryochloris	Gemmatimonadetes	SubsectionIV
Acidimethylosilex	GIF3	SubsectionV
Acidobacteria	Holophagae	Synergistia
Actinobacteria	JTB23	TA18
Alphaproteobacteria	KD3-62	Thermales
Anaerolineae	KD4-96	Thermodesulfobacteria
Aquificae	Lentisphaeria	Thermomicrobia
Arctic97B-4	Lineage_I_Endomicrobia	Thermotogae
Bacilli	Lineage_IV	TK10
Bacteroidia	MBMPE71	unclassified
Betaproteobacteria	ML635J-21	unclassified
Brasilonema	MLE1-12	unclassified
Caldilineae	Mollicutes	unclassified
Candidatus_Jettenia	Nitrospira	unclassified
Candidatus_Kuenenia	OM190	unclassified
Candidatus_Scalindua	OPB35	unclassified
Candidatus_Thiobios	Opitutae	unclassified
Chlamydiae	Phycisphaerae	unclassified
Chlorobia	Pla4	unclassified
Chloroflexi	Planctomycetacia	unclassified
Chloroplast	RB25	unclassified
Chrysiogenetes	S085	unclassified
Clostridia	SAR202	unclassified
Deferribacteres	SHA-109	unclassified
Deinococcales	SHA-26	uncultured
Deltaproteobacteria	SM1A07	vadinBA26
Epsilonproteobacteria	Spartobacteria	vadinHA49
Erysipelotrichi	Sphingobacteria	VC2.1
Fibrobacteria	Spirochaetes	Verrucomicrobiae
Flavobacteria	SubsectionI	WD272
Fusobacteria	SubsectionII	

* = ‘Unclassified’ could be bacteria or archaea.

Soil Bacterial Profile OTU Diversity

Soil bacterial profiles from the evidence averaged 249 – 1062 OTUs based on multiple subsamplings of each sequence dataset (Appendix D). The soils collected from each habitat showed a tighter range, with the agricultural field and treated yard being the most diverse, followed by the dirt road and the coniferous forest (910, 865, 795, 525 OTUs, respectively). OTU diversity for each habitat did not vary based on the amount of soil processed. In contrast, OTU diversity was affected by input DNA volume for PCR, soil storage temperature, and the length of time soil evidence was removed from a habitat. The number of OTUs from the smallest amounts of soil (10, 5, and 1 mg), amplified using 2 or 5 µL input DNA, were roughly equivalent, but resulted in approximately 100 more OTUs than these soils amplified using 1 µL of input DNA. Additionally, the average number of OTUs did not change over eight weeks when soils were stored at -80°C and -20°C, while soils stored at room temperature had fewer OTUs after eight weeks, and the average number of OTUs from soils stored at 4°C varied between sampling times. Lastly, the number of OTUs from the soils on t-shirts (Figure 11) and shovels, sneakers, and jeans (Figure 12) fluctuated over time. The soil on the jeans had lower OTU diversity than the shovel and sneakers, regardless of habitat.

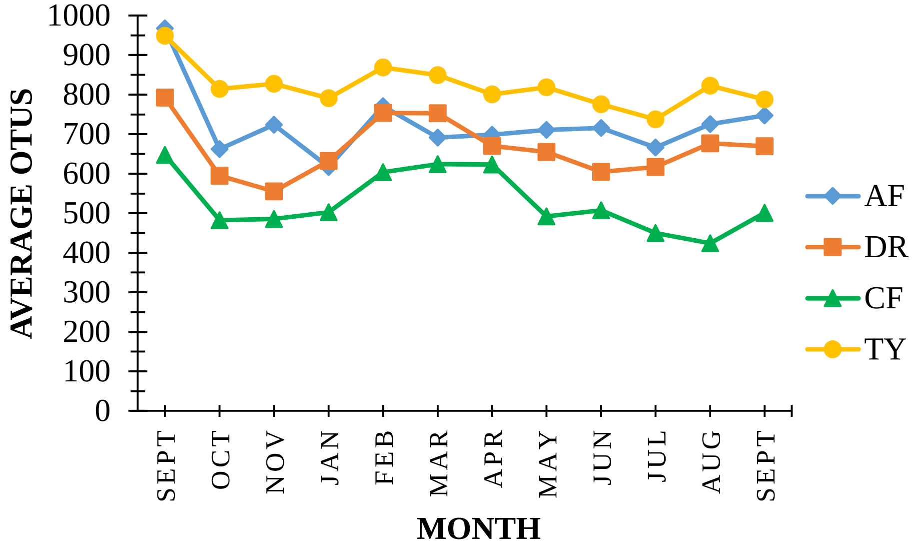


Figure 11. The average number of OTUs from t-shirt soils for each habitat over one year. OTU diversity fluctuated over time, with the fewest OTUs existing in coniferous forest soils. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

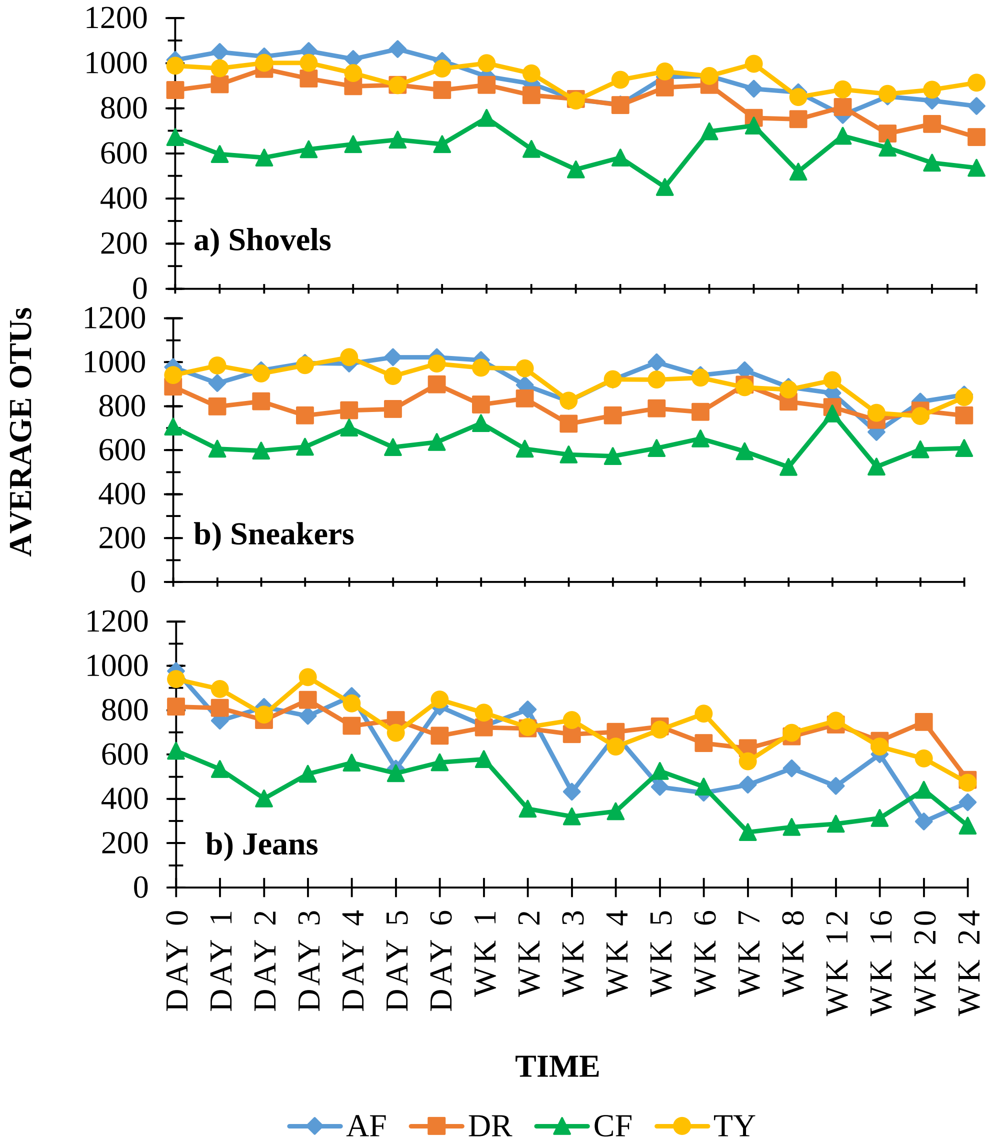


Figure 12. The average number of OTUs from a) shovels, b) sneakers, and c) jeans over six months at each habitat. OTU diversity fluctuated over time, with the fewest OTUs existing in coniferous forest soils. In general, the jeans had fewer OTUs than the shovels and sneakers, regardless of habitat. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

Visual Analyses of Aged Soil Evidence Profiles

Bacterial Abundance Charts

Abundance charts provided a visual representation of the bacterial makeup of the habitat and the bacterial composition changes that occurred on the aged soil evidence over time. These are exemplified in Figure 13, which shows the class level abundance changes of the agricultural field t-shirt soil collections over one year. Visually identifiable changes included an increase in Actinobacteria and Bacilli and a decrease in Sphingobacteria and Acidobacteria. Abundance changes were the most pronounced within the first two months of the soil being removed from the habitat. Similar compositional changes were apparent in all other habitats (Appendix E), although the actual abundancies of the bacterial classes differed.

The same bacterial changes occurred in soils collected from the shovel, sneakers, and jeans over time (exemplified in Figure 14 – 16, respectively, from the agricultural field), and were consistent among the remaining habitats (Appendix E). As in the t-shirts, most abundance changes were more evident within the first two months. The exception was Bacilli, which continued to increase from three to four months after the soil was removed from the habitat. The profiles from the jeans changed in a slightly different manner than the other evidence types, as the least abundant classes (those towards the top of the chart) were lost over time.

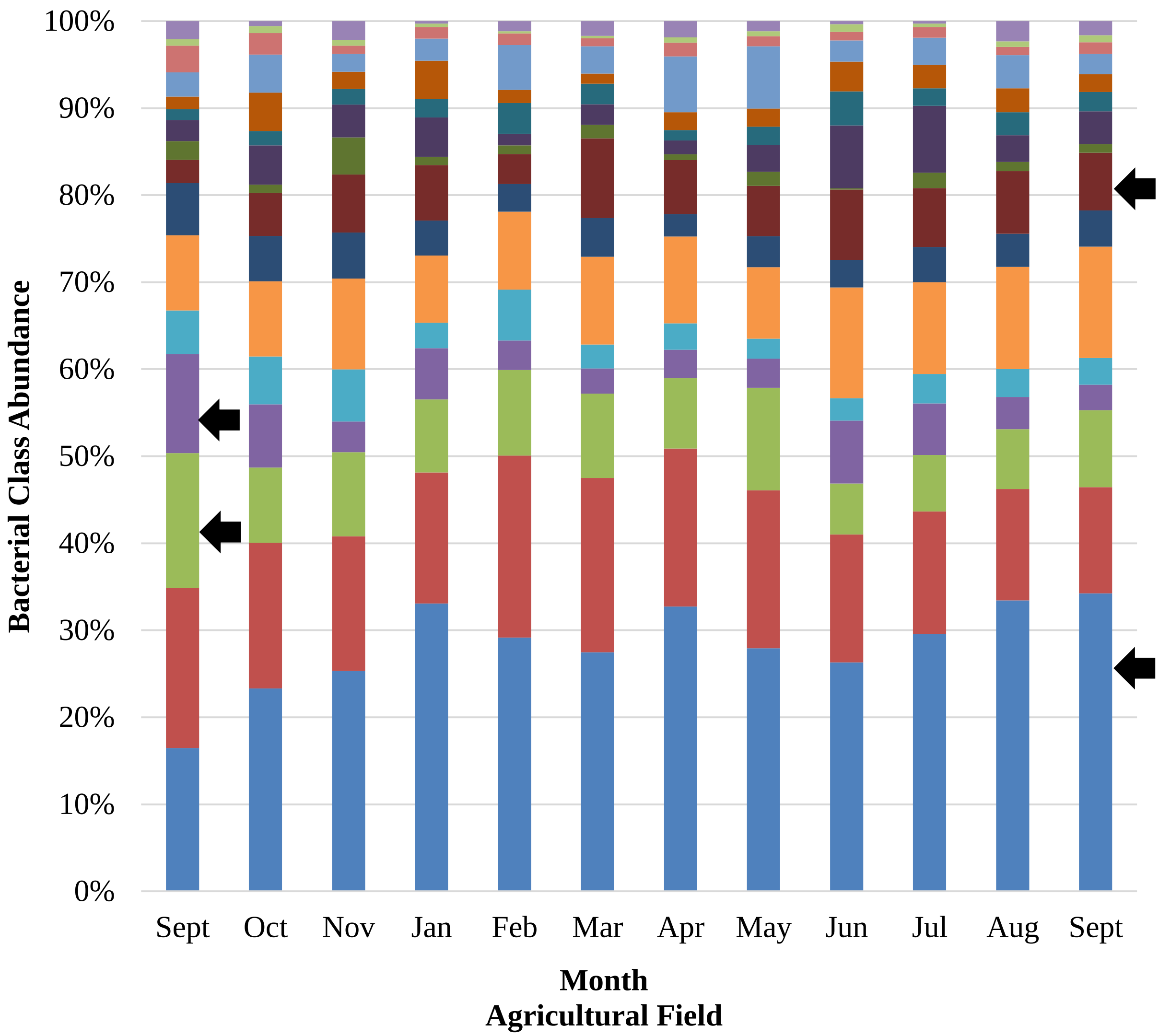


Figure 13. Bacterial class abundance changes from agricultural field t-shirt soil collections over one year. T-shirts were stored at 24°C. Actinobacteria and Bacilli (arrows in ascending order on the right) increased over time, whereas classes such as Sphingobacteria and Acidobacteria (arrows in ascending order on the left) decreased.

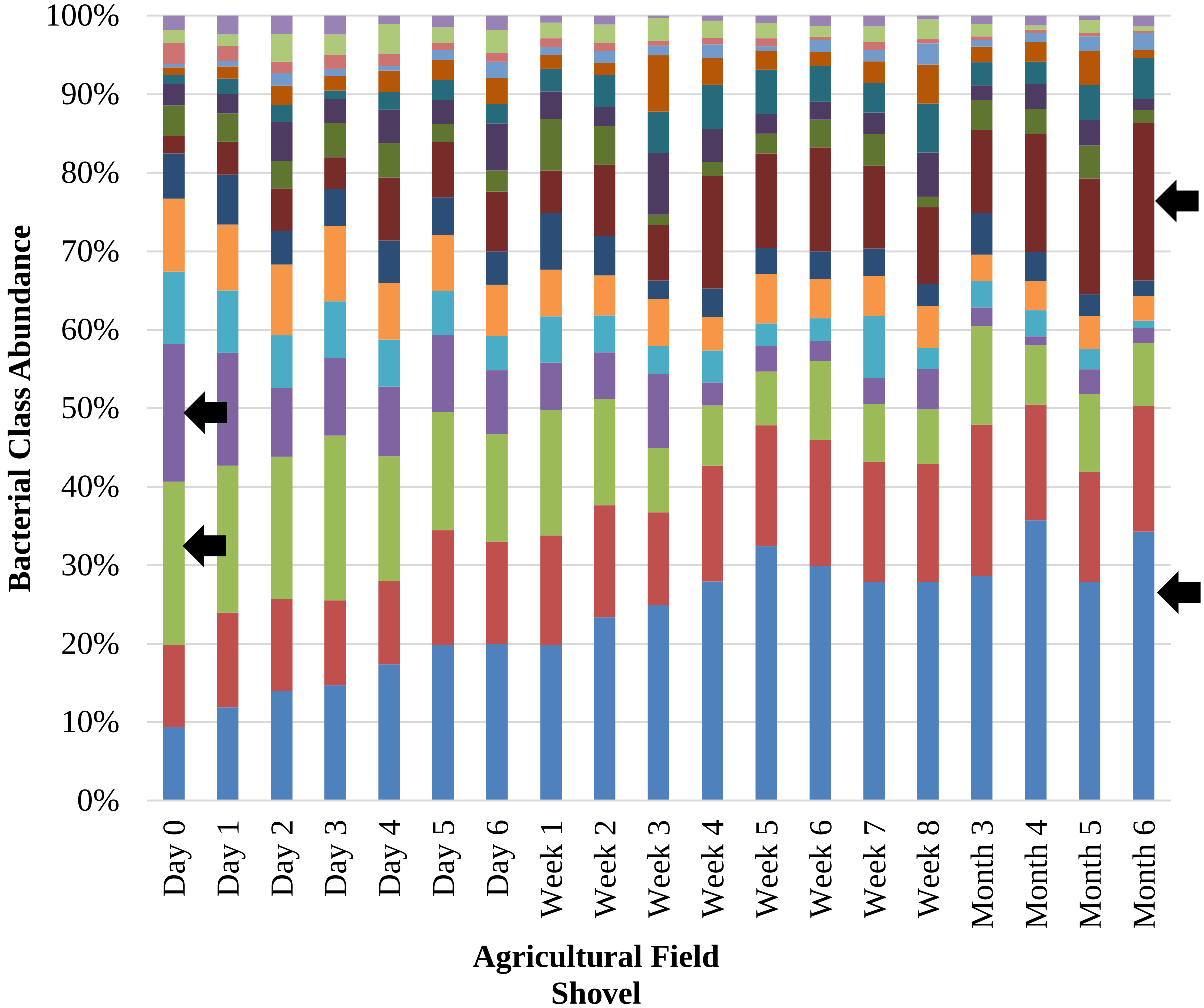


Figure 14. Bacterial class abundance changes from agricultural field soil collected daily for one week, weekly for two months, and monthly up to six months from a shovel. Similar to the t-shirts, Actinobacteria and Bacilli (arrows in ascending order on the right) increased, and Sphingobacteria and Acidobacteria (arrows in ascending order on the left) decreased.

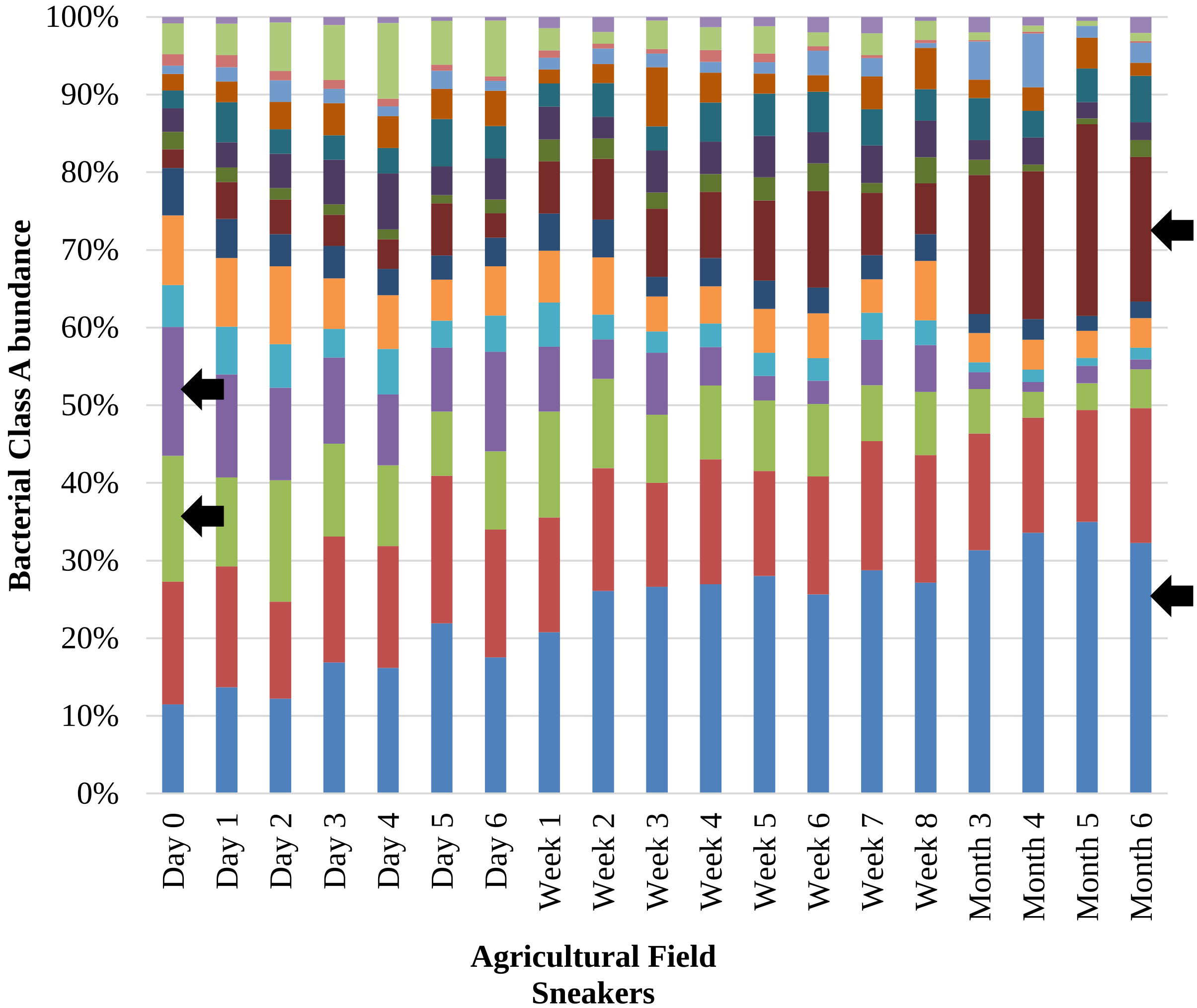


Figure 15. Bacterial class abundance changes from agricultural field soil collected daily for one week, weekly for two months, and monthly up to six months from sneakers. Similar to other evidence items, Actinobacteria and Bacilli (arrows in ascending order on the right) increased, and Sphingobacteria and Acidobacteria (arrows in ascending order on the left) decreased.

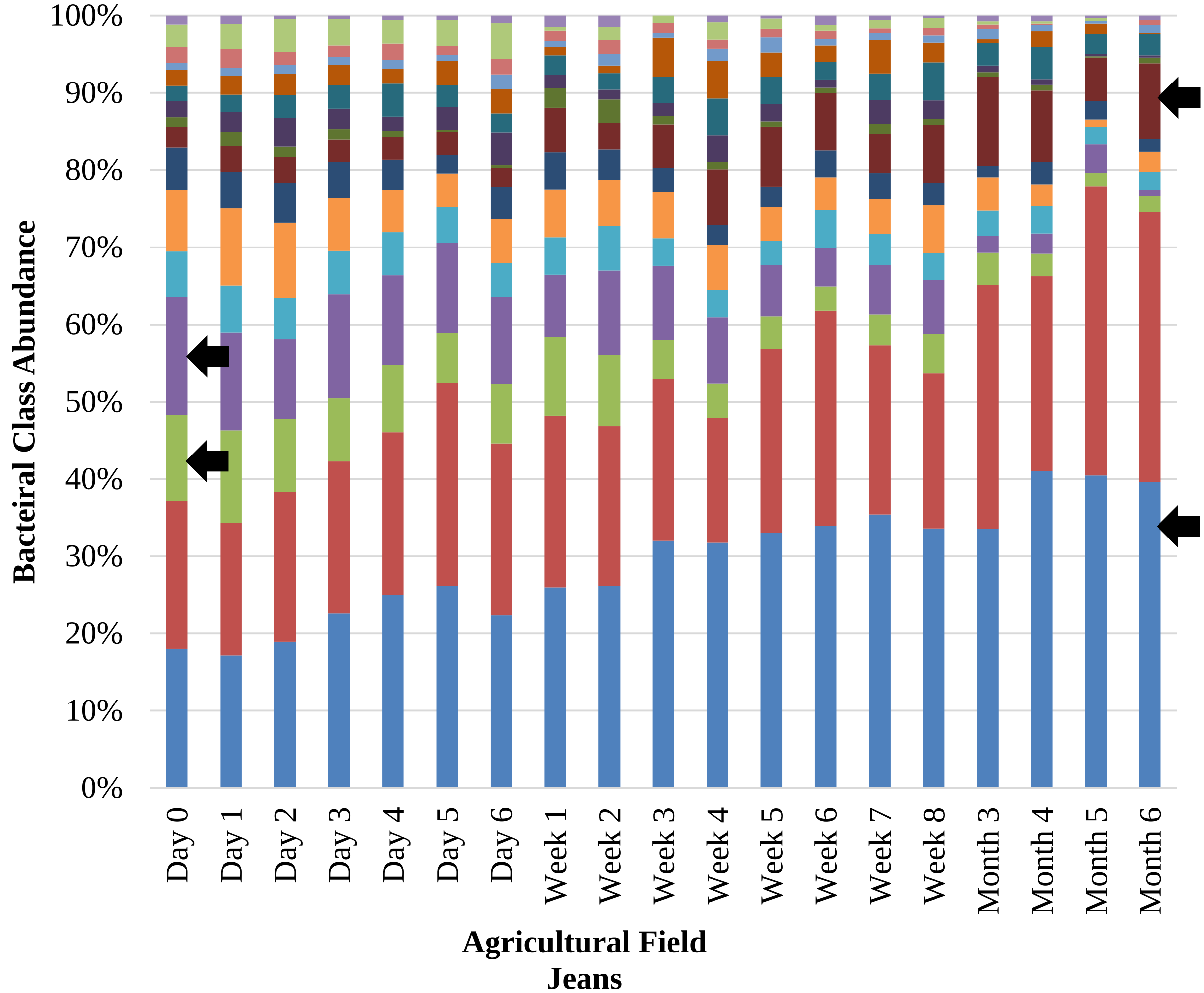


Figure 16. Bacterial class abundance changes from agricultural field soil collected daily for one week, weekly for two months, and monthly up to six months from jeans. Similar to other evidence items, Actinobacteria and Bacilli (arrows in ascending order on the right) increased, and Sphingobacteria and Acidobacteria (arrows in ascending order on the left) decreased.

Nonmetric Multidimensional Scaling Plots

Bacterial profiles from the aged soil evidence clustered with the habitat of origin in multidimensional space. Figure 17 shows that the t-shirt soil profiles grouped with the profiles from the training set soils collected in April 2015. However, coniferous forest profiles oriented away from the other habitat profiles, which themselves grouped extremely close together; the clean t-shirt profile did not cluster with any habitat. Removal of the coniferous forest (and clean t-shirt) profiles (Figure 18) allowed separation of the other three habitats, and a change in t-shirt soil profiles over time could be discerned. The profiles from the t-shirts drifted away from the habitat of origin over the span of a year, resembling the bacterial changes noted above. An NMDS plot with only two habitats further separated the clusters (not shown).

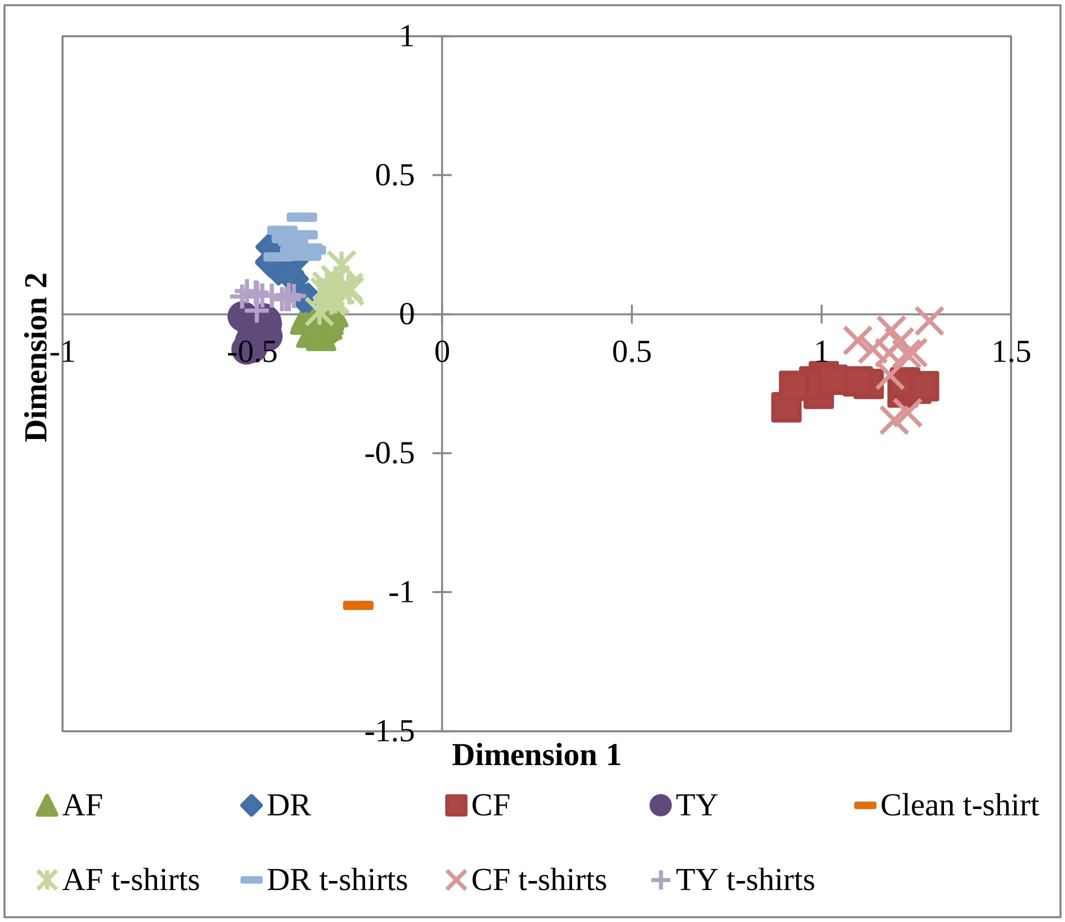


Figure 17. Habitat of origin ordination via NMDS (Kruskal's stress = 0.088) of soils collected monthly from t-shirts over one year (line symbols; n = 12 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The clean t-shirt did not group with any of the four habitats. Bacterial profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

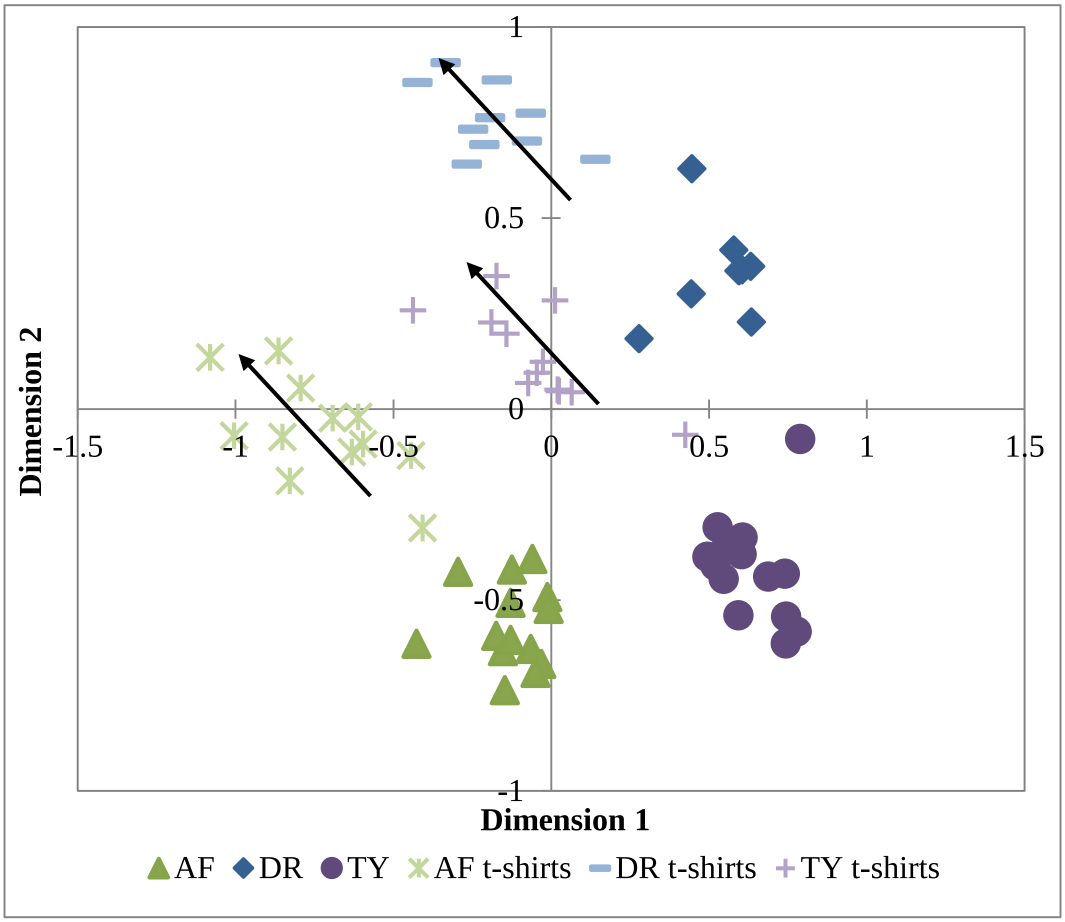


Figure 18. Habitat of origin ordination via NMDS (Kruskal's stress = 0.191) of soils collected monthly from t-shirts over one year (line symbols; n = 12 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The profiles generated from the three habitats are better separated and the change in profiles over time can now be discerned (direction of arrows). AF = agricultural field, DR = dirt road, TY = treated yard.

The bacterial profiles from the shovels, sneakers, and jeans behaved similarly to the t-shirts in multidimensional space. Coniferous forest profiles oriented away from all others, obscuring evidence profile changes over time, and when coniferous forest profiles were removed, the other three habitats were readily differentiated (Figures 19 – 22). Profiles generated from soil collected daily for one week from the shovels, sneakers, and jeans grouped closely with the habitat of origin (Figure 19). After collecting weekly for one (Figure 20) and two months (Figure 21), evidence profiles drifted away from their habitat of origin. The profiles from soil collected monthly from three to six months on the evidence items did not group with any habitat, although there was no intermingling (Figure 22). NMDS plots for daily, weekly, and monthly collections that include coniferous forest profiles can be found in Appendix F.

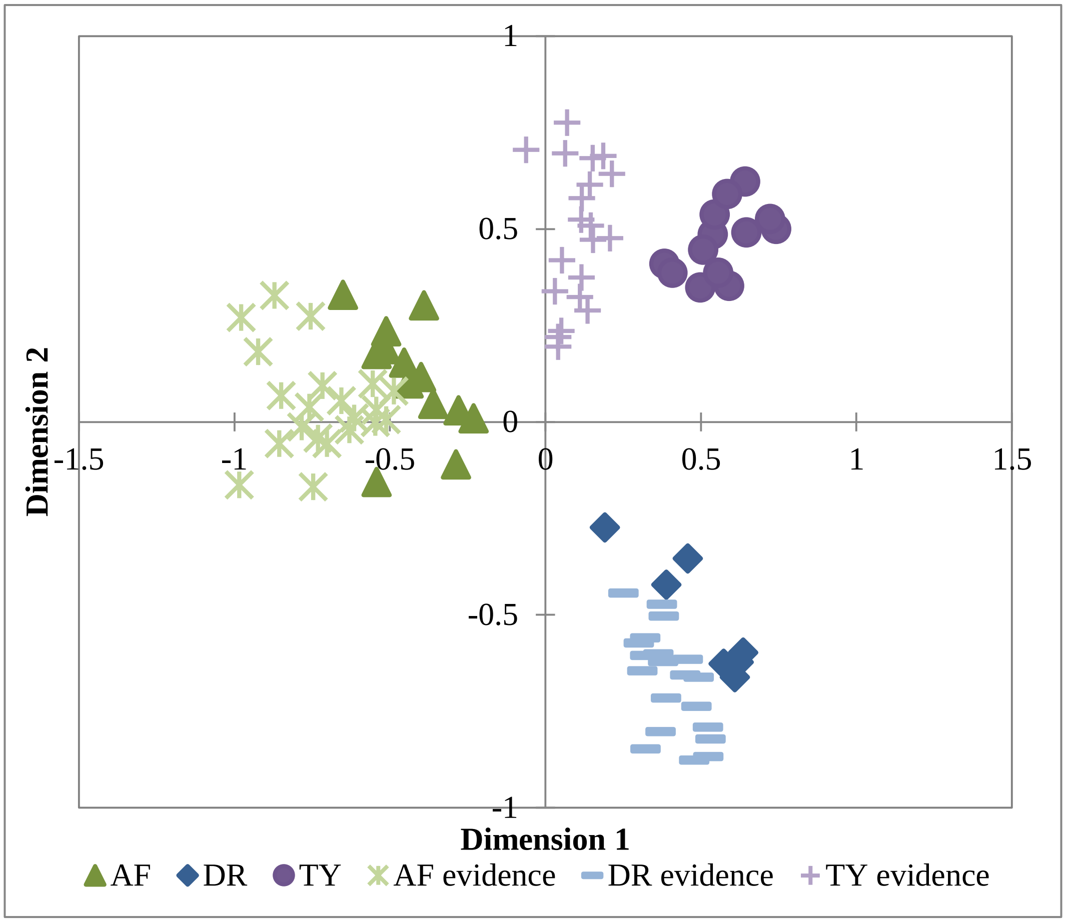


Figure 19. Habitat of origin ordination via NMDS (Kruskal's stress = 0.137) of soil evidence collected daily for one week from shovels, sneakers, and jeans (line symbols; n = 21 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The profiles from the evidence grouped closely with the habitat of origin. AF = agricultural field, DR = dirt road, TY = treated yard.

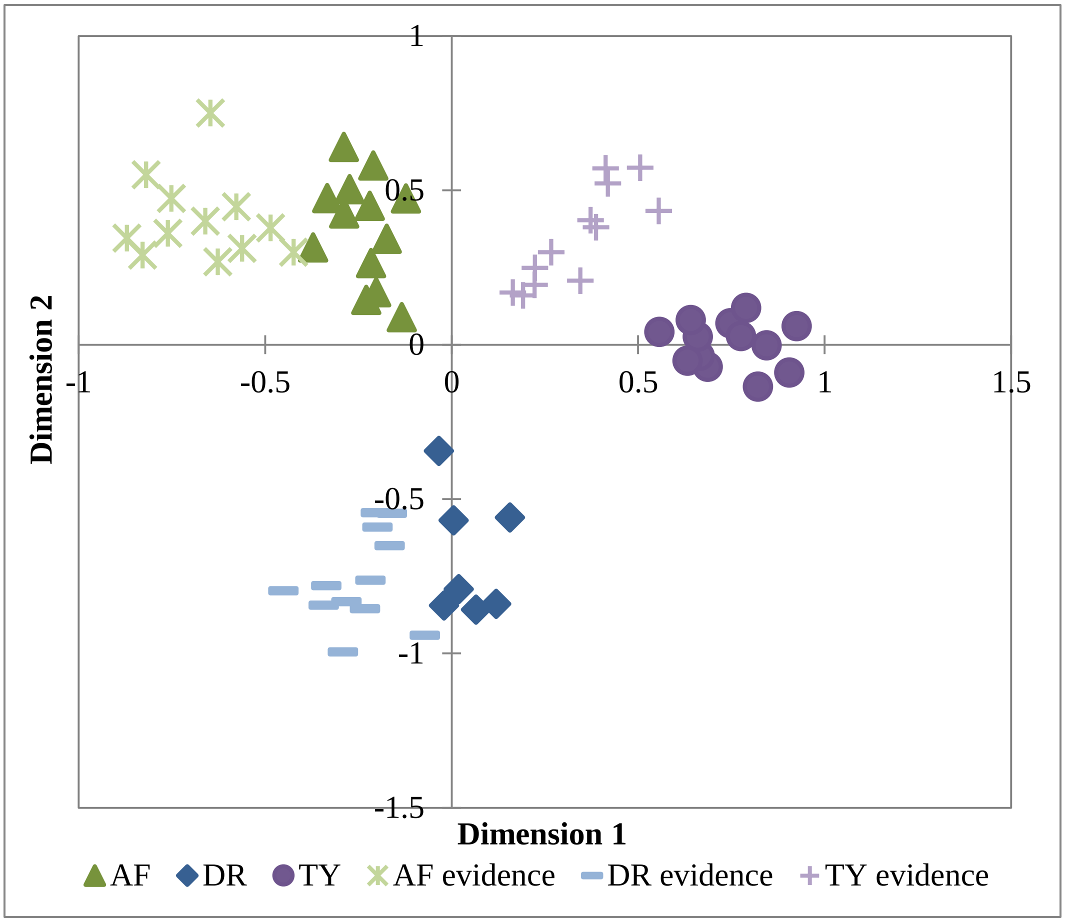


Figure 20. Habitat of origin ordination via NMDS (Kruskal's stress = 0.174) of soil evidence collected weekly for one month from shovels, sneakers, and jeans (line symbols; n = 12 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Bacterial profiles generated from soil evidence remained closely grouped with the habitat of origin, except for the treated yard soil evidence. AF = agricultural field, DR = dirt road, TY = treated yard.

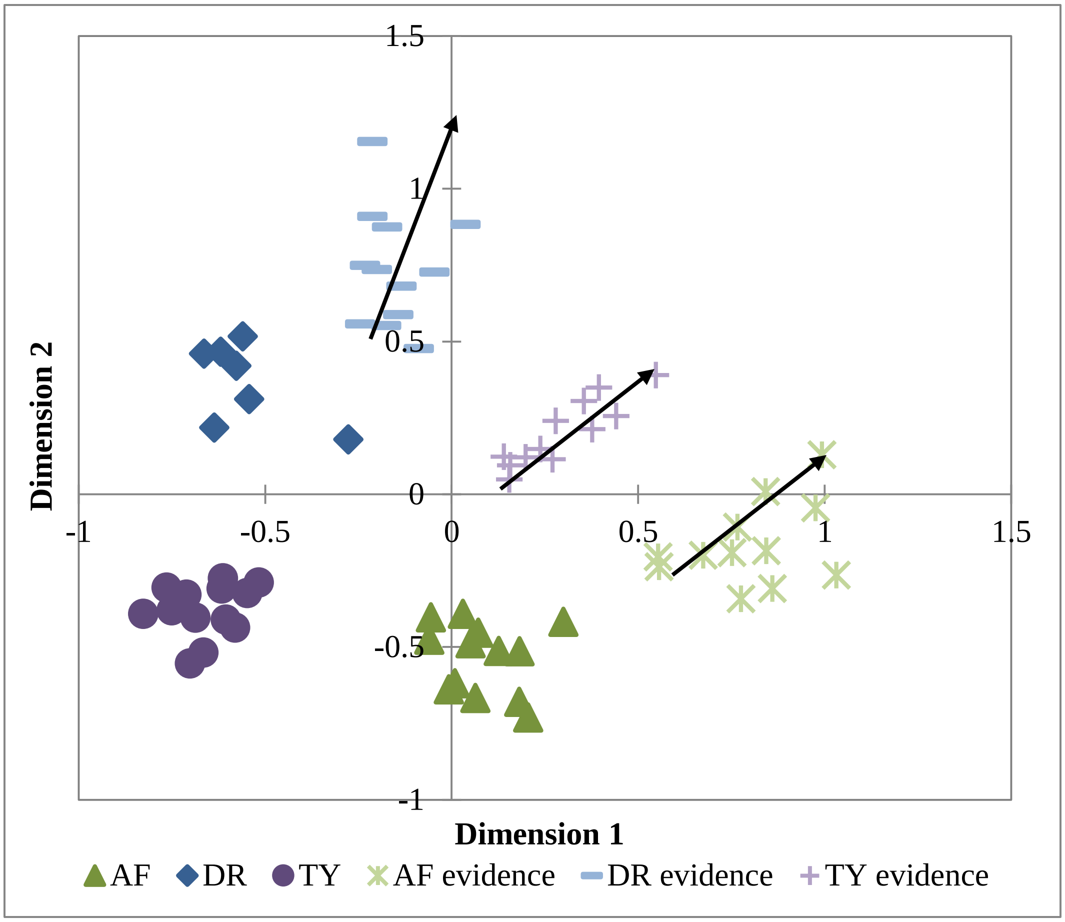


Figure 21. Habitat of origin ordination via NMDS (Kruskal's stress = 0.185) of soil evidence collected weekly during weeks 5 – 8 from shovels, sneakers, and jeans (line symbols; n = 12 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The clustering of profiles from the evidence were not tightly grouped with their habitat of origin, and the profiles drifted over time (direction of arrows). AF = agricultural field, DR = dirt road, TY = treated yard.

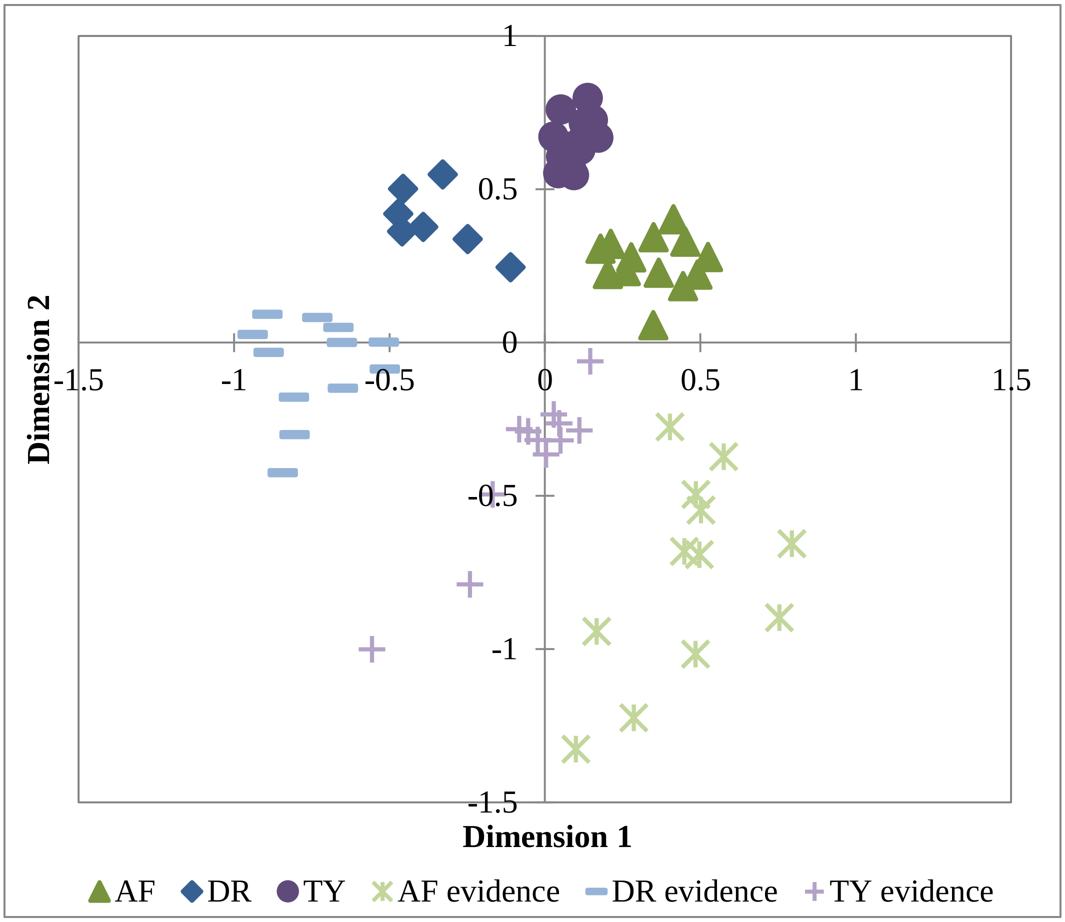
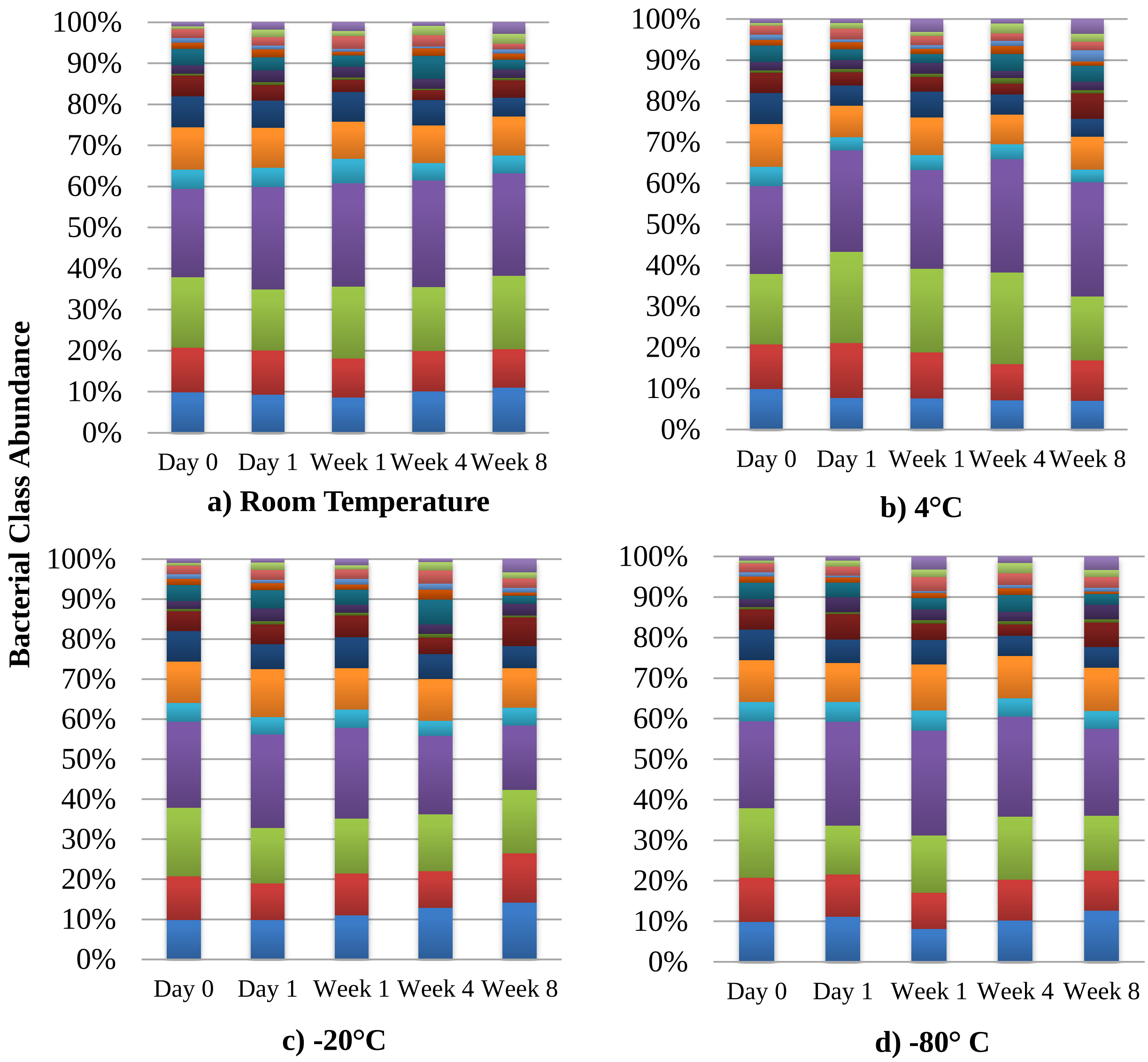


Figure 22. Habitat of origin ordination via NMDS (Kruskal's stress = 0.188) of soil evidence collected monthly from three to six months on shovels, sneakers, and jeans (line symbols; n = 12 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Profiles generated from the soil evidence were the least clustered with the habitat of origin compared to prior collection time points, although evidence did not intermingle. AF = agricultural field, DR = dirt road, TY = treated yard.

Visual Analyses of Profiles from the Storage Temperature Study

Bacterial Abundance Charts

The storage temperature of the known soils did not have a substantial effect on bacterial composition changes. Figure 23 displays the composition of agricultural field soils stored at room temperature, 4°C, -20°C, and -80°C, which were sampled for two months. Similar charts for the three remaining habitats can be found in Appendix E. The bacterial composition of the soils was maintained at all four temperatures. In contrast, once a portion of the soils stored at room temperature was removed from the bags and sampled again for two months, bacterial composition changes in all four habitats were consistent with those that occurred on the aged soil evidence (exemplified in Figure 24 and Appendix E).



Agricultural Field

Figure 23. Bacterial class abundance from agricultural field soils stored at room temperature, 4°C, -20°C, and -80°C for 8 weeks. The bacterial composition of soils stored at the four temperatures did not change appreciatively.

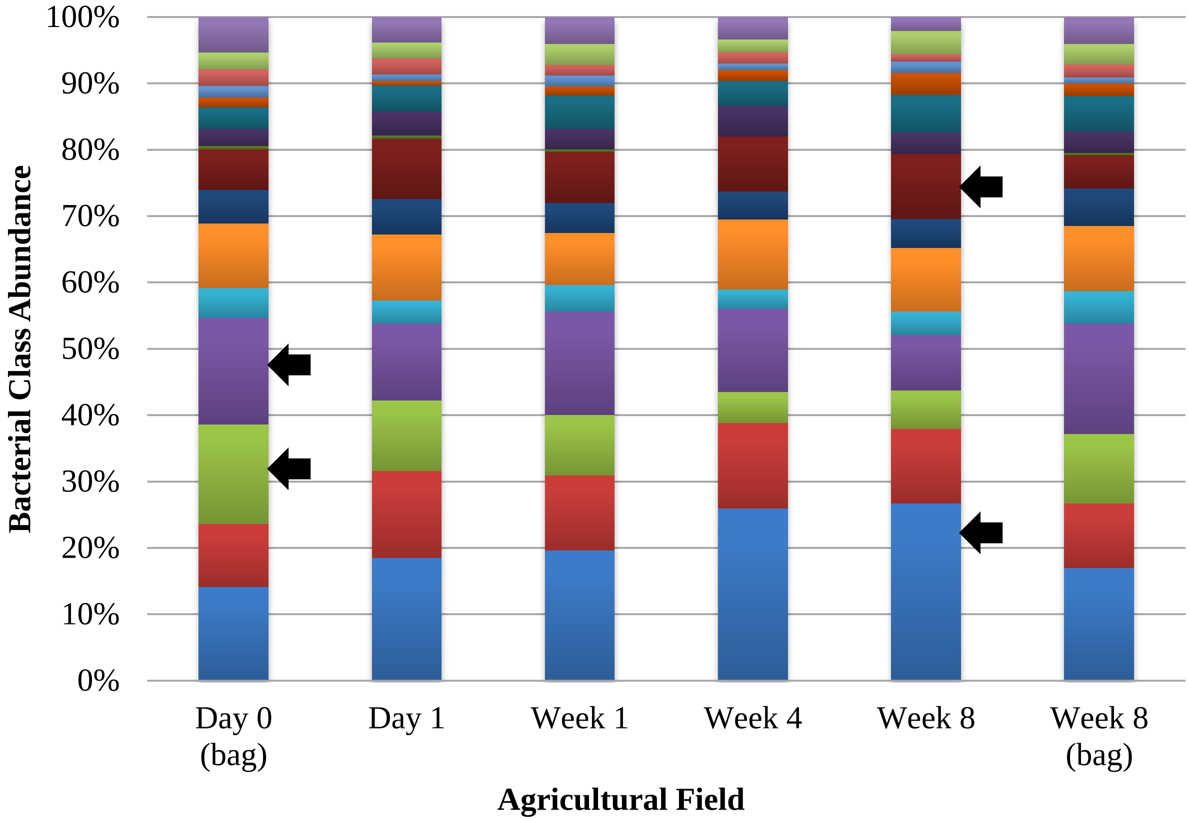


Figure 24. Bacterial class abundance changes from agricultural field soils stored at room temperature. Soils were placed in open weigh boats on day zero. Similar to the bacterial profiles from the evidence, Actinobacteria and Bacilli (arrows in ascending order on the right) increased, and Sphingobacteria and Acidobacteria (arrows in ascending order on the left) decreased over eight weeks. The bacterial composition of Day 0 and Week 8 soils kept in the bag were similar.

Nonmetric Multidimensional Scaling Plots

There were differences between the ordination of the known soils stored at room temperature (unbagged) and -80°C in multidimensional space, although the coniferous forest once again caused the other three habitats to orient extremely closely, thus it was removed (Figures 25 – 29). The t-shirt profiles, regardless of habitat, grouped more closely to the habitat of origin when known soils were stored at room temperature than at -80°C (Figure 25), again reflecting the changes that occur in known and evidence samples kept at room temperature. NMDS plots including the coniferous forest soils can be found in Appendix F.

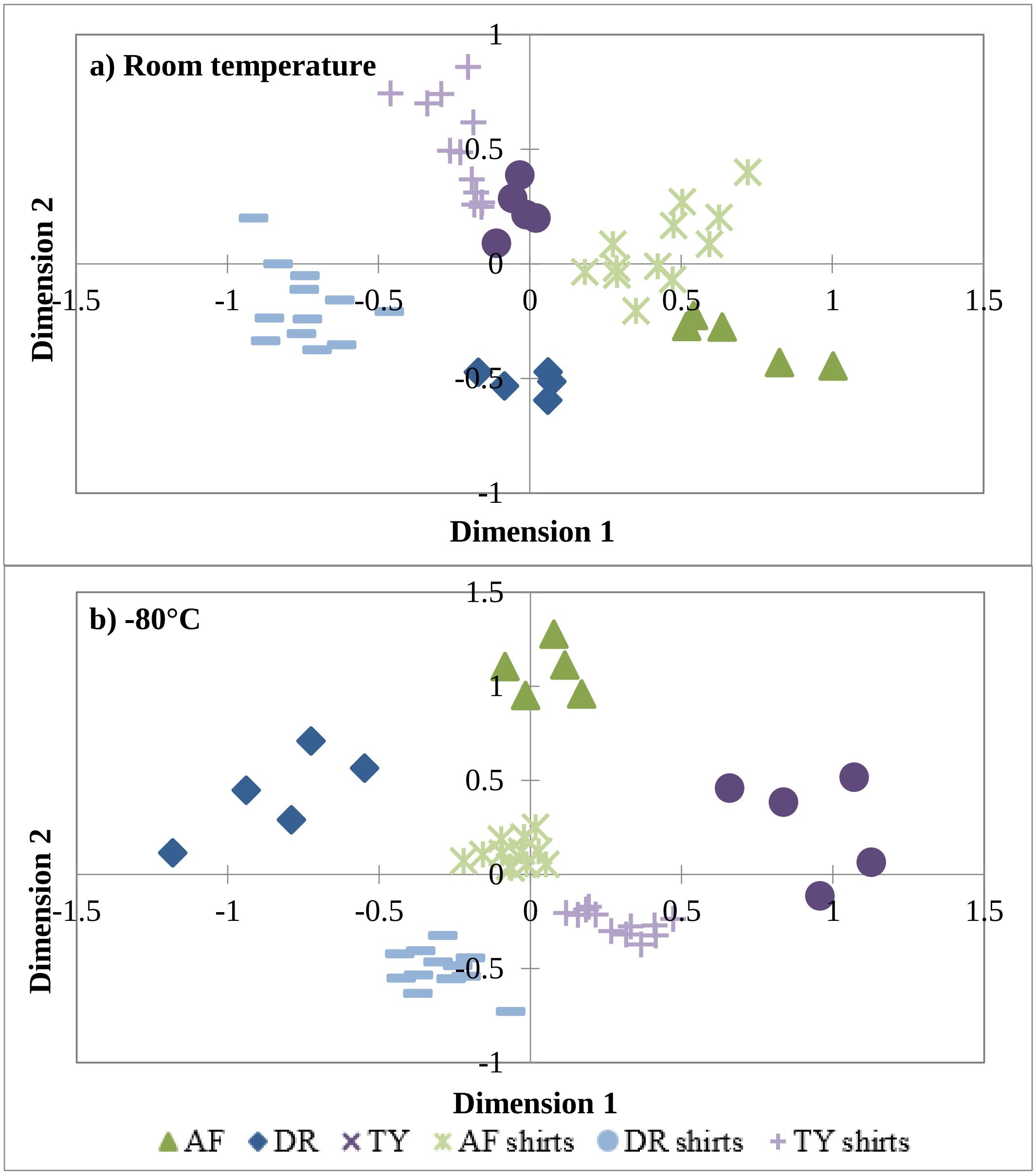


Figure 25. Habitat of origin ordination of t-shirt soils collected monthly over one year (line symbols; n = 12 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.198 and 0.170, respectively), excluding the coniferous forest. Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the t-shirts grouped more closely to the habitat of origin when soils were stored at room temperature. AF = agricultural field, DR = dirt road, TY = treated yard.

Similar to the t-shirts, bacterial profiles from soil collected daily for one week on shovels, sneakers, and jeans grouped closer to the habitat of origin when known soils were stored at room temperature (unbagged) than at -80°C (Figure 26). The profiles from the aged evidence still grouped near the habitat of origin after one (Figure 27) and two months (Figure 28) when known soils were stored at room temperature, mirroring the bacterial composition changes that occurred in the known soils and aged soil evidence, but not known soils stored at -80°C. Also, the known soils from the dirt road and treated yard stored at -80°C after two months began to intermingle, and by six months all known soils grouped closely together (Figure 29b). In contrast, the profiles from the aged soil evidence collected from three to six months were less similar to the habitat of origin than in previous months; however, they still grouped more closely with their habitat when the known soils were stored at room temperature (Figure 29a). NMDS plots including all four diverse habitats at the two storage temperatures can be found in Appendix F.

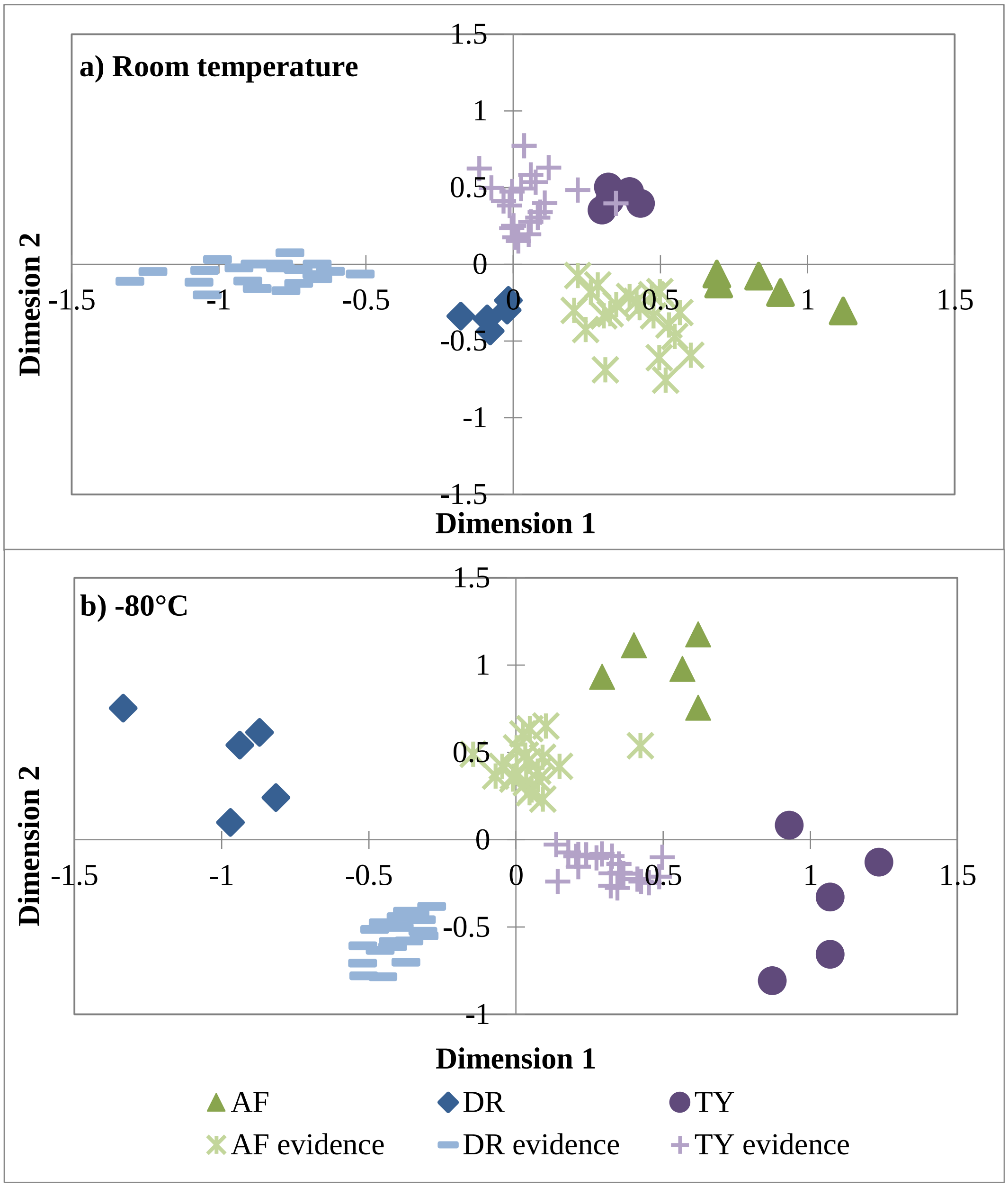


Figure 26. Habitat of origin ordination of soils collected daily for one week from shovels, sneakers, and jeans (line symbols; n = 21 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.160 and 0.161, respectively), excluding the coniferous forest. Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the aged evidence grouped closely with the habitat of origin when soils were stored at room temperature. AF = agricultural field, DR = dirt road, TY = treated yard.

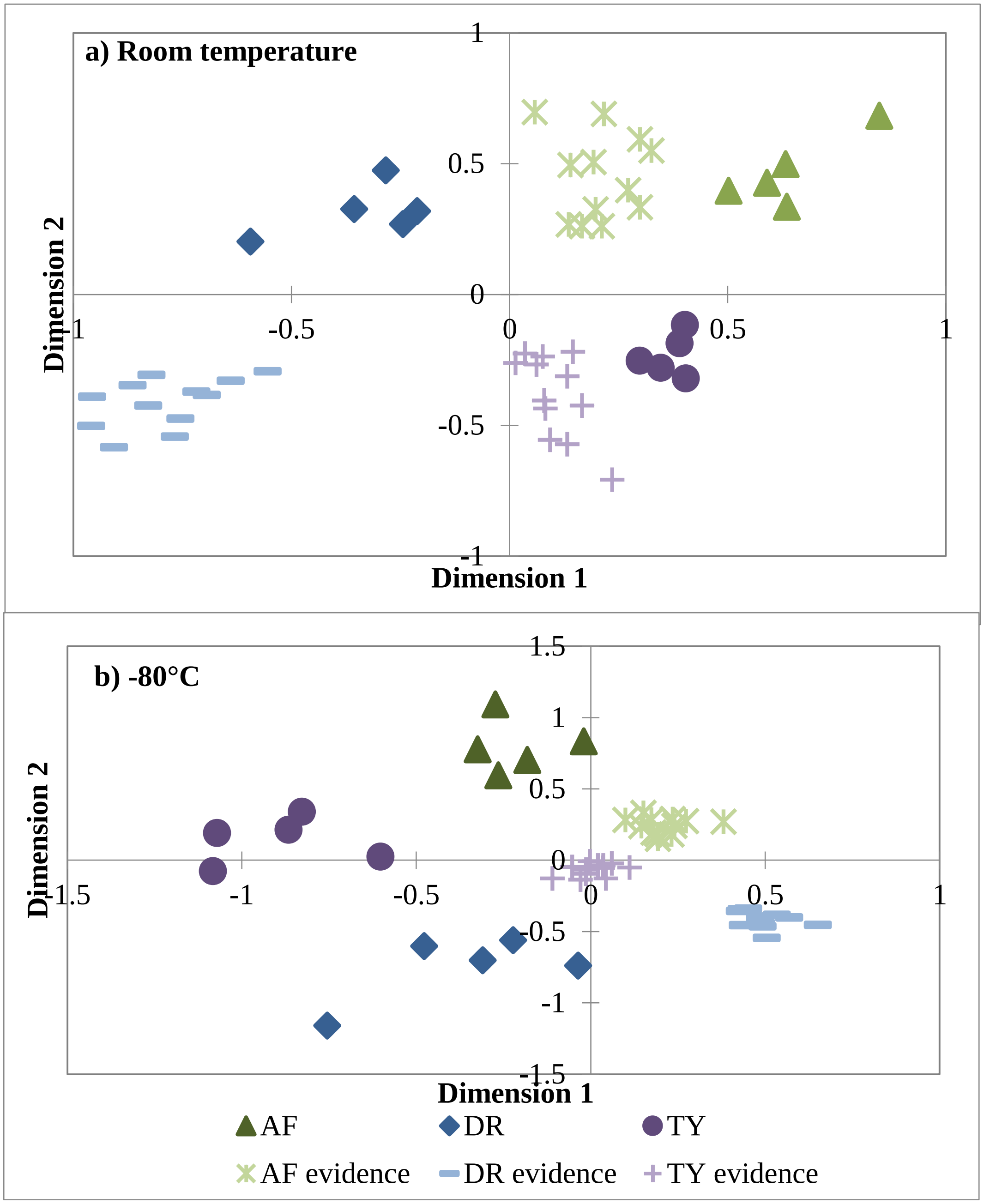


Figure 27. Habitat of origin ordination of soils collected weekly for one month from shovels, sneakers, and jeans (line symbols; n = 12 per habitat) and training set soils (geometric symbols) at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.160 and 0.201, respectively), excluding the coniferous forest. Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the aged evidence grouped more closely to the habitat of origin when soils were stored at room temperature than those at -80°C. AF = agricultural field, DR = dirt road, TY = treated yard.

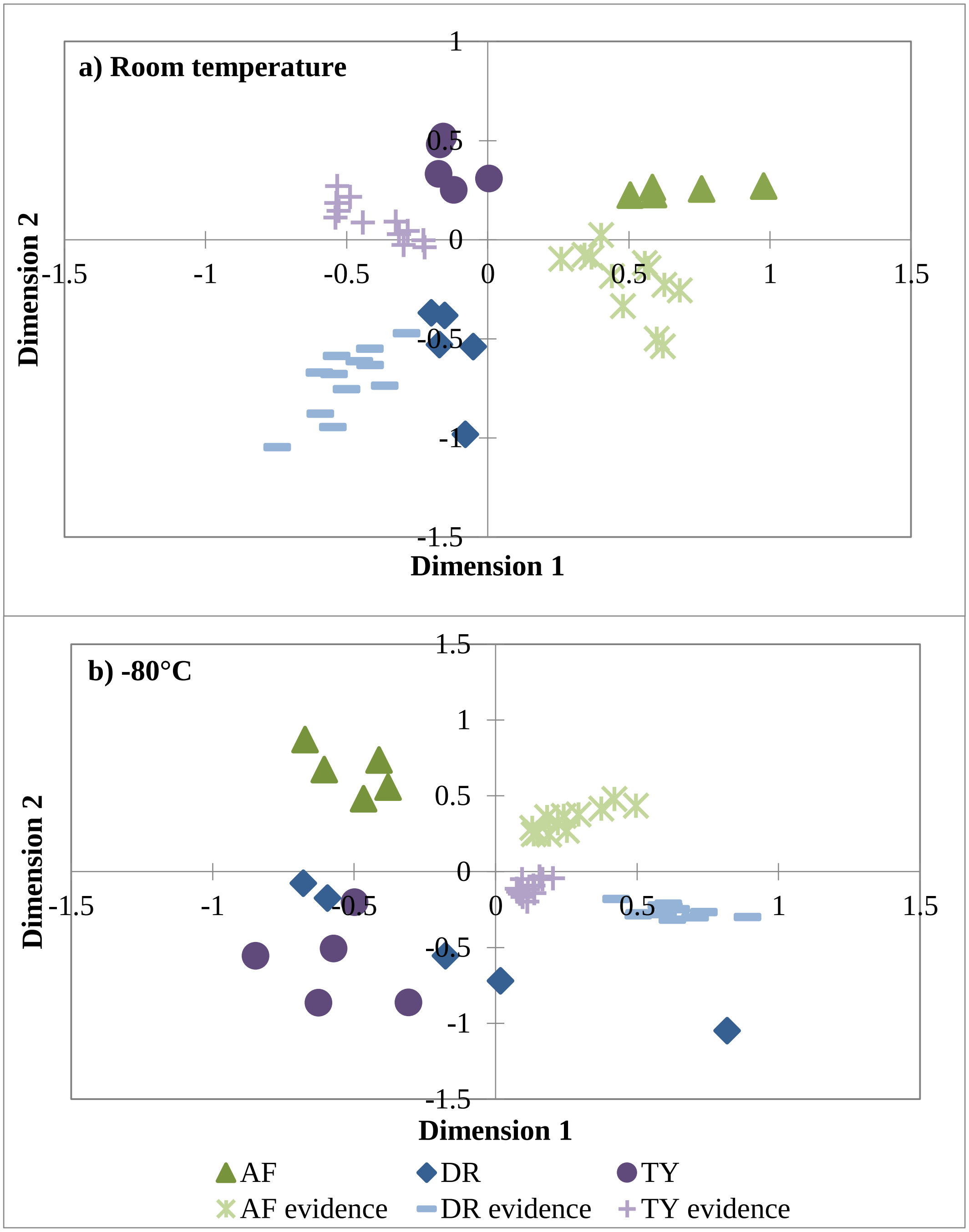


Figure 28. Habitat of origin ordination of soils collected weekly during weeks 5 – 8 from shovels, sneakers, and jeans (line symbols n = 12 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.179 and 0.189, respectively), excluding the coniferous forest. Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the aged evidence grouped more closely to the habitat of origin when known soils were stored at room temperature than at -80°C. Known soils from the treated yard and dirt road intermingled. AF = agricultural field, DR = dirt road, TY = treated yard.

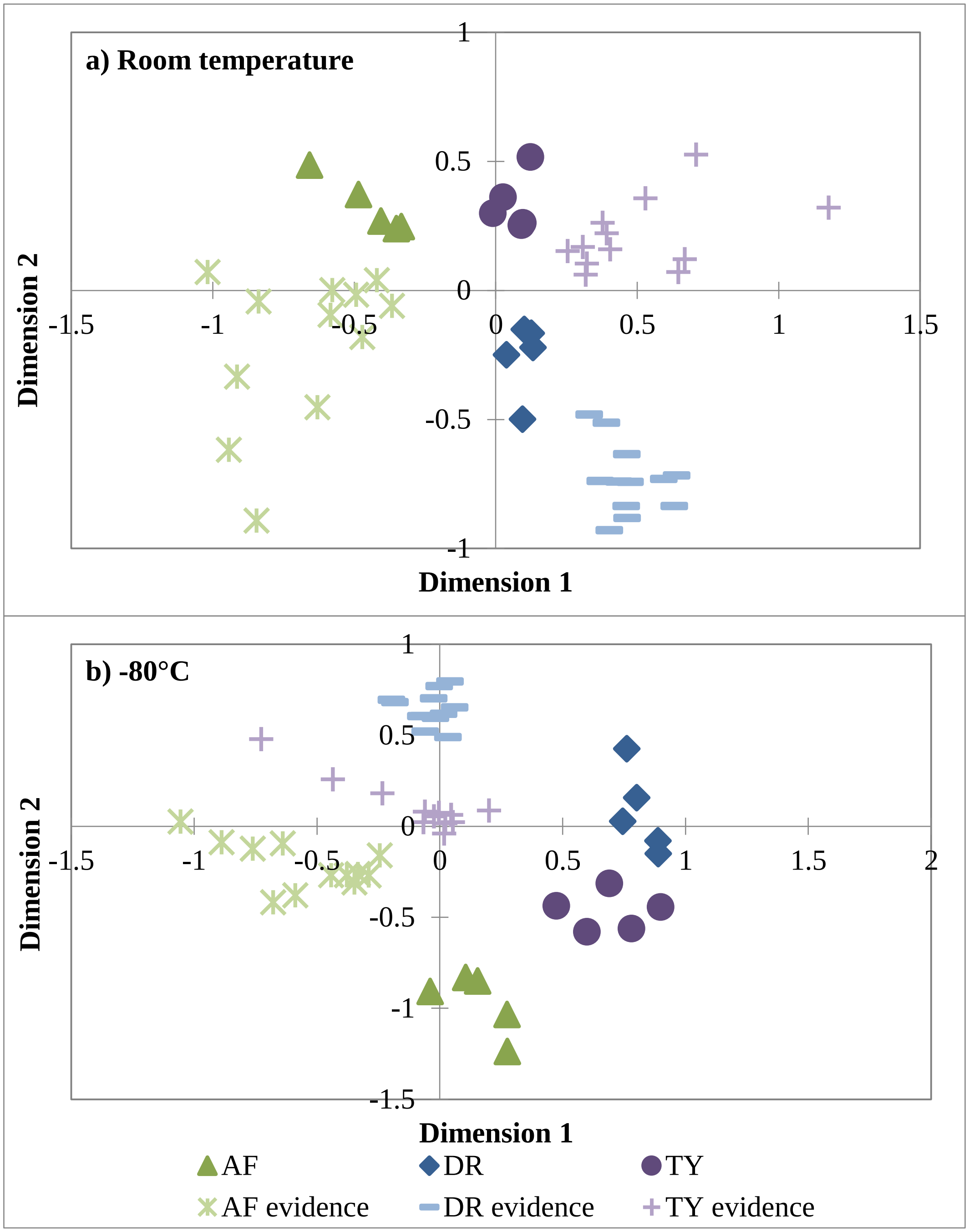


Figure 29. Habitat of origin ordination of soils collected monthly from three to six months from shovels, sneakers, and jeans (line symbols; n = 12 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.175 and 0.173, respectively), excluding the coniferous forest. Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the aged evidence no longer grouped closely with any habitat when known soils were stored at -80°C. AF = agricultural field, DR = dirt road, TY = treated yard.

Visual Analyses of Profiles from the Sensitivity Study

Bacterial Abundance Charts

The bacterial profiles generated from different soil masses (250 – 1 mg) were similar to each other (exemplified in Figure 30 from the agricultural field), as there were only slight differences in bacterial composition among the profiles. This was consistent with the other three habitats, whose abundance charts can be found in Appendix E. Additionally, similar bacterial profiles were generated from the smallest amounts of soil (10, 5, and 1 mg) and varying input DNA volumes (1, 2, and 5 µL) added in PCR (exemplified in Figure 31 from the agricultural field). This was true for the other three habitats, whose data can be found in Appendix E.

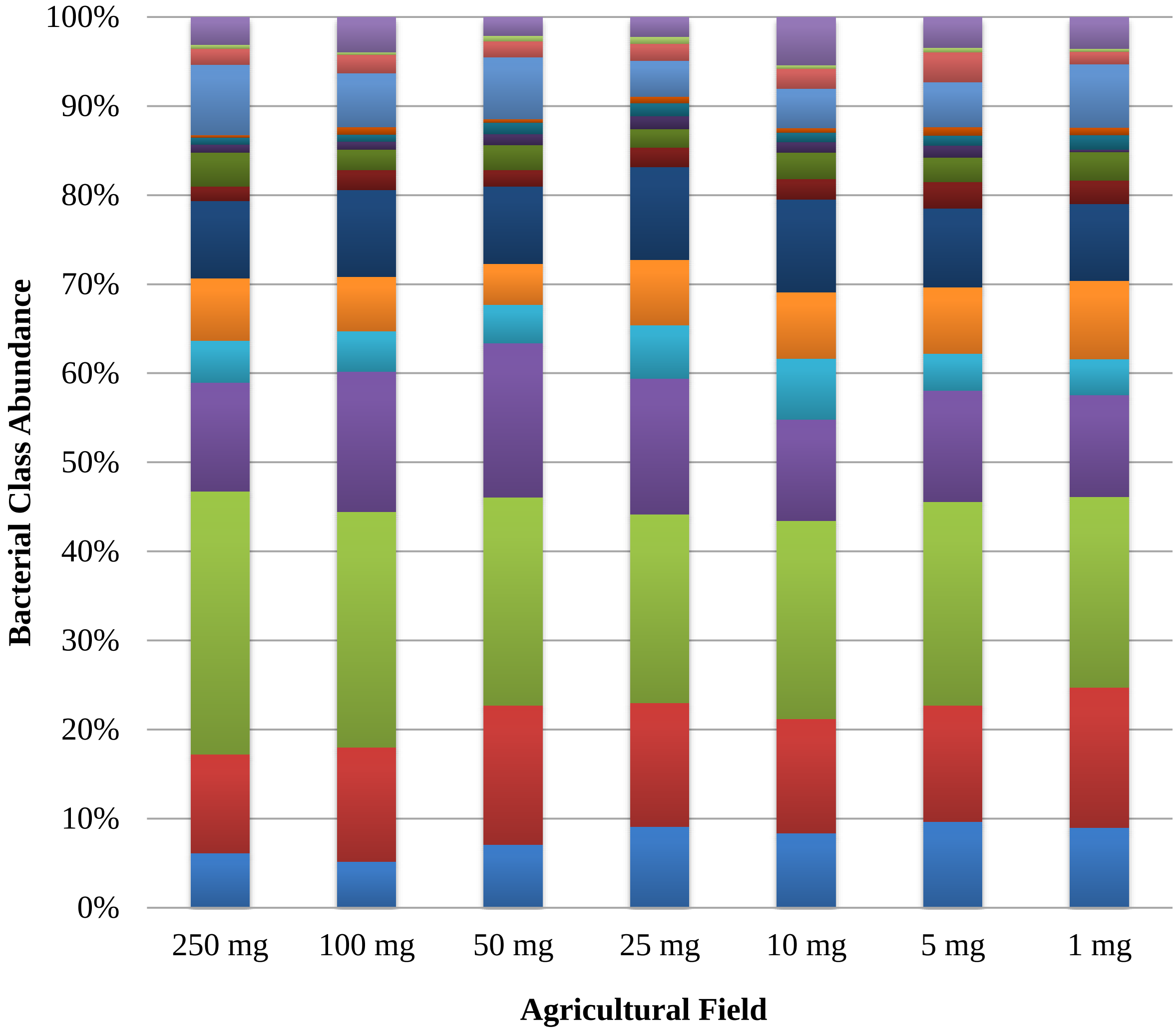


Figure 30. Bacterial class abundance from differing masses of agricultural field soils. Bacterial profiles maintained a similar bacterial composition as the mass of soil decreased.

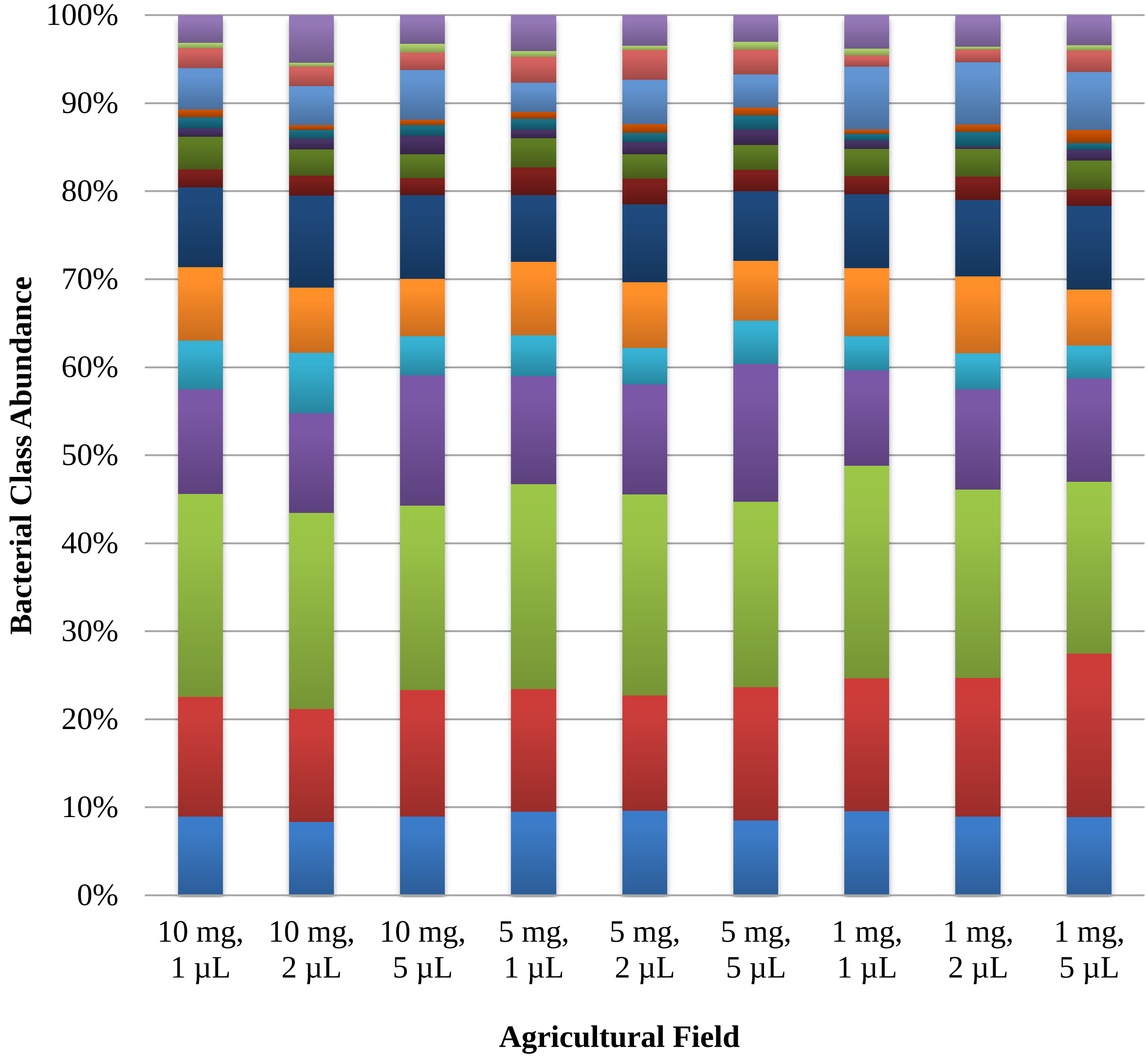


Figure 31. Bacterial class abundance from 10, 5, and 1 mg soils amplified with 1, 2, and 5 µL of DNA from the agricultural field. Bacterial profiles were similar among the three input DNA volumes for each soil mass.

Nonmetric Multidimensional Scaling Plots

Bacterial profiles from the different soil masses grouped with the habitat of origin in multidimensional space (Figure 32), with the coniferous forest orienting away from the other habitats. Removal of the coniferous forest profiles separated the remaining habitats, and the clustering of profiles based on input DNA could be seen. The larger quantities of soil grouped tightly with the known samples, while the smaller amounts of soil (10, 5, and 1 mg) were more distant. Increasing the amount of input DNA to 5 or 2 µL improved the groupings with the habitat of origin (Figure 33). The same improvement occurred with the coniferous forest profiles (data not shown).

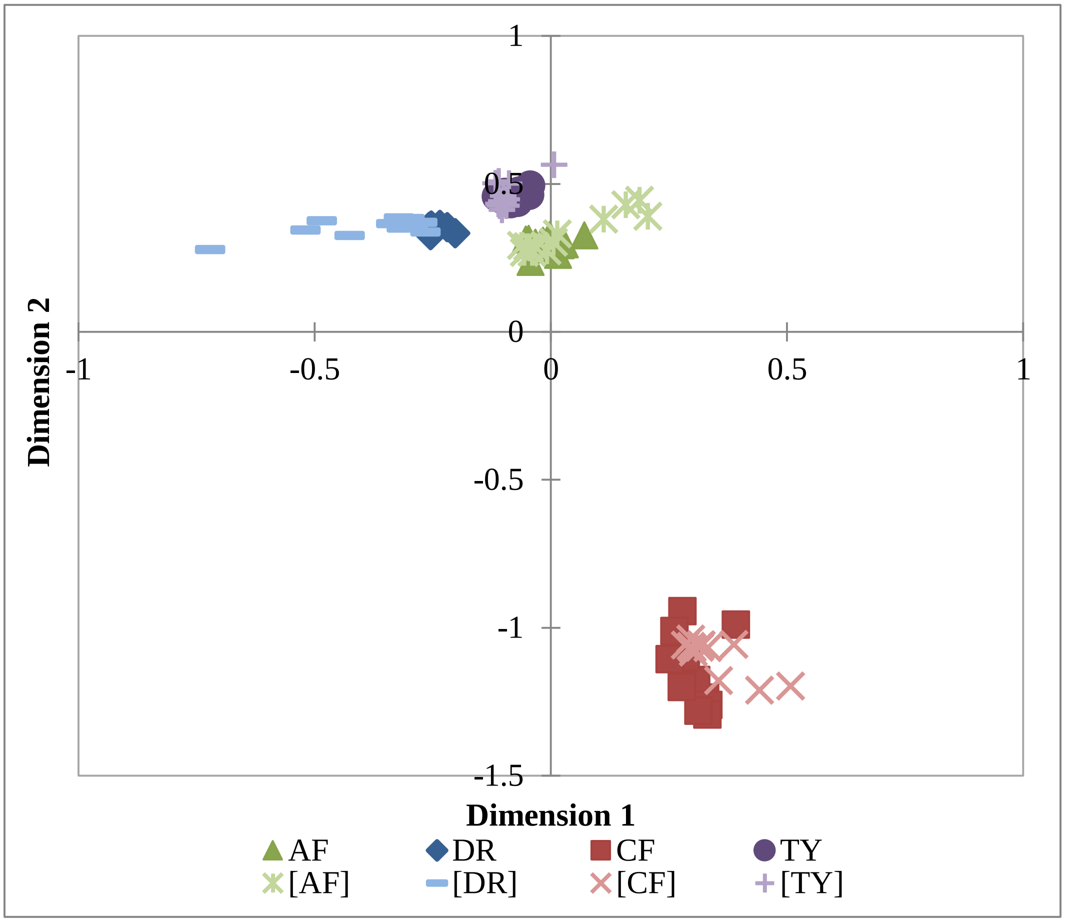


Figure 32. Habitat of origin ordination via NMDS (Kruskal's stress = 0.055) of soils at different masses (line symbols; n = 7 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Profiles generated from the soils of different masses are denoted by brackets in the legend. All profiles from the different masses clustered with the habitat of origin. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

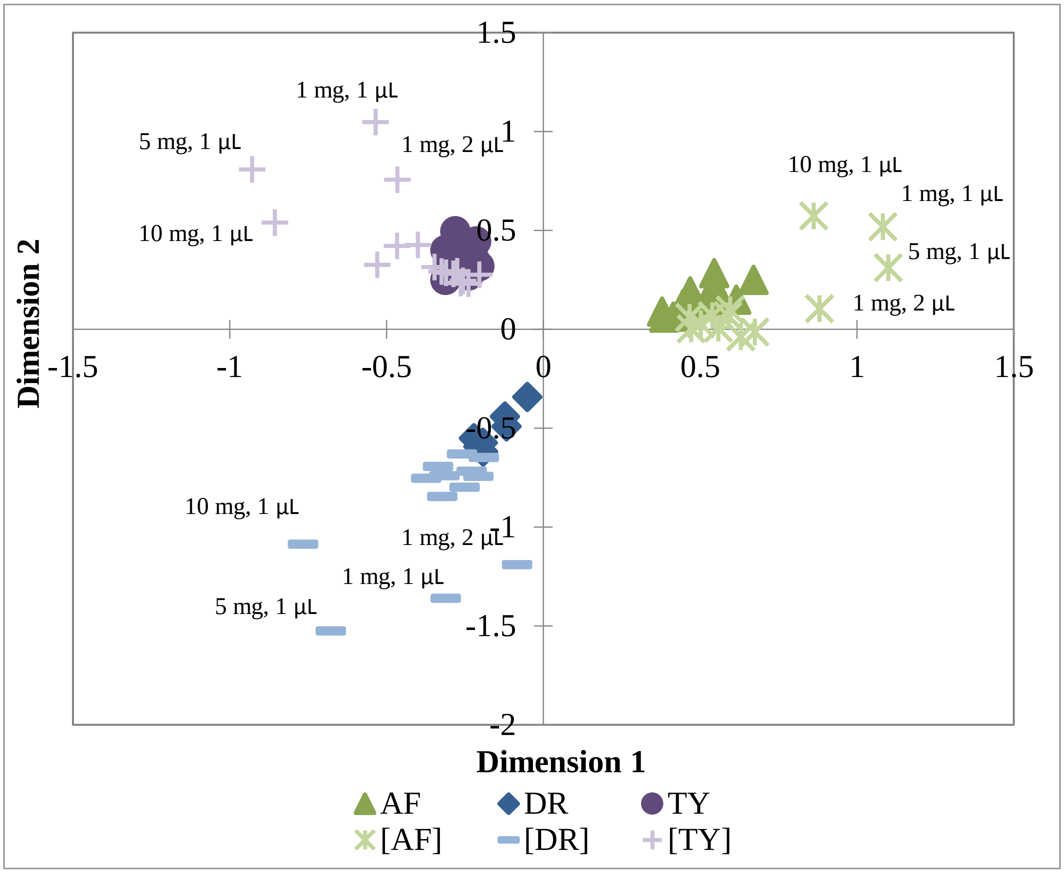


Figure 33. Habitat of origin ordination via NMDS (Kruskal's stress = 0.099) of soils at different masses (line symbols; n = 7 per habitat), excluding the coniferous forest. Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Profiles generated from the soils of different masses are denoted by brackets in the legend. The 10, 5, and 1 mg soils amplified with 1 µL DNA were less similar to the habitat of origin. Profiles from the same masses but amplified with 2 or 5 µL of DNA clustered more closely. AF = agricultural field, DR = dirt road, TY = treated yard.

Supervised Classification of Soil Bacterial Profiles

The length of time soil evidence was removed from a habitat, storage temperature of known soils, and quantity of input soil resulted in different classification accuracies, based on the classification model, the number of OTUs, and the training set used. Tables 4, 6, and 8 display the classification results of SVMs and bagged trees, specifying the number of OTUs, validation and model accuracies, and the percentage of evidence that failed to classify and misclassified. The validation accuracy of SVMs and bagged trees was generally 100%. A lower validation accuracy using SVMs resulted from a dirt road profile that classified to the agricultural field or an agricultural field profile that classified to the treated yard. Overall, SVMs accurately classified 85.5% (median) of the soil evidence profiles to the habitat of origin, whereas bagged trees accurately classified 93.4% (median) of them. The profiles generated from the soils collected on jeans failed to classify and misclassified over twice as often as the other evidence profiles using both classification models. The specific soil evidence items that failed to classify and misclassified with SVMs and bagged trees can be found in Appendix G.

Known Soils from the April 2015 Collection

Table 4 summarizes the soil evidence classification results using the April 2015 soil collection as the training set. SVMs and bagged trees had 100% validation accuracy, with the exception of SVMs using 100 and 200 OTUs, which each had one bacterial profile that misclassified. The soil evidence classification accuracies with SVMs and bagged trees were similar except for the bacterial profiles generated from the soil collected on jeans, where bagged trees classification accuracy was approximately 23 percentage points higher. The classification accuracy of SVMs and bagged trees improved when the number of OTUs was increased from 100 to 200 and 200 to 500. The highest average classification accuracy for SVMs was 92% and for bagged trees was 95.2%. Evidence that failed to classify and misclassified tended to be from soils at later sampling time points (Appendix G). All soils in the sensitivity study accurately classified to their habitat, regardless of the number of OTUs or classification model.

The median scores and ranges using SVMs and bagged trees for soils from the aged evidence and sensitivity studies that accurately classified, failed to classify, and misclassified (separated by classification model and number of OTUs used) are summarized in Table 5. The scores for failed to classify and misclassified evidence overlapped with accurately classified evidence scores in all cases. Increasing the number of OTUs did not alter these results. The habitat prediction and the corresponding classification results for individual soil evidence items can be found in Table H1 – H10 and Table H31 – H34 in Appendix H.

Table 4. Supervised classification of soils from the aged evidence study (t-shirts [n = 12 per habitat], shovels, sneakers, and jeans [n = 19 per evidence item for each habitat]) and the sensitivity study (n = 13 per habitat). Training set soils were collected in April 2015 (n = 13 per habitat, except dirt road n = 7). The validation accuracy is given as a percentage of how many predicted habitats classified to the true habitat. The model accuracy was measured by the ability to classify soil evidence to its habitat of origin. Evidence that failed to classify indicates the algorithm could not differentiate habitats, all of which had similar scores. Misclassified evidence incorrectly classified to a habitat, with a higher score than all others. The number of failed to classify or misclassified evidence items are in parentheses.

Supervised Classification	**Support Vector Machines**					**Bagged Trees using Random Forests**				
	T-shirts	*Shovels*	*Sneakers*	*Jeans*	*Sensitivity*	*T-shirts*	*Shovels*	*Sneakers*	*Jeans*	*Sensitivity*
100 OTUs										
Validation Accuracy	98.0%					100.0%				
Model Accuracy	87.5%	88.2%	88.2%	60.5%	100.0%	97.9%	82.9%	84.2%	85.5%	100.0%
Failed to Classify	4.2% (2)	3.9% (3)	2.6% (2)	14.5% (11)	0.0%	2.1% (1)	6.6% (5)	9.2% (7)	6.6% (5)	0.0%
Misclassified	8.3% (4)	7.9% (6)	9.2% (7)	25.0% (19)	0.0%	0.0%	10.5% (8)	6.6% (5)	7.9% (6)	0.0%
200 OTUs										
Validation Accuracy	98.0%					100.0%				
Model Accuracy	87.5%	90.8%	92.1%	63.2%	100.0%	83.3%	89.5%	94.7%	86.8%	100.0%
Failed to Classify	10.4% (5)	1.3% (1)	5.3% (4)	23.6% (18)	0.0%	16.7% (8)	7.9% (6)	1.3% (1)	7.9% (6)	0.0%
Misclassified	2.1% (1)	7.9% (6)	2.6% (2)	13.2% (10)	0.0%	0.0%	2.6% (2)	4.0% (3)	5.3% (4)	0.0%
500 OTUs										
Validation Accuracy	100.0%					100.0%				
Model Accuracy	97.9%	96.1%	97.4%	68.4%	100.0%	95.8%	96.1%	96.1%	88.2%	100.0%
Failed to Classify	2.1% (1)	1.3% (1)	0.0%	17.1 (13)	0.0%	4.2% (2)	1.3% (1)	4.0% (3)	7.9% (6)	0.0%
Misclassified	0.0%	2.6% (2)	2.6% (2)	14.5% (11)	0.0%	0.0%	2.6% (2)	0.0%	4.0% (3)	0.0%

Table 5. Median classification scores, including the range, for soil evidence profiles that accurately classified to the habitat of origin, failed to classify, and misclassified with SVMs and bagged trees. The training set contained bacterial profiles from the soils collected from the four habitats in April 2015. With SVMs and bagged trees, accurately classified evidence scores overlapped with failed to classify and misclassified evidence scores, regardless of the number of OTUs used.

	Support Vector Machines			**Bagged Trees using Random Forests**		
	Accurately Classified	**Failed to Classify**	**Misclassified**	**Accurately Classified**	**Failed to Classify**	**Misclassified**
			100 OTUs			
T-shirts	**0.00**	-0.10	-0.07	**0.48**	0.40	-
Shovels	**-0.01**	-0.09	-0.05	**0.50**	0.34	0.35
Sneakers	**-0.01**	-0.10	-0.17	**0.49**	0.29	0.36
Jeans	**-0.24**	-1.01	-0.70	**0.46**	0.32	0.34
Sensitivity	**-0.03**	-	-	**0.76**	-	-
Range	0.00 to -1.56	-0.08 to -1.03	-0.03 to -1.38	0.44 to 0.90	0.28 to 0.36	0.29 to 0.43
			200 OTUs			
T-shirts	**-0.02**	-0.13	-0.13	**0.49**	0.35	-
Shovels	**-0.02**	-0.09	-0.07	**0.44**	0.34	0.40
Sneakers	**-0.01**	-0.15	-0.08	**0.51**	0.46	0.34
Jeans	**-0.02**	-0.13	-0.27	**0.46**	0.32	0.34
Sensitivity	**-0.03**	-	-	**0.77**	-	-
Range	0.00 to -0.26	-0.06 to -0.19	-0.03 to -0.28	0.31 to 0.89	0.32 to 0.46	0.30 to 0.45
			500 OTUs			
T-shirts	**-0.01**	-0.13	-	**0.49**	0.32	-
Shovels	**-0.01**	-0.14	-0.17	**0.45**	0.34	0.4
Sneakers	**-0.01**	-	-0.10	**0.47**	0.34	-
Jeans	**-0.04**	-0.07	-0.21	**0.41**	0.29	0.36
Sensitivity	**-0.03**	-	-	**0.81**	-	-
Range	0.00 to -0.23	-0.07 to -0.71	-0.04 to -0.51	0.19 to 0.80	0.27 to 0.34	0.31 to 0.40

Known Soils Stored at Room Temperature

Table 6 summarizes the aged soil evidence classification results using the known soils stored at room temperature (unbagged) as the training set. SVMs and bagged trees had 100% validation accuracy, except with SVMs using 100 OTUs, which had one profile that misclassified. The highest average classification accuracy for SVMs was 85% using 500 OTUs.

The classification accuracy of SVMs improved when the number of OTUs was increased from 100 to 200 and 200 to 500. Bacterial profiles from soil collected on the jeans had the lowest classification accuracy among the evidence items using SVMs; however, the classification accuracy of jeans was similar to the other items using bagged trees. Approximately 99% of the soil evidence accurately classified to a habitat of origin with bagged trees using 200 and 500 OTUs. Evidence soils collected within two months of being removed from the habitat tended to fail to classify or misclassify with both classification models (Appendix G).

The median scores and ranges using SVMs and bagged trees for soils from the aged evidence study that accurately classified, failed to classify, and misclassified (separated by classification model and number of OTUs used) are summarized in Table 7. The range of accurately classified scores with SVMs improved with an increase in OTUs from 100 to 200 and 200 to 500, but there was some overlap with failed to classify and misclassified evidence score ranges. An increase in OTUs from 100 to 200 and 200 to 500 negatively influenced the median scores with bagged trees. Further, no evidence profiles failed to classify using 200 OTUs and only one misclassified using 500 OTUs. The habitat prediction and the corresponding classification results for individual soil evidence items can be found in Table H11 – H20 in Appendix H.

Table 6. Supervised classification of soils from the aged evidence study (t-shirts [n = 12 per habitat], shovels, sneakers, and jeans [n = 19 per evidence item for each habitat]). Training set soils were collected in August 2015 and stored at room temperature (n = 5 per habitat). The validation accuracy is given as a percentage of how many predicted habitats classified to the true habitat. The model accuracy was measured by the ability to classify soil evidence to its habitat of origin. Evidence that failed to classify indicates the algorithm could not differentiate habitats, all of which had similar scores. Misclassified evidence incorrectly classified to a habitat, with a higher score than all others. The number of failed to classify or misclassified evidence items are in parentheses.

Supervised Classification	**Support Vector Machines**				**Bagged Trees using Random Forests**			
	T-shirts	*Shovels*	*Sneakers*	*Jeans*	*T-shirts*	*Shovels*	*Sneakers*	*Jeans*
	100 OTUs							
Validation Accuracy	97.5%				100.0%			
Model Accuracy	68.8%	79.0%	84.2%	57.9%	91.7%	90.8%	100.0%	88.2%
Failed to Classify	10.4% (5)	9.2% (7)	7.9% (6)	23.7% (18)	6.3% (3)	6.6% (5)	0.0%	10.5% (8)
Misclassified	20.8 (10)	11.8% (9)	7.9% (6)	18.4% (14)	2.0% (1)	2.6% (2)	0.0%	1.3% (1)
	200 OTUs							
Validation Accuracy	100.0%				100.0%			
Model Accuracy	81.3%	82.9%	85.5%	56.6%	100.0%	98.7%	100.0%	97.4%
Failed to Classify	8.3% (4)	11.8% (9)	9.2% (7)	19.7% (15)	0.0%	0.0%	0.0%	0.0%
Misclassified	10.4% (5)	5.3% (4)	5.3% (4)	23.7% (18)	0.0%	1.3% (1)	0.0%	2.6% (2)
	500 OTUs							
Validation Accuracy	100.0%				100.0%			
Model Accuracy	79.2%	93.4%	98.7%	68.4%	100.0%	98.7%	100.0%	97.4%
Failed to Classify	10.4% (5)	1.3% (1)	1.3% (1)	14.5% (11)	0.0%	0.0%	0.0%	2.6% (2)
Misclassified	10.4% (5)	5.3% (4)	0.0%	17.1% (13)	0.0%	1.3% (1)	0.0%	0.0%

Table 7. Median classification scores, including the range, for aged soil evidence profiles that accurately classified to the habitat of origin, failed to classify, and misclassified with support vector machines and bagged trees. The training set contained profiles from the soils collected from the four habitats in August 2015 and stored at room temperature. The range of accurately classified scores with SVMs improved as the number of OTUs used increased. No profiles failed to classify using 200 OTUs and one profile misclassified using 500 OTUs with bagged trees.

	Support Vector Machines			**Bagged Trees using Random Forests**		
	Accurately Classified	**Failed to Classify**	**Misclassified**	**Accurately Classified**	**Failed to Classify**	**Misclassified**
			100 OTUs			
T-shirts	**0.00**	-0.10	-0.03	**0.55**	0.35	0.36
Shovels	**-0.02**	-0.25	-0.10	**0.65**	0.37	0.49
Sneakers	**-0.02**	-0.16	-0.03	**0.66**	-	-
Jeans	**-0.03**	-0.43	-0.58	**0.53**	0.37	0.37
Range	0.00 to -0.15	-0.08 to -1.54	-0.03 to -1.00	0.33 to 0.93	0.33 to 0.41	0.24 to 0.36
			200 OTUs			
T-shirts	**0.00**	-0.07	-0.02	**0.53**	-	-
Shovels	**-0.01**	-0.26	-0.12	**0.67**	-	0.65
Sneakers	**-0.02**	-0.23	-0.05	**0.66**	-	-
Jeans	**-0.02**	-0.61	-0.48	**0.55**	-	0.39
Range	0.00 to -0.10	-0.06 to -1.53	-0.01 to -1.30	0.34 to 0.88	N/A*	0.38 to 0.65
			500 OTUs			
T-shirts	**0.00**	-0.11	-0.07	**0.46**	-	-
Shovels	**-0.01**	-0.07	-0.07	**0.65**	-	0.53
Sneakers	**-0.01**	-0.05	-	**0.66**	-	-
Jeans	**-0.02**	-0.38	-0.23	**0.54**	0.34	-
Range	0.00 to -0.08	-0.08 to -0.71	-0.03 to -0.59	0.34 to 0.88	0.30 to 0.38	N/A†

* = No evidence failed to classify.
† = One item of evidence misclassified and a range could not be calculated.

Known Soils Stored at -80°C

Table 8 summarizes the soil evidence classification results using known soils stored at -80°C as the training set. SVMs and bagged trees had 100% validation accuracy, except with SVMs using 100 and 200 OTUs, which each had one profile that misclassified. The classification accuracy of SVMs improved as OTUs increased from 100 to 200 and 200 to 500, with the highest average classification accuracy being 85%. The bacterial profiles from the jeans did not classify as well as the other evidence items using SVMs, as the average classification accuracy was 53.5%. Conversely, bagged trees classification accuracy, while still higher than SVMs, decreased to an average of 85% (from 93%) when OTUs increased from 100/200 to 500. For both classification models, evidence that failed to classify and misclassified tended to be from soils at later sampling time points (Appendix G).

The median scores and ranges using SVMs and bagged trees for soils from the aged evidence study that accurately classified, failed to classify, and misclassified (separated by classification model and number of OTUs used) are summarized in Table 9. The score ranges for the accurately classified evidence overlapped with the failed to classify and misclassified scores for SVMs and bagged trees. The scores using SVMs for misclassified evidence were close to zero (-0.02 to -0.07). Using bagged trees, the accurately classified evidence scores did not improve when the number of OTUs increased from 100 to 200 or 200 to 500. The habitat prediction and the corresponding classification results for individual soil evidence items can be found in Table H21 – H30 in Appendix H.

Table 8. Supervised classification of soils from the aged evidence study (t-shirts [n = 12 per habitat], shovels, sneakers, and jeans [n = 19 per evidence item for each habitat]). Training set soils were collected in August 2015 and stored at -80°C (n = 5 per habitat). The validation accuracy is given as a percentage of how many predicted habitats classified to the true habitat. The model accuracy was measured by the ability to classify soil evidence to its habitat of origin. Evidence that failed to classify indicates the algorithm could not differentiate habitats, all of which had similar scores. Misclassified evidence incorrectly classified to a habitat, with a higher score than all others. The number of failed to classify or misclassified evidence are in parentheses.

Supervised Classification	**Support Vector Machines**				**Bagged Trees using Random Forests**			
	T-shirts	*Shovels*	*Sneakers*	*Jeans*	*T-shirts*	*Shovels*	*Sneakers*	*Jeans*
	100 OTUs							
Validation Accuracy	97.5%				100.0%			
Model Accuracy	75.0%	85.5%	78.9%	50.0%	93.8%	92.1%	90.8%	93.4%
Failed to Classify	10.4% (5)	7.9% (6)	13.2% (10)	23.7% (18)	4.2% (2)	5.3% (4)	9.2% (7)	4.0% (3)
Misclassified	15.6% (7)	6.6% (5)	7.9% (6)	26.3% (20)	2.0% (1)	2.6% (2)	0.0%	2.6% (2)
	200 OTUs							
Validation Accuracy	97.5%				100.0%			
Model Accuracy	81.3%	92.1%	86.8%	52.6%	87.5%	93.4%	98.7%	93.4%
Failed to Classify	10.4% (5)	4.0% (3)	9.2% (7)	27.6% (21)	10.4% (5)	2.6% (2)	1.3% (1)	5.3% (4)
Misclassified	8.3% (4)	4.0% (3)	4.0% (3)	19.7% (15)	2.0% (1)	4.0% (3)	0.0%	1.3% (1)
	500 OTUs							
Validation Accuracy	100.0%				100.0%			
Model Accuracy	87.5%	98.7%	96.1%	57.9%	79.2%	85.5%	88.2%	88.2%
Failed to Classify	6.3% (3)	1.3% (1)	4.0% (3)	23.7% (18)	14.6% (7)	5.3% (4)	5.3% (4)	4.0% (3)
Misclassified	6.3% (3)	0.0%	0.0%	19.7% (15)	6.3% (3)	9.2% (7)	6.6% (5)	7.9% (6)

Table 9. Median classification scores, including the range, for aged soil evidence profiles that accurately classified to the habitat of origin, failed to classify, and misclassified with support vector machines and bagged trees. The training set contained profiles from the soils collected from the four habitats in August 2015 and stored at -80°C. The scores for SVMs improved with an increase in OTUs, but misclassified evidence scores were close to zero. Increasing the number of OTUs did not change the findings for bagged trees.

	Support Vector Machines			**Bagged Trees using Random Forests**		
	Accurately Classified	**Failed to Classify**	**Misclassified**	**Accurately Classified**	**Failed to Classify**	**Misclassified**
			100 OTUs			
T-shirts	**0.00**	-0.20	-0.04	**0.58**	0.36	0.43
Shovels	**0.00**	-0.12	-0.05	**0.57**	0.37	0.43
Sneakers	**-0.01**	-0.22	-0.05	**0.56**	0.39	-
Jeans	**-0.02**	-0.25	-0.07	**0.50**	0.42	0.43
Range	0.00 to -0.07	-0.01 to -0.40	-0.01 to -0.10	0.31 to 0.93	0.31 to 0.40	0.41 to 0.45
			200 OTUs			
T-shirts	**0.00**	-0.16	-0.06	**0.56**	0.36	0.39
Shovels	**-0.02**	-0.21	-0.03	**0.60**	0.37	0.44
Sneakers	**0.00**	-0.22	-0.03	**0.60**	0.40	-
Jeans	**-0.02**	-0.50	-0.04	**0.54**	0.35	0.40
Range	0.00 to -0.07	-0.04 to -0.38	-0.01 to -0.19	0.31 to 0.92	0.33 to 0.40	0.40 to 0.50
			500 OTUs			
T-shirts	**0.00**	-0.08	-0.02	**0.57**	0.33	0.35
Shovels	**-0.01**	-0.12	-	**0.57**	0.34	0.39
Sneakers	**-0.01**	-0.08	-	**0.56**	0.37	0.41
Jeans	**-0.02**	-0.22	-0.04	**0.53**	0.36	0.37
Range	0.00 to -0.07	-0.06 to -0.80	-0.01 to -0.06	0.31 to 0.86	0.30 to 0.43	0.34 to 0.41

DISCUSSION

Soil is forensically valuable as trace evidence, as it can aid in a criminal investigation and link an item to the victim or suspect. The physical and chemical components of soil are complex, and soils from different locations and habitats originate from, and are exposed to, diverse conditions, both environmental and anthropological. In contrast, soils from the same general location or habitat are likely to have similar properties (Murray and Solebello, 2002). Forensic chemists traditionally attempt to associate a soil sample with its source based on class characteristics; however, these associations are not necessarily objective or definitive. Microbial profiling has been suggested as a method for individualizing soil samples, as the microbial community structure and composition of soils vary among habitats (reviewed by Sensabaugh, 2009). While a variety of methods have been used towards this goal, the high resolving power of NGS has proved most useful, allowing for the differentiation of soil samples from diverse and similar habitats (Jesmok et al., 2016), and the association of mock soil evidence to the correct location of origin (e.g., Young et al., 2015). However, a general shortcoming of these earlier studies is that soils have been collected directly from a site and either assayed a short time later or frozen until DNA processing, neither of which reflect the transient nature of soil evidence. Further, a variety of factors inherent to forensic analysis may affect the microbial composition of both questioned and known soil samples when collected and analyzed, such as the amount of soil recovered from the evidence, the time between the occurrence of a crime and soil collection, and the storage conditions of soil samples in the laboratory—all of which were evaluated in this thesis research. Additionally, both visual and purely statistical techniques were employed to assess their impact on the comparisons and statistical associations of questioned and known soil bacterial profiles.

A common limitation in forensic science is the amount of material retrieved as evidence, which can certainly be the case for a questioned soil sample. Typical DNA extraction protocols for soil, including the MoBio® PowerSoil DNA Isolation Kit utilized in this research, call for 250 mg of input soil; however, this is actually a substantial amount, and it is likely much smaller quantities will exist on evidence items submitted for analysis. Young et al. (2016) analyzed the effect of larger soil input mass (250, 100, and 50 mg) on fungal profiles from five different soil types, and found that a decrease in soil mass resulted in a decrease in PCR product yield, which is largely consistent with the current research, wherein the smallest masses of soil resulted in the least PCR product. However, in the present study DNAs from the highest soil masses (250 and 100 mg) had unexpectedly lower post-PCR yields than the 50 and 25 mg soils. When this was compensated for by adding proportionately more of the high soil mass PCR product into sequencing reactions, they produced far more sequences than all other samples. These observations indicate that the PCR product yields were underestimated during quantification. DNAs were quantified using PicoGreen, which intercalates into double-stranded DNA and fluoresces under UV light. Humic acid, a major organic component of soil, can co-purify with DNA (Tebbe and Vahjen, 1993), and has been shown to strongly inhibit fluorescence (e.g., Sidstedt et al., 2015). Bachoon et al. (2001) used PicoGreen to quantify DNA and found that as little as 20 ng of humic acid can reduce the DNA concentration estimates by 50%. In the current research, small amounts of humic acid may have remained after DNA extraction from the largest quantities of soils tested,[6] and thus, inhibited fluorescence and lowered PCR product concentration estimates, resulting in adding too much product to sequencing reactions and the increased number of sequences. Standard microbiological research, including many studies at

[6] The PowerSoil kit is designed to remove any inhibitors, such as humic acid, in soil; however, it may leave trace amounts behind.

Michigan State University, often utilizes the exact same quantitation procedure; however, the overall outcomes would presumably not be affected because all of the input soil masses are a consistent 250 mg, meaning every sample quantitation is similarly inhibited and the PCR yields are underestimated across all samples. In a forensic context, ample amounts of known soils will likely be collected, but questioned soil evidence may only be received in trace quantities. This could cause PCR yield disparities between soils of higher and lower masses and affect downstream processes, as was seen in the current research. On the other hand, because all sequences were subsampled down to 3,000 and there was no difference in the number of OTUs across soil masses, florescence inhibition and any but the most drastic errors in quantitation should not substantially impact the comparisons of known and questioned soil profiles.

The other important finding from the sensitivity study was that consistent bacterial profiles were produced across all soil masses. The exception was that bacterial classes of lowest abundance were lost when 1 µL of DNA from the 10, 5 and 1 mg soil masses were added to PCR reactions, wherein these samples clearly plotted more distant from their habitat of origin in multidimensional space than did higher masses. However, the profiles generated using 2 or 5 µL of DNA plotted with the others, indicating that the increase in input DNA resulted in a better representation of the bacteria in the soil, compensating for trace quantities of soil. Based on these results, one might expect that 1 µL of input DNA from 10 mg of soil would produce similar results to 2 µL of input DNA from 5 mg of soil; however, an increase from 1 to 2 µL of input DNA always improved the associations in NMDS, regardless of low soil mass. Further, 1 mg of soil gave poor clustering with 1 µL of input DNA, slightly better results using 2 µL, and much better results when 5 µL was added, indicating that some stochastic threshold was reached using these very small amounts of soil. A final consideration in regards to increasing the amount of

DNA obtained from trace quantities of soil is determining the optimal method for its isolation and purification. Extremely small amounts of DNA may not efficiently bind to or elute from the PowerSoil silica column, as it has been shown that such columns retain some DNA (e.g., Miller et al., 1999). For this reason, Qiagen recommends adding carrier RNA to a low level DNA sample before it is placed on the column, as it prevents the DNA from being irretrievably bound (Qiagen DNeasy® Tissue Handbook). Given these factors, when only trace quantities of soil evidence are available, either adding more than 1 µL of input DNA in PCR, augmenting the DNA extraction process, or both should be considered so as to optimize bacterial representation and generate the most accurate profile.

The second goal of the research presented here was to begin to understand bacterial composition changes that occur temporally in soil evidence, and how they affect that soil's traceability to its habitat of origin. When soil evidence is submitted to a forensic laboratory, the soil will have been removed from its habitat for some period of time, perhaps weeks or months or more, and may no longer have the same bacterial composition as the habitat. For example, soil on a shovel that is kept in a shed before it is found by authorities has not been exposed to the same environmental conditions that exist in its original habitat. Preliminary analysis by Jesmok (2015) of Michigan deciduous woodlot soils on evidence items showed that the bacterial composition changed over time. Those profiles displayed relative increases in Actinobacteria and Bacilli and decreases in Sphingobacteria and Acidobacteria, with the changes being most pronounced within the first two months of storage. These results are consistent with the current research, which included four other habitats. Given that these temporal changes were specific and reliable across very diverse habitats, it seems probable that similar bacterial composition trends will occur in others. Such changes likely result from environmental modifications that predominantly influence certain classes of bacteria, many of which have been extensively studied. For instance, Actinobacteria, which increased over time, is tolerant to dry and warm environments (Costello et al., 2009a), and thus, may have persisted when evidence was stored indoors at summer temperatures. Bacilli, which also increased, have spores that are resistant to changing environments and exhibit viability in conditions different than the original habitat (Nicholson et al., 2000). On the other hand, Sphingobacteria, which decreased in the soil evidence profiles, have lipid membranes that require moisture and oxygen (Janssen, 2006), either of which could have become limiting during soil evidence storage. The decrease in Acidobacteria may have resulted from breakdown of the soil medium, which has been shown to negatively influence this class (Fierer et al., 2007). Other more subtle changes in bacterial class makeup also occurred as soils in this study aged, particularly loss of some of the rarest classes. While these were not examined in detail, they too might act as effective indicators of soil aging.

These consistent and predictable bacterial composition changes could potentially be used to develop a temporal biological clock predicting how long soil evidence has been removed from a habitat, similar to a microbial clock proposed to estimate the post-mortem interval during human decomposition (e.g., Metcalf et al., 2013; Finley et al., 2015). Such a biological clock would be based on the percentage of certain bacterial classes in the profile. For example, Actinobacteria initially made up between 10 and 20% of all profiles, increased substantially after one week in the evidence profiles, and after one month reached about 30% in all four habitats. Similarly, the other bacterial classes noted above changed in a reliable, clock-like manner. However, the starting abundancies of each bacterial class differed by habitat, meaning that it is impossible to state that the existence of a class at a certain percentage directly correlates with the age of a soil sample. As an example, the percentage of Bacilli approximately tripled in all habitats after four months; however, its starting percentage in the coniferous forest was much higher, and by the end of that time period made up between 25 and 30% of the profile, while it was less than 10% in the others. Therefore, if the percent of Bacilli in a questioned soil sample from an unknown habitat was used as a biological clock, a value of 10% would provide little information about the age of the evidence. Given this, perhaps the only way to utilize a biological clock would be to first determine which habitat the questioned sample is most similar to using a technique like NMDS, and then based on the starting class percentages for that habitat, estimate how long the questioned soil has been removed from it.

The rates of bacterial composition change differed when evidence was stored in an incubator at a constant 24°C versus at ambient temperature in an office between the months of May and November, where the temperature ranged from 21°C – 30°C. The changes in bacterial classes were similar in both settings, however, they occurred much more quickly in the office. For example, Bacilli from the coniferous forest evidence samples stored at ambient temperature made up 20% of the profile after approximately three months, while the same percentage was not reached on the evidence stored in the incubator until ten months. The often warm temperatures in the office during the summer, and possibly the resultant loss of moisture from the soil, may have accelerated bacterial changes. It is further possible that other characteristics of the soil, such as the breakdown of organic matter or decreased nutrient availability, occurred sooner in the office, resulting in the faster rate. Based on these observations, environmental conditions will have to be considered if a biological clock is to be used to predict how long soil evidence has been removed from a habitat. For instance, the temperature at which the soil evidence item was stored could vary considerably based on location, the season, etc., and must be taken into account, similar to how forensic entomologists or pathologists consider external factors (e.g., temperature, humidity) in time of death estimations. Owing to the interplay of all of these variables, a biological clock will likely only provide a rough estimate of how long a soil sample has been removed from a habitat, and might even be limited to determining if it is fresh (e.g., a week removed or less) or aged, as opposed to specifically predicting how many days, weeks, or months it has been removed. However, even with such limitations, any information about the 'age' of a soil sample can be useful for corroborating a timeline or story about the crime, although more research will need to be conducted to develop a robust biological clock.

Another interesting factor that must be considered if bacterial profiling of soil is to have forensic utility is the possibility that the evidence item itself impacts the associations between a soil sample and its source. Given the ubiquity of bacteria, an evidence item will almost certainly generate a bacterial profile, which likely contains taxa in common with the soil. However, soil is a very rich source of bacteria, while more inert substrates commonly submitted as evidence (e.g., shovel, tire, clothing) are not. An example of this is the newly purchased, unsoiled t-shirt tested in this research. When profiled on its own, it shared many bacterial classes with the soils, although it had far less OTU diversity, making the profile, based on NMDS, very different than the soils. It seems possible that the clean t-shirt originally harbored quite low levels of bacteria, but after PCR, when even a small amount of starting bacterial DNA is amplified into the billions of copies needed for sequencing, a complete profile could be generated. If this is the case, while a piece of evidence may generate its own bacterial profile, the bacteria-rich soil on that item will likely overshadow a profile stemming solely from it, thus not affecting the traceability of the soil evidence to a habitat. As an example, in all cases the t-shirt soil profiles clustered with the habitat of origin using NMDS.

On the other hand, there is a possibility the traceability of a soil sample to a habitat of origin may be affected when the evidence itself is bacterially rich, such as in worn clothing, given the human body has its own microbial makeup. Costello et al. (2009b) found that three of the most abundant bacterial phyla on the human skin are Actinobacteria, Firmicutes, and Proteobacteria, making up almost 90% of the sequences generated. Although these are also among the most prevalent phyla in soils (based on this research), it seems likely that the profile generated from the soil on clothing evidence will minimally be affected, as once again, the bacteria in the soil are so abundant that they will be preferentially reflected in the resulting profile. However, researchers at Michigan State University have begun to assess the effect of worn clothing on the traceability of soil evidence back to a habitat of origin. If it is found that human bacteria on clothing substantially influences the profiles obtained, an alternative method for generating soil profiles from clothing may need to be developed, such as scraping soil from the material rather than using cuttings for DNA extraction.

Beyond harboring their own bacteria, evidence items could also influence generation of soil profiles in other ways. For instance, many metals have antimicrobial properties that could reduce microbial diversity, although this did not appear to negatively influence the ability to accurately predict the habitat of origin for the metal evidence items tested in the current study. Likewise, soils on t-shirts and sneakers also classified well, indicating those surfaces did not alter the profiles. In contrast, the soil on jeans produced profiles that differed from the other evidence types, and often misclassified to their habitat of origin, indicating the substrate on which soil evidence exists can interfere with the recovery of microbial DNA and/or developing accurate bacterial profiles. Jean soils had lower bacterial OTU diversity and abundance of the rare classes than the other evidence items. This may have been caused by the jeans directly impeding the extraction process. It is possible that the soil became entrapped in the dense denim material, such that DNA from only a very small amount of soil was isolated, resulting in reduced OTU diversity, as was seen in the sensitivity study using 1 mg of input soil. This concept is supported by the fact that a considerable amount of soil remained on the jean cuttings after it was removed from the tubes with beads. More likely, the heavy denim dampened the bead beating process used to mechanically lyse bacterial cells; therefore, certain types of bacteria, owing to their physical makeup, were not lysed and their DNA was not extracted, leading to loss of profile diversity. Given these results, if soils on denim or similar material are submitted as evidence, it may be advantageous to scrape off soil prior to DNA extraction. If only trace quantities of soil are available that cannot be scraped off, removal of the cutting a few minutes after vortexing, and then proceeding as usual, could be helpful, although this was not tested in the current research.

Prior to DNA isolation, known soils are going to spend some amount of time in the forensic laboratory under conditions that may also affect their bacterial composition. Biological evidence is often refrigerated or frozen in the laboratory to preserve it in its present state. However, based on the current research, it is clear that the bacterial composition of the questioned soil evidence may have changed before arriving at the laboratory; therefore, it might be advantageous to allow those changes to occur in the known soils as well. As expected, the bacterial profiles from the known soils stored from day zero to two months at -80°C and -20°C were similar within each habitat. What was unexpected was that there was no change when known soils were stored at 4°C, and even more so, that profiles from the known soils stored at room temperature were very similar to those stored at the other three temperatures. In fact, all the known soils stored at room temperature grouped closer to the other knowns in multidimensional space than they did to the aged soil evidence stored at room temperature (data not shown).

The main difference between the aged evidence and the known soils stored at room temperature was that the former were kept in paper bags and the latter in plastic bags. This suggests that moisture, which will be retained in the plastic bags, plays a key role in bacterial composition. When the room temperature known soils were stored in the open, bacterial profiles exhibited increases in Actinobacteria and Bacilli and decreases in Sphingobacteria and Acidobacteria, similar to what occurred on evidence. Given these results, it seems that storing known soils like other biological evidence—refrigerated or frozen, or even in plastic bags—will be problematic when it comes to comparing it to aged soil evidence stored, for instance, indoors. If such is the case, storing the known soils open and at room temperature, possibly for as long as the evidence has been removed from the habitat, might be required in order to allow the same bacterial changes to occur. On the other hand, it is possible an evidence item, such as a shovel left outdoors in winter, will have been kept at quite different conditions before it is collected by authorities. Based on this, the ideal storage conditions of known soil samples should best reflect those under which the questioned soil evidence was kept. Further, known soils that need to be aged should not be stored in plastic bags, as it is now known this directly affects bacterial composition changes.

Similarly, the storage of questioned soil samples must be considered. Based on the current research, evidence items or soils collected from them should likely be kept frozen to retain the bacterial composition present at that time. Freezing the questioned soils is more important when it is fresh (i.e., within the first two weeks following removal from a habitat) because its bacterial composition would be most similar to the habitat at this point, and allowing more changes to occur would not be desirable. On the other hand, if the soil evidence is many months removed from a habitat, freezing it is less critical, as the most substantial changes would already have occurred. However, in the current research some bacterial changes were detected beyond two months, thus if possible, soil should be collected from evidence and stored frozen.

The processing of the questioned soil evidence is also a critical consideration. Ideally, DNA will be extracted from the evidence samples shortly after they are submitted to the laboratory, ensuring the bacterial profile best reflects the composition of the soil on the day it was collected. Preliminary experiments performed during the current research showed that profiles from DNAs kept at -20°C for over a year and then re-amplified were very similar to the original profile. Therefore, if DNA is extracted immediately from the questioned soil sample, it does not need to be amplified and sequenced right away, which is beneficial given it may take a laboratory some time to obtain known soils or prepare all the samples needed for a sequencing run.

Finally, the best technique for analyzing soil microbial data needs to be established. The National Academy of Sciences report (2009) includes substantial criticisms of many of the forensic sciences, particularly in the way evidence is examined. For example, when only visual comparisons are made between known and questioned samples, the interpretation is based on expert opinion, generally with no statistical support. Ideally, statistical analysis of soil bacterial profiles should be highly robust and completely objective. However, it is still worthwhile to use visual tools for comparing soils even if their interpretation might be somewhat subjective (Jesmok et al., 2016), particularly in a courtroom setting, where lay people may have little or no statistical background. The combination of abundance charts and NMDS used to analyze the bacterial profile data in this research helped fill this role.

Abundance charts of soil bacterial profiles produced via NGS will be advantageous for forensic purposes because they provide a simple, pictorial representation of the vast quantity of data produced. These charts can be created at any taxonomic level; however, the bacterial composition changes that occurred when the soil was removed from the habitat were not apparent at the phylum level, and soils from the same habitat looked extremely different at the order and family levels (data not shown). Owing to this, constructing charts using bacterial classes seem to be most appropriate for comparing soils, although they are not ideal given that lower abundant or rare classes are difficult to distinguish. A strength of abundance charts is that the bacterial composition differences both between and within habitats can be understood. For example, without abundance charts it would not be possible to explain why a given habitat is less similar to others or why aged evidence profiles become less similar to a habitat over time. In this research, it was not apparent why the coniferous forest plotted away from the other three habitats until abundance charts were examined, which revealed lower bacterial class diversity and a very different bacterial makeup. In the same example, abundance charts showed that the three habitats that grouped together were not nearly as similar as they were portrayed to be in multidimensional space. Because these charts allow for an illustrative representation of the bacterial makeup in a sample, specific compositional changes in the soil evidence over time can be determined as well. Once it was discovered that these changes are consistent, information that was only available through abundance charts, it became clear that there is the potential to provide information about the ‘age’ of the soil, whereas other analysis methods cannot. Lastly, an expert witness could present such charts in court, visually clarifying for the jury the similarities and differences in bacterial occurrence and abundance among known and questioned samples, instead of overwhelming them with baffling statistics and technical jargon.

NMDS complements the use of abundance charts, as it allows for the comparison of soil samples to each other and provides an assessment of the similarity between or among them.

Additionally, multidimensional scaling plots afford a different type of visual representation of the data, providing the expert witness with another aid for explaining results. However, attempting to ordinate too many locations in a single plot may generate misleading results, as similarities and differences among samples can become distorted. For example, the groupings of profiles from the four habitats in this research were strongly affected by how different the coniferous forest profile was from the other habitats. This most likely resulted from one of two factors, either the low pH of the coniferous forest soil relative to the other habitats, or because it was the most spatially distinct sampling area. Inclusion of the coniferous forest magnified the similarities among the other three habitats and NMDS oriented them as a single habitat, considering the 'two' habitats to be well separated based on low stress values. When the coniferous forest was excluded, NMDS resolved the ordination of the three remaining habitats. This can happen because the number of habitats is not defined prior to NMDS analysis, and all bacterial profiles are ordinated solely on similarity. Based on these results, it is likely better to include the fewest habitats possible, avoiding having profiles appearing artificially similar. A further limitation with NMDS for forensic purposes is that the assessment and comparisons among soil samples is somewhat subjective. For instance, groupings are user defined, as there is no measure of proximity for the profiles or for what is considered 'close enough' to be included in the same group. Nevertheless, it is still a helpful visual tool for discriminating bacterial profiles that can be comprehensible to a jury.

Supervised classification techniques allow for more objective associations of soil samples with a location of origin, which is necessary if the goal of bacterial profiling for forensic soil analysis is to provide statistical levels of certainty. Knights et al. (2011) reviewed the performance of five supervised classifiers (random forests, multinomial naïve Bayes, nearest shrunken centroids, elastic net, and support vector machines) in accurately assigning human microbial communities to body sites or individuals using pyrosequencing data, due to each classifier's previous, extensive usage with complex data for microarray analysis. Random forests was ranked first and SVMs last among the classifiers; however, when SVM non-default program settings were used (addition of feature filters) the two models had similar performance. Further, these data were generated with older next-generation sequencing technology, which may have limited the capability of SVMs. Recent research has included microbial data analyzed via SVMs to predict microbial phenotypes (e.g., aerobic, motile, photosynthetic [Feldbauer et al., 2015]) and to assign human microbiota to a location on the body (Ning and Beiko, 2015). SVMs have been shown to result in varying levels of success when classifying unknowns, which seem to depend on the source of the microbes. Ning and Beiko (2015) swabbed different human body parts, and reported that SVMs accurately classified 84.4% of tongue samples, while those from the throat correctly classified less than 40% of the time. Owing to their reasonable success in previous studies, SVMs and bagged trees, which used a random forest algorithm (Breiman, 2001), were the classification techniques examined in the current research.

Although SVMs and random forests are widely-used in microbiological research, they have not been utilized with next-generation soil bacterial profile data to trace a soil sample back to its source. As a result, the optimal number of features (i.e., OTUs) was unknown, which is crucial for microbial classification, as models can produce different results depending on the number used (Knights et al., 2011). Thousands of OTUs were generated in this research, a subset or all of which could be used to build a model. Different numbers of OTUs, ranging from the 50 to the 1000 most common, were tested in preliminary analyses, which revealed that 50 OTUs had low classification accuracy (approximately 50%) while more than 500 OTUs did not improve classification accuracy (data not shown), thus 100, 200, and 500 were utilized in this research.

In general, an increase in OTUs (100 to 200 to 500) improved the classification accuracy of both SVMs and bagged trees, indicating more features were helpful in differentiating the four habitats. However, adding more OTUs for bagged trees has the potential to introduce problems because the algorithm used approximately all OTUs when building a model. Since the OTUs were organized from most to least common, OTUs in a dataset become fairly rare after about the first 200, with very few or none of a given OTU existing in most profiles. Because of this, OTUs that actually exist in all samples at low levels may or may not be detected due to stochastic sampling effects, resulting in a given OTU being randomly identified in one sample and not in another, particularly after subsampling down to 3000 sequences. Random forests uses the frequency of an OTU to build decisions at each node; therefore, if an inner decision node is based on extremely rare OTUs, the habitat predictions could easily change depending on their random presence or absence. Further, as more and more nodes are added based on these rare OTUs, the probability of classifying a sample to the wrong habitat increases. This change in OTU frequency likely negatively impacted the results using 500 OTUs with the -80°C training set, which classified more poorly than when using 200 OTUs, as known soils stored at -80°C maintain rare OTUs out to 500, while these same OTUs were lost in the aged soil evidence. Given this, it is advisable to test different number of OTUs during supervised classification as the ideal number of OTUs may differ based on the dataset.

In addition, the changes in OTU frequencies as soil samples aged affected the bagged trees classification accuracy of evidence soils, although this happened in different ways depending on what training set was used. For instance, the known soils stored at -80°C were most like the freshest soil evidence, and as the evidence soils changed over time, they became less and less like the training set, causing them to misclassify. On the other hand, known soils that were allowed to age for two months constituted a better training set for the aged evidence soil, at which point the fresh soils were more likely to misclassify. Given all this, a worthwhile strategy might be to sample known soils throughout the aging process so that the training set is representative of the full range of changes that occur on soil evidence.

The effectiveness of any classification technique will be limited by how well it is validated using its training set. In the current research, unlike bagged trees, SVMs often did not result in 100% validation using 100 and 200 OTUs, potentially resulting in misclassifications of the unknown samples. Less than perfect SVM validation suggests that either one or more training set samples within a habitat was quite different from the others, or the model simply needed more features to differentiate the four habitats. There are two possible solutions for this: remove the profile(s) that misclassified or increase the number of OTUs. However, removing a misclassified known bacterial profile might be considered a manipulation of the data, which could certainly be criticized in a forensic setting. Additionally, removal of a known profile may make the training set less representative of the natural variation within a habitat, likely causing soil evidence bacterial profiles to misclassify. Given the drawbacks of removing data, the number of OTUs for SVMs was instead increased to 500, which resulted in perfect validation accuracy, indicating those models needed more features to distinguish the habitats. This does not mean, however, that adding more OTUs is always better. SVMs have been found to perform worse when extra, unnecessary features are added (Knights et al., 2011), suggesting that they cannot adequately divide the data into specific categories when given too much data. Overall, multiple subsets of increasing number of OTUs should be tested to determine which validates best, and even if none resulted in 100% validation accuracy, the training set with the highest accuracy could still be used.

Interestingly, when the results of known soils stored at room temperature and -80°C were compared via SVMs, the influence of storage temperature that existed with bagged trees was not apparent, as both had approximately equal percentages of misclassification. A more detailed examination revealed that, as was seen with bagged trees, fresh evidence misclassified when knowns were stored at room temperature, while older evidence misclassified when knowns were stored at -80°C. However, the fresh evidence was purposefully sampled much more often than was older evidence (daily and weekly versus monthly, respectively), thus fresh evidence had a higher chance of misclassifying. Had soil samples from evidence been collected uniformly, it is clear that the room temperature training set would have outperformed -80°C storage when used to classify the soil evidence to a habitat.

Another interesting result when comparing classification accuracies among the three training sets was that the known soils from the April 2015 collection, which were stored at -20°C, did not mirror those from the -80°C training set. Based on abundance charts, profiles at either of these storage temperatures do not change over time; therefore, the supervised classification results should be similar. However, the April 2015 collection averaged approximately 10% more accurately classified profiles than the -80°C training set collected in August of 2015, using both bagged trees and SVMs. A possible explanation for this is soil collection timing, as the April 2015 collection was closer to the collection dates of both t-shirt and evidence soils (September 2014 and May 2015, respectively). The microbial makeup of a habitat has been shown to fluctuate over a year (e.g., Meyers and Foran, 2008; Jesmok, 2015), and it is possible the profiles from the evidence were more similar to the April soils simply by chance. A more important consideration involves the difference in the number of samples included in the training set. The August training set had 5 samples per habitat that were each at different distances radiating outward from the main collection point (5, 10, 15, 20 feet) in an attempt to incorporate spatial variation in microbial structure within a habitat. In contrast, the April training set consisted of 13 samples per habitat that were collected at a center point and out to 20 feet in each of the cardinal directions. Based on the more accurate results obtained from the April 2015 collection, is seems advisable to collect a complete set of known samples at each distance, as that will provide a better representation of the microbial variation in a habitat.

As noted in the 2009 National Academy of Sciences report, as is true of a great many types of forensic evidence, the classification of a soil evidence profile to a habitat has limited forensic utility until numerical values are generated that indicate the likelihood that a given classification is correct. The science may associate a soil sample with a crime scene, but an attorney could ask how confident the analyst is in that classification, or the probability of an erroneous classification. The SVMs and random forests algorithms used in this research are hard classifiers, meaning a questioned soil sample will be classified to one of the known habitats in the training set, even if the results are weak or the 'correct' habitat is not even included. However, if a score is given with the classification, it can indicate that the association of an evidence sample with a specific habitat is very strong, while an association based on a low score has little forensic value.

From a research standpoint, the best case scenario is that scores for accurately classified evidence do not overlap with scores for failed to classify and misclassified evidence, allowing for a threshold or cut-off value to be determined for use in future forensic testing. However, in the current research erroneous classifications occasionally had relatively good scores, making a threshold value impossible to generate. The coniferous forest profiles were the only ones that consistently had strong scores for accurately classified evidence that did not overlap with failed to classify or misclassified evidence. This is not surprising as the coniferous forest profiles were extremely different from the other three habitats, and all models readily identified them. With that in mind, the coniferous forest data were removed from the training and test sets to determine how it impacted the classification accuracy and corresponding scores of the other three habitats using both SVM and bagged trees. Following coniferous forest removal, the same evidence profiles that originally failed to classify and misclassified were still assigned to the wrong habitat; however, the scores became much lower and no longer overlapped with the accurately classified evidence (data not shown). This indicates that in using both bagged trees and SVMs, the removal of a very different habitat allows for much more refined differences among the remaining habitats to be discerned. On the other hand, the fact that the same samples continued to misclassify suggests a model still could not be built that accurately differentiates all habitats, and that it may be advantageous to further reduce the number of habitats used when developing training sets. In this way, the hyperplanes in SVM could be more distinctive for each habitat, without the need to generate multiple, complicated, and potentially misleading hyperplanes. Similarly, bagged trees are likely to be more discriminatory with fewer habitats, as it would be easier to develop a model that uses a greater number of OTUs to separate them, resulting in an accurate assignment to the habitat of origin.

In conclusion, next-generation bacterial data from soil are more individualizing and objective than are results derived from traditional analysis methods, indicating it is a valuable alternative for forensic soil examinations. This methodology was successful even with trace quantities of soil, and representative bacterial profiles could be produced from the smallest amounts by adjusting the input DNA for PCR. However, one must be mindful that the bacterial composition of soil evidence will likely be changing or have already changed when it is submitted to a forensic laboratory, as it is virtually impossible that it will be collected at the exact time a crime occurs. Given this, questioned soil samples should be stored as other biological evidence—refrigerated or frozen—to maintain the bacterial composition, such that it best reflects that makeup from the time of collection. If the soil is submitted on clothing, the soils should be scraped off or removed if at all possible, so that the substrate does not interfere with the DNA extraction process. Once evidentiary soil has been identified, known samples will need to be collected for comparison to the questioned evidence. A substantial number of knowns should be collected (roughly 10 or more) from a habitat or location at varying distances, to account for spatial variation, which will serve as a training set in supervised classification. Once known soils are received at the laboratory, they should be stored for the appropriate amount of time and under conditions that best reflect those at which the soil evidence was kept, helping to mirror the bacterial composition changes that occurred when it was removed from the habitat.[7]

Another advantage of the NGS data produced in the research presented here is that the discrimination and/or association of questioned and known soil bacterial profiles is conducive to objective statistical analysis via supervised classification, thus meeting the recommendations given in the National Academy of Sciences report (2009). The random forest algorithm was the superior supervised classification technique, as it resulted in the overall highest classification accuracies and was less susceptible to the variations in profiles caused by the many factors inherent to the discovery and analysis of soils (e.g., time, storage conditions, the substrate submitted). The production of scores, or a measure of the likelihood a given classification is

[7] A standard operating procedure for the collection and storage of questioned and known soils is provided in Appendix I.

correct, is extremely valuable forensically because they give definitive measures of the associations. Beyond the statistical comparisons of known and questioned soil samples, visual analysis methods, such as abundance charts and NMDS, help to differentiate soil samples and delineate the supervised classification results. Further, visual representations of the data are advantageous for court presentation, especially when scientific and statistical jargon might overwhelm the jury. The combination of bacterial profiling via NGS and objective statistical analysis of the data provide the discriminatory power necessary in soil analysis. Further, the understanding of bacterial composition changes in known and questioned soils, including how to best handle soils when submitted to a laboratory, will allow for more informative comparisons, strengthening the use of soil in forensic investigations.

APPENDICES

APPENDIX A. Photographs of the Four Diverse Habitats and Soil Evidence Items

Figure A1. Agricultural field on Michigan State University's campus, south of Mt. Hope Road, in East Lansing, Michigan.

Figure A2. Treated yard (Vet Med Field) next to Fee Hall on Michigan State University's campus in East Lansing, Michigan.

Figure A3. Dirt road (Hoyt Avenue) off of Aurelius Road in Lansing, Michigan.

Figure A4. Coniferous forest at the Woldumar Nature Center in Lansing, Michigan.

Figure A5. Folded white cotton t-shirts exposed to the agricultural field (left) and dirt road (right) soils in September 2014. T-shirts were stored in an incubator at 24°C.

Figure A6. Folded white cotton t-shirts exposed to the coniferous forest (left) and treated yard (right) soils in September 2014. T-shirts were stored in an incubator at 24°C.

Figure A7. Hand steel shovels exposed to soil from the four diverse habitats in May 2015.

Figure A8. Gently-worn sneakers exposed to soil from the four diverse habitats in May 2015. Sneakers were laundered before soil exposure.

Figure A9. Folded sections (approximately 8x10 inches) cut from a pair of jeans and exposed to soil from the four diverse habitats in May 2015.

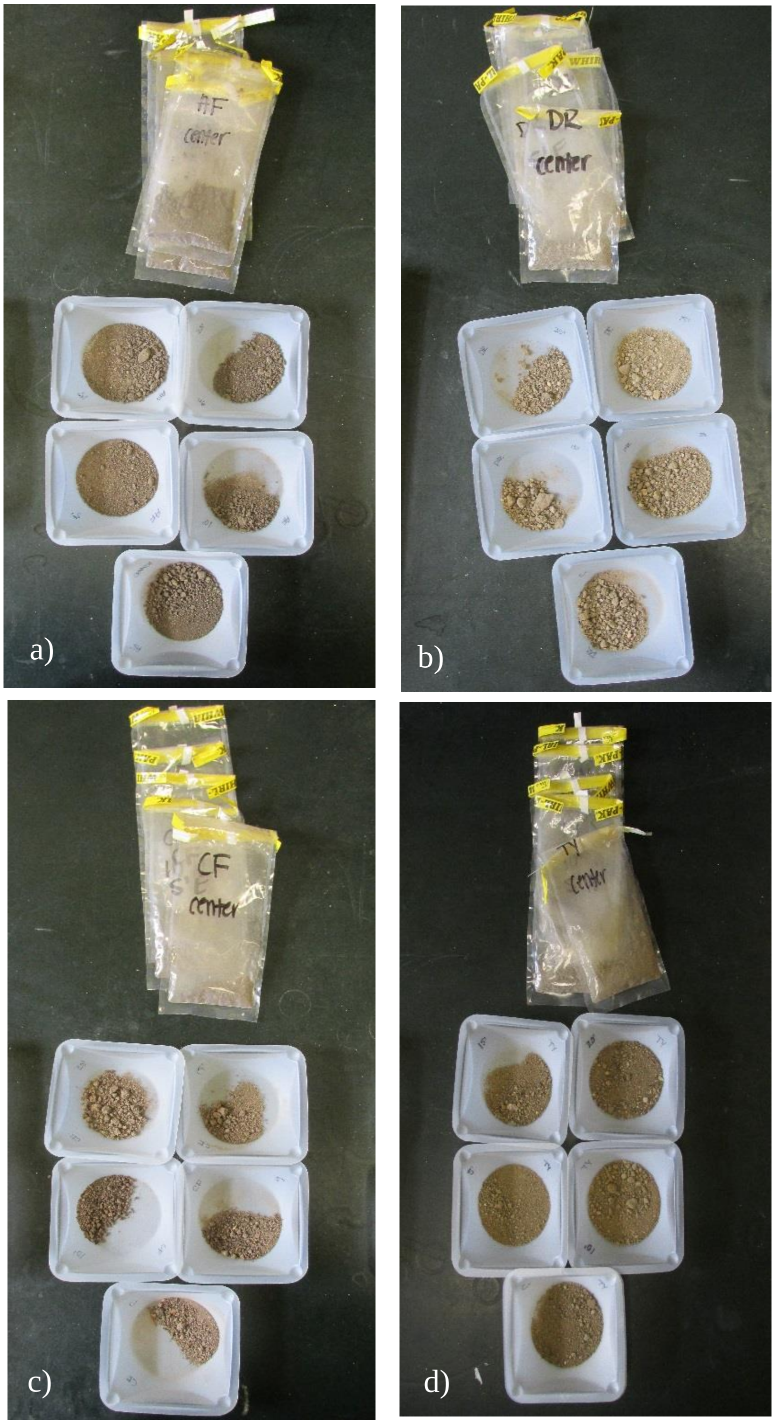


Figure A10. (a) Agricultural field, (b) dirt road, (c) coniferous forest, and (d) treated yard soils removed from Whirl-Pak® bags and placed in weigh boats in January 2016. Soils were stored at ambient temperature in Giltner Hall and collected from one day, one week, one month, and two months after being removed.

APPENDIX B. Mothur Version 1.36.1 Sequence Processing Commands

Mothur must be in the same folder as a stability file. A stability file is made in Microsoft Excel containing all the samples the user wishes to compare. The names of the samples must be in Column A. The file name for the forward primer is in Column B, and the file name for the reverse primer is in Column C. Stability files are a tab delaminated text document (txt.).

1. mothur > make.contigs(file=NameOfStabilityFile.txt, processors=8)
2. mothur > summary.seqs(fasta=NameOfStabilityFile.trim.contigs.fasta)
3. mothur > screen.seqs(fasta=NameOfStabilityFile.trim.contigs.fasta, group=NameOfStabilityFile.contigs.groups, maxambig=0, maxlength=475)
4. mothur > summary.seqs(fasta=NameOfStabilityFile.trim.contigs.good.fasta)
5. mothur > count.groups(group=NameOfStabilityFile.contigs.good.groups)

If files need to be merged, do so now (*optional)*. Two files must be merged: trim.contigs.good.fasta and contigs.good.groups.

6. mothur > merge.files(input=fileA-fileB-fileC, output=fileABC)

7. mothur > sub.sample(fasta=NameOfStabilityFile.trim.contigs.good.fasta, group=NameOfStabilityFile.contigs.good.groups, size=3000,persample=T)
8. mothur > unique.seqs(fasta=NameOfStabilityFile.trim.contigs.good.Subsample.fasta)
9. mothur > count.seqs(name=NameOfStabilityFile.trim.contigs.good.Subsample.names, group=NameOfStabilityFile.contigs.good.Subsample.groups)
10. mothur > summary.seqs(count=NameOfStabilityFile.trim.contigs.good.Subsample.count_table)

To run the next command, the reference database (silva.bacteria.fasta) must be in the same folder as mothur and the user must know where in that alignment the sequences start and end. The reference alignment can be downloaded from SILVA http://www.arb-silva.de/ (Quast et al., 2013). Note: Once a new reference file is created for the sequence of interest and placed in the same file as mothur, steps 11-13 can be skipped.

11. mothur > pcr.seqs(fasta=silva.bacteria.fasta, start=11894, end=25319, keepdots=F, processors=8)
12. mothur > system(rename silva.bacteria.pcr.fasta silva.NewFile.fasta)
13. mothur > summary.seqs(fasta=silva.NewFile.fasta)
14. mothur > align.seqs(fasta=NameOfStabilityFile.trim.contigs.good.Subsample.unique.fasta, reference=silva.NewFile.fasta)
15. mothur > summary.seqs(fasta=NameOfStabilityFile.trim.contigs.good.Subsample.unique.align, count=NameOfStabilityFile.trim.contigs.good.Subsample.count_table)

16. mothur > screen.seqs(fasta=NameOfStabilityFile.trim.contigs.good.Subsample.unique.align, group=NameOfStabilityFile.contigs.good.Subsample.groups, name=NameOfStabilityFile.trim.contigs.good.Subsample.names, summary=NameOfStabilityFile.trim.contigs.good.Subsample.unique.summary, start=1968, end=11550, maxhomop=8,processors=8)
17. mothur > summary.seqs(fasta=current, count=current)
18. mothur > filter.seqs(fasta=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.align, vertical=T, trump=., processors=8)
19. mothur > unique.seqs(fasta=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.fasta, count=NameOfStabilityFile.trim.contigs.good.subsample.count_table)
20. mothur > pre.cluster(fasta=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.fasta, count=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.count_table, diffs=2)
21. mothur > classify.seqs(fasta=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.fasta, template=silva.UserName.fasta, taxonomy=silva.bacteria.silva.tax)
22. mothur > cluster.split(fasta=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.fasta, count=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.count_table, taxonomy=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.silva.wang.taxonomy, cutoff=.15, splitmethod=classify, taxlevel=3, processors=8)
23. mothur > make.shared(list=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.an.unique_list.list, count=NameOfStabilityFile.trim.contigs.good.subsample.unique.good.filter.unique.precluster.count_table, label=0.03)
24. mothur > summary.shared(shared=current,calc=braycurtis-sorclass)
25. mothur > classify.otu(list=current, count=current, taxonomy=current, label=0.03)

The Bray-Curtis/Sørenson-Dice and taxonomic classification summary files can be opened in Microsoft Excel to build dissimilarity matrices and abundance charts, respectively. The shared file contains the OTUs for each sample.

APPENDIX C. Parameters for the Classification Learner App in MATLAB v2015b

1. OTU data must be imported as a table. For training set data, the first column is the name of the habitats (AF, CF, DR, TY). The test set data tables do not have this column. The remaining columns are OTUs.

2. Classification models were cross-validated into 5 randomly chosen subsets, where one subset was used to validate the remaining four using the training set. This process was repeated so each subset was used once for validation.

3. The confusion matrix (Classification Learner tab > Plots > Confusion Matrix) identified if any soil samples in the training set did not classify correctly. The rows are the 'true' habitats and the columns are the 'predicted' habitats. The validation accuracy was determined from this matrix.

4. The number of 'learners' (i.e., how many OTUs were used to make a prediction) for bagged trees was 120 for 100 OTUs, 250 for 200 OTUs, and 600 for 500 OTUs.

4. Each trained classification model must be exported from the Classification Learner App.

5. The exported classification model can be used to make predictions about the test set by using the form: *yfit = X.predictFcn(Y)*

> Where *X* is the name of the trained model (e.g., SVMevidence100OTUs) and *Y* is the name of the test set data table (e.g., Evidence100OTUs).

6. The following equation was used to obtain predictions and scores for each classification type.

> *[yfit, scores] = X.predictFcn(Y)*

APPENDIX D. Soil Bacterial Profiles OTUs

Aged Soil Evidence Study

Table D1. Average OTUs for the bacterial profiles from the soil-covered t-shirts sampled from monthly for one year. T-shirts were exposed to soil from each of the four diverse habitats in September 2014.

T-shirt	Average OTU	T-Shirt	Average OTU	T-Shirt	Average OTU	T-shirt	Average OTU
AF 9-5-14	**968**	DR 9-5-14	**793**	CF 9-5-14	**648**	TY 9-5-14	**949**
AF 10-3-14	**662**	DR 10-3-14	**595**	CF 10-3-14	**482**	TY 10-3-14	**815**
AF 11-10-14	**724**	DR 11-10-14	**555**	CF 11-10-14	**485**	TY 11-10-14	**827**
AF 1-7-15	**617**	DR 1-7-15	**632**	CF 1-7-15	**438**	TY 1-7-15	**791**
AF 2-10-15	**771**	DR 2-10-15	**754**	CF 2-10-15	**604**	TY 2-10-15	**953**
AF 3-6-15	**591**	DR 3-6-15	**753**	CF 3-6-15	**624**	TY 3-6-15	**849**
AF 4-10-15	**698**	DR 4-10-15	**671**	CF 4-10-15	**623**	TY 4-10-15	**801**
AF 5-11-15	**711**	DR 5-11-15	**655**	CF 5-11-15	**492**	TY 5-11-15	**819**
AF 6-5-15	**716**	DR 6-5-15	**605**	CF 6-5-15	**508**	TY 6-5-15	**776**
AF 7-6-15	**666**	DR 7-6-15	**517**	CF 7-6-15	**350**	TY 7-6-15	**737**
AF 8-4-15	**726**	DR 8-4-15	**677**	CF 8-4-15	**424**	TY 8-4-15	**823**
AF 9-4-15	**847**	DR 9-4-15	**669**	CF 9-4-15	**501**	TY 9-4-15	**788**

Table D2. Average OTUs for the bacterial profiles from the soil-covered shovels sampled from daily for one week, weekly for two months, and monthly for six months. Shovels were exposed to soil from each of the four diverse habitats in May 2015.

Shovel							
AF	**Average OTU**	**DR**	**Average OTU**	**CF**	**Average OTU**	**TY**	**Average OTU**
Day 0	**1014**	Day 0	**880**	Day 0	**672**	Day 0	**988**
Day 1	**1049**	Day 1	**907**	Day 1	**596**	Day 1	**978**
Day 2	**1030**	Day 2	**975**	Day 2	**581**	Day 2	**1002**
Day 3	**1054**	Day 3	**932**	Day 3	**618**	Day 3	**1001**
Day 4	**1019**	Day 4	**898**	Day 4	**641**	Day 4	**955**
Day 5	**1062**	Day 5	**903**	Day 5	**661**	Day 5	**901**
Day 6	**1010**	Day 6	**880**	Day 6	**641**	Day 6	**975**
Wk 1	**941**	Wk 1	**904**	Wk 1	**757**	Wk 1	**1000**
Wk 2	**909**	Wk 2	**858**	Wk 2	**620**	Wk 2	**954**
Wk 3	**838**	Wk 3	**840**	Wk 3	**529**	Wk 3	**834**
Wk 4	**817**	Wk 4	**813**	Wk 4	**581**	Wk 4	**925**
Wk 5	**939**	Wk 5	**892**	Wk 5	**451**	Wk 5	**962**
Wk 6	**943**	Wk 6	**904**	Wk 6	**697**	Wk 6	**943**
Wk 7	**886**	Wk 7	**758**	Wk 7	**724**	Wk 7	**996**
Wk 8	**871**	Wk 8	**752**	Wk 8	**519**	Wk 8	**850**
Wk 12	**771**	Wk 12	**806**	Wk 12	**678**	Wk 12	**883**
Wk 16	**852**	Wk 16	**687**	Wk 16	**625**	Wk 16	**864**
Wk 20	**834**	Wk 20	**730**	Wk 20	**559**	Wk 20	**883**
Wk 24	**809**	Wk 24	**673**	Wk 24	**536**	Wk 24	**913**

Table D3. Average OTUs for the bacterial profiles from the soil-covered sneakers sampled from daily for one week, weekly for two months, and monthly for six months. Sneakers were exposed to soil from each of the four diverse habitats in May 2015.

Sneakers							
AF	**Average OTU**	**DR**	**Average OTU**	**CF**	**Average OTU**	**TY**	**Average OTU**
Day 0	**978**	Day 0	**889**	Day 0	**707**	Day 0	**941**
Day 1	**905**	Day 1	**798**	Day 1	**606**	Day 1	**984**
Day 2	**963**	Day 2	**821**	Day 2	**598**	Day 2	**949**
Day 3	**997**	Day 3	**757**	Day 3	**614**	Day 3	**986**
Day 4	**993**	Day 4	**780**	Day 4	**702**	Day 4	**1022**
Day 5	**1022**	Day 5	**787**	Day 5	**614**	Day 5	**936**
Day 6	**1022**	Day 6	**898**	Day 6	**637**	Day 6	**993**
Wk 1	**1009**	Wk 1	**807**	Wk 1	**722**	Wk 1	**975**
Wk 2	**896**	Wk 2	**835**	Wk 2	**606**	Wk 2	**972**
Wk 3	**823**	Wk 3	**720**	Wk 3	**579**	Wk 3	**824**
Wk 4	**920**	Wk 4	**757**	Wk 4	**572**	Wk 4	**922**
Wk 5	**999**	Wk 5	**790**	Wk 5	**610**	Wk 5	**920**
Wk 6	**941**	Wk 6	**774**	Wk 6	**652**	Wk 6	**930**
Wk 7	**963**	Wk 7	**897**	Wk 7	**595**	Wk 7	**885**
Wk 8	**887**	Wk 8	**821**	Wk 8	**524**	Wk 8	**876**
Wk 12	**860**	Wk 12	**795**	Wk 12	**766**	Wk 12	**918**
Wk 16	**682**	Wk 16	**738**	Wk 16	**525**	Wk 16	**769**
Wk 20	**819**	Wk 20	**779**	Wk 20	**604**	Wk 20	**755**
Wk 24	**852**	Wk 24	**757**	Wk 24	**608**	Wk 24	**841**

Table D4. Average OTUs for the bacterial profiles from the soil-covered jeans sampled from daily for one week, weekly for two months, and monthly for six months. Jeans were exposed to soil from each of the four diverse habitats in May 2015.

Jeans							
AF	**Average OTU**	**DR**	**Average OTU**	**CF**	**Average OTU**	**TY**	**Average OTU**
Day 0	**976**	Day 0	**816**	Day 0	**616**	Day 0	**940**
Day 1	**752**	Day 1	**809**	Day 1	**533**	Day 1	**895**
Day 2	**814**	Day 2	**755**	Day 2	**401**	Day 2	**780**
Day 3	**773**	Day 3	**846**	Day 3	**513**	Day 3	**948**
Day 4	**863**	Day 4	**729**	Day 4	**562**	Day 4	**829**
Day 5	**536**	Day 5	**754**	Day 5	**515**	Day 5	**697**
Day 6	**815**	Day 6	**685**	Day 6	**564**	Day 6	**847**
Wk 1	**729**	Wk 1	**722**	Wk 1	**578**	Wk 1	**788**
Wk 2	**802**	Wk 2	**717**	Wk 2	**355**	Wk 2	**724**
Wk 3	**431**	Wk 3	**691**	Wk 3	**321**	Wk 3	**755**
Wk 4	**687**	Wk 4	**702**	Wk 4	**343**	Wk 4	**636**
Wk 5	**453**	Wk 5	**725**	Wk 5	**626**	Wk 5	**712**
Wk 6	**428**	Wk 6	**650**	Wk 6	**455**	Wk 6	**784**
Wk 7	**463**	Wk 7	**628**	Wk 7	**249**	Wk 7	**568**
Wk 8	**536**	Wk 8	**681**	Wk 8	**272**	Wk 8	**697**
Wk 12	**457**	Wk 12	**734**	Wk 12	**287**	Wk 12	**752**
Wk 16	**600**	Wk 16	**661**	Wk 16	**314**	Wk 16	**634**
Wk 20	**297**	Wk 20	**746**	Wk 20	**440**	Wk 20	**582**
Wk 24	**384**	Wk 24	**485**	Wk 24	**279**	Wk 24	**472**

Storage Temperature Study

Table D5. Average OTUs for bacterial profiles from soils collected at each of the four diverse habitats in August 2015 and stored at room temperature. Soils were removed from the plastic bags in January 2016. DNA was extracted from these soils on day one and weekly (Wk) for two months.

Room Temperature							
AF	**Average OTUs**	**DR**	**Average OTUs**	**CF**	**Average OTUs**	**TY**	**Average OTUs**
Day 0 bag	**967**	Day 0 bag	**979**	Day 0 bag	**562**	Day 0 bag	**943**
Day 1	**977**	Day 1	**983**	Day 1	**538**	Day 1	**920**
Wk 1	**1014**	Wk 1	**993**	Wk 1	**483**	Wk 1	**929**
Wk 4	**979**	Wk 4	**980**	Wk 4	**499**	Wk 4	**852**
Wk 8	**1022**	Wk 8	**961**	Wk 8	**415**	Wk 8	**909**
Wk 8 bag	**1009**	Wk 8 bag	**920**	Wk 8 bag	**589**	Wk 8 bag	**997**

Table D6. Average OTUs for bacterial profiles from soils collected at each of the four diverse habitats in August 2015 and stored at four different storage temperatures. Soils were collected on day one and for a two month time span (weeks [Wk] 1, 4 and 8). Soils stored at room temperature (RT) were those removed from the plastic bags.

AF	Average OTUs	DR	Average OTUs	CF	Average OTUs	TY	Average OTUs
Day 0	**929**	Day 0	**994**	Day 0	**664**	Day 0	**917**
RT Day 1	**1015**	RT Day 1	**949**	RT Day 1	**478**	RT Day 1	**947**
RT Wk 1	**1059**	RT Wk 1	**1008**	RT Wk 1	**415**	RT Wk 1	**959**
RT Wk 4	**988**	RT Wk 4	**979**	RT Wk 4	**451**	RT Wk 4	**880**
RT Wk 8	**881**	RT Wk 8	**836**	RT Wk 8	**465**	RT Wk 8	**875**
4°C Day 1	**867**	4°C Day 1	**996**	4°C Day 1	**604**	4°C Day 1	**805**
4°C Wk 1	**830**	4°C Wk 1	**948**	4°C Wk 1	**606**	4°C Wk 1	**885**
4°C Wk 4	**901**	4°C Wk 4	**892**	4°C Wk 4	**613**	4°C Wk 4	**988**
4°C Wk 8	**954**	4°C Wk 8	**975**	4°C Wk 8	**589**	4°C Wk 8	**754**
-20°C Day 1	**982**	-20°C Day 1	**1011**	-20°C Day 1	**651**	-20°C Day 1	**774**
-20°C Wk 1	**982**	-20°C Wk 1	**965**	-20°C Wk 1	**680**	-20°C Wk 1	**575**
-20°C Wk 4	**948**	-20°C Wk 4	**1005**	-20°C Wk 4	**683**	-20°C Wk 4	**810**
-20°C Wk 8	**898**	-20°C Wk 8	**985**	-20°C Wk 8	**741**	-20°C Wk 8	**762**
-80°C Day 1	**1040**	-80°C Day 1	**881**	-80°C Day 1	**647**	-80°C Day 1	**978**
-80°C Wk 1	**956**	-80°C Wk 1	**982**	-80°C Wk 1	**647**	-80°C Wk 1	**889**
-80°C Wk 4	**967**	-80°C Wk 4	**988**	-80°C Wk 4	**671**	-80°C Wk 4	**959**
-80°C Wk 8	**1009**	-80°C Wk 8	**927**	-80°C Wk 8	**662**	-80°C Wk 8	**829**

Sensitivity Study

Table D7. OTUs for bacterial profiles from soils of different masses from each of the four diverse habitats.

Habitat	OTU	Habitat	OTU	Habitat	OTU	Habitat	OTU
250mg AF	**749**	250mg DR	**705**	250mg CF	**643**	250mg TY	**852**
100mg AF	**797**	100mg DR	**749**	100mg CF	**612**	100mg TY	**784**
50mg AF	**840**	50mg DR	**852**	50mg CF	**654**	50mg TY	**902**
25mg AF	**894**	25mg DR	**764**	25mg CF	**535**	25mg TY	**907**
10mg AF	**775**	10mg DR	**737**	10mg CF	**527**	10mg TY	**863**
5mg AF	**805**	5mg DR	**639**	5mg CF	**564**	5mg TY	**818**
1mg AF	**724**	1mg DR	**664**	1mg CF	**545**	1mg TY	**851**

Table D8. OTUs for bacterial profiles from soils weighing 10, 5, and 1 mg from each of the four diverse habitats. DNAs from the soil samples were amplified with 5, 2, and 1 µL.

Habitat	OTU	Habitat	OTU	Habitat	OTU	Habitat	OTU
10mg AF 5µL	**765**	10mg DR 5µL	**757**	10mg CF 5µL	**527**	10mg TY 5µL	**863**
10mg AF 2µL	**778**	10mg DR 2µL	**796**	10mg CF 2µL	**539**	10mg TY 2µL	**866**
10mg AF 1µL	**700**	10mg DR 1µL	**687**	10mg CF 1µL	**492**	10mg TY 1µL	**837**
5mg AF 5µL	**885**	5mg DR 5µL	**659**	5mg CF 5µL	**533**	5mg TY 5µL	**818**
5mg AF 2µL	**896**	5mg DR 2µL	**680**	5mg CF 2µL	**564**	5mg TY 2µL	**807**
5mg AF 1µL	**750**	5mg DR 1µL	**605**	5mg CF 1µL	**457**	5mg TY 1µL	**765**
1mg AF 5µL	**774**	1mg DR 5µL	**654**	1mg CF 5µL	**545**	1mg TY 5µL	**851**
1mg AF 2µL	**797**	1mg DR 2µL	**664**	1mg CF 2µL	**570**	1mg TY 2µL	**828**
1mg AF 1µL	**698**	1mg DR 1µL	**602**	1mg CF 1µL	**504**	1mg TY 1µL	**763**

Training Set Soils

April 2015 Collection

Table D9. Average OTUs for the bacterial profiles from the soils collected at each of the four diverse habitats in April 2015.

April Training Set							
Habitat	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**
AF Center	**746**	DR Center	**606**	CF Center	**521**	TY Center	**867**
AF 5' N	**837**	DR 5' E	**687**	CF 5' N	**463**	TY 5' N	**762**
AF 5' S	**870**	DR 5' W	**616**	CF 5' S	**512**	TY 5' S	**848**
AF 5' E	**857**	DR 10' E	**844**	CF 5' E	**469**	TY 5' E	**775**
AF 5' W	**863**	DR 10' W	**669**	CF 5' W	**597**	TY 5' W	**792**
AF 10' N	**824**	DR 20' E	**848**	CF 10' N	**489**	TY 10' N	**675**
AF 10' S	**856**	DR 20' W	**644**	CF 10' S	**640**	TY 10' S	**720**
AF 10' E	**831**			CF 10' E	**686**	TY 10' E	**747**
AF 10' W	**902**			CF 10' W	**683**	TY 10' W	**725**
AF 20' N	**793**			CF 20' N	**625**	TY 20' N	**798**
AF 20' S	**871**			CF 20' S	**534**	TY 20' S	**860**
AF 20' E	**909**			CF 20' E	**615**	TY 20' E	**886**
AF 20'W	**648**			CF 20'W	**600**	TY 20' W	**848**
Per Habitat	**831**		**702**		**572**		**792**

Known Soils Stored at Room Temperature

Table D10. Average OTUs for the bacterial profiles from the soils collected at each of the four diverse habitats in August 2015 and stored at room temperature. Soils were removed from the plastic bags in January 2016.

Room Temperature Training Set							
Habitat	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**
AF Center	**1022**	DR Center	**961**	CF Center	**415**	TY Center	**909**
AF 5'	**999**	DR 5'	**896**	CF 5'	**460**	TY 5'	**975**
AF 10'	**938**	DR 10'	**909**	CF 10'	**347**	TY 10'	**983**
AF 15'	**867**	DR 15'	**689**	CF 15'	**416**	TY 15'	**906**
AF 20'	**896**	DR 20'	**870**	CF 20'	**390**	TY 20'	**962**
Per Habitat	**945**		**865**		**405**		**947**

Known Soils Stored at -80°C

Table D11. Average OTUs for the bacterial profiles from the soils collected at each of the four diverse habitats in August 2015 and stored at -80°C.

-80°C Training Set							
Habitat	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**	**Habitat**	**Average OTU**
AF Center	**944**	DR Center	**841**	CF Center	**616**	TY Center	**810**
AF 5'	**987**	DR 5'	**871**	CF 5'	**631**	TY 5'	**807**
AF 10'	**997**	DR 10'	**859**	CF 10'	**580**	TY 10'	**799**
AF 15'	**970**	DR 15'	**714**	CF 15'	**513**	TY 15'	**921**
AF 20'	**835**	DR 20'	**803**	CF 20'	**625**	TY 20'	**948**
Per Habitat	**947**		**818**		**593**		**857**

APPENDIX E. Supplemental Bacterial Abundance Charts

Aged Soil Evidence Study

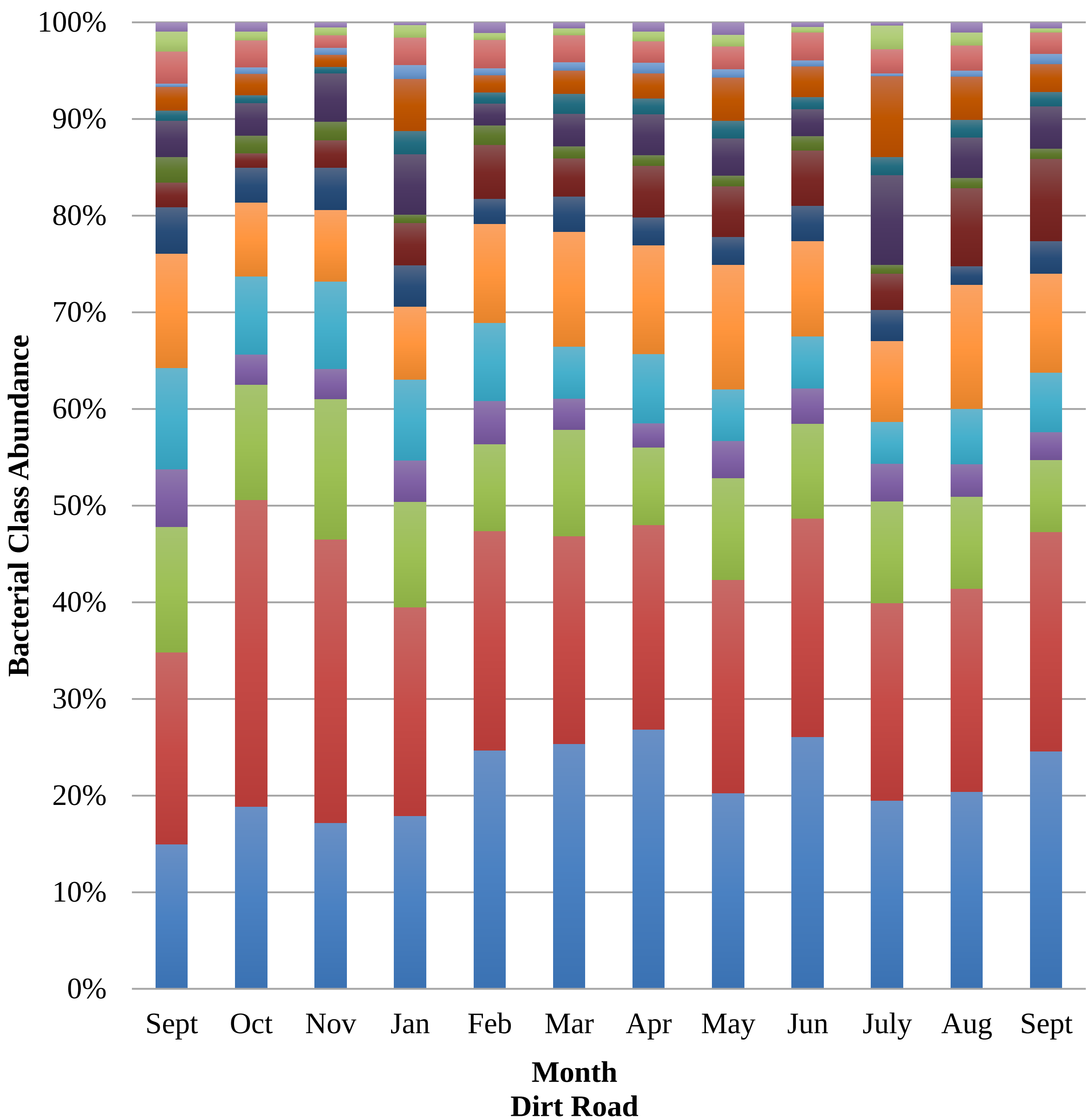


Figure E1. Bacterial class abundance changes from dirt road t-shirt soil collections over one year. T-shirts were stored at 24°C.

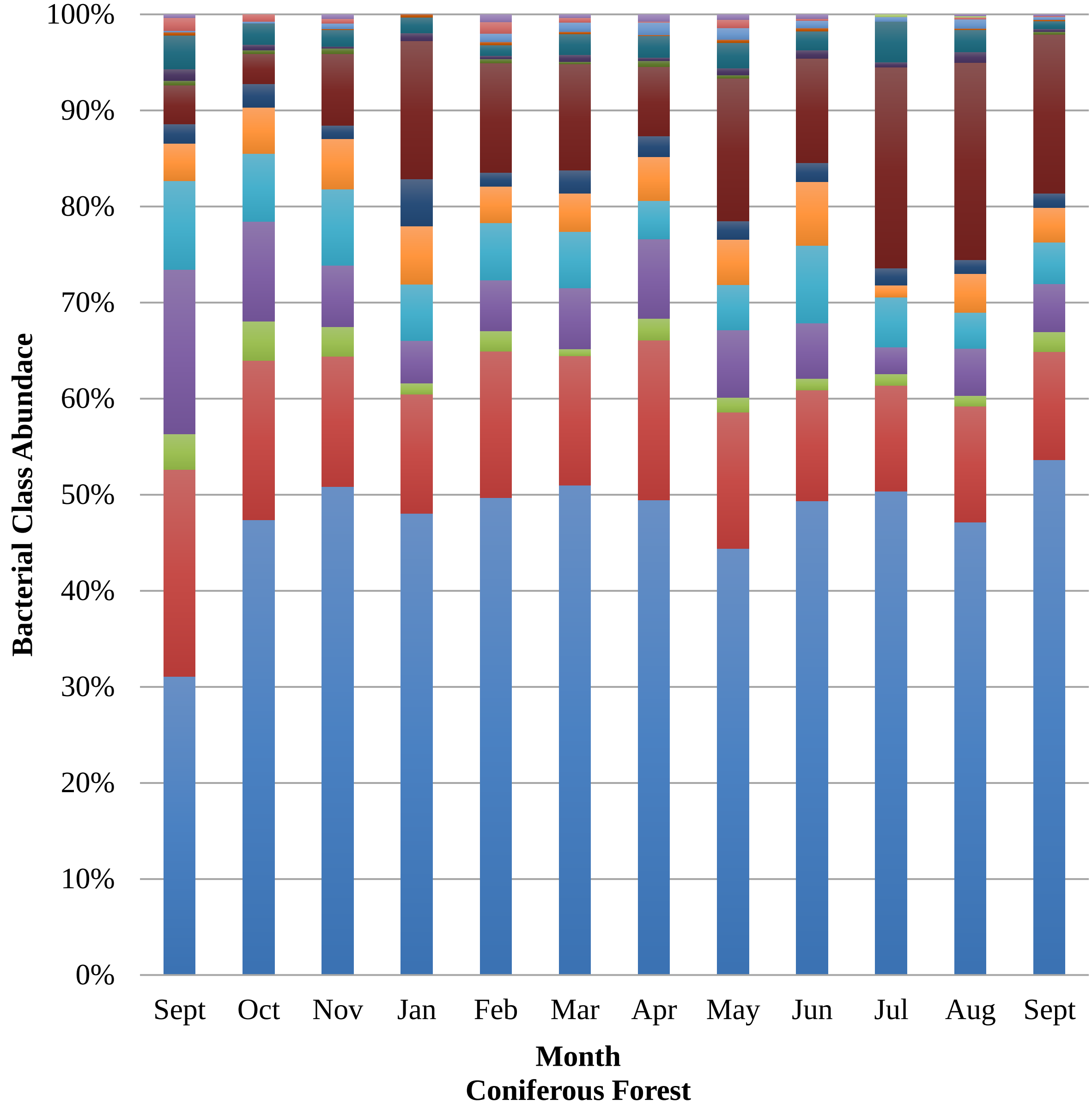


Figure E2. Bacterial class abundance changes coniferous forest t-shirt soil collections over one year. T-shirts were stored at 24°C.

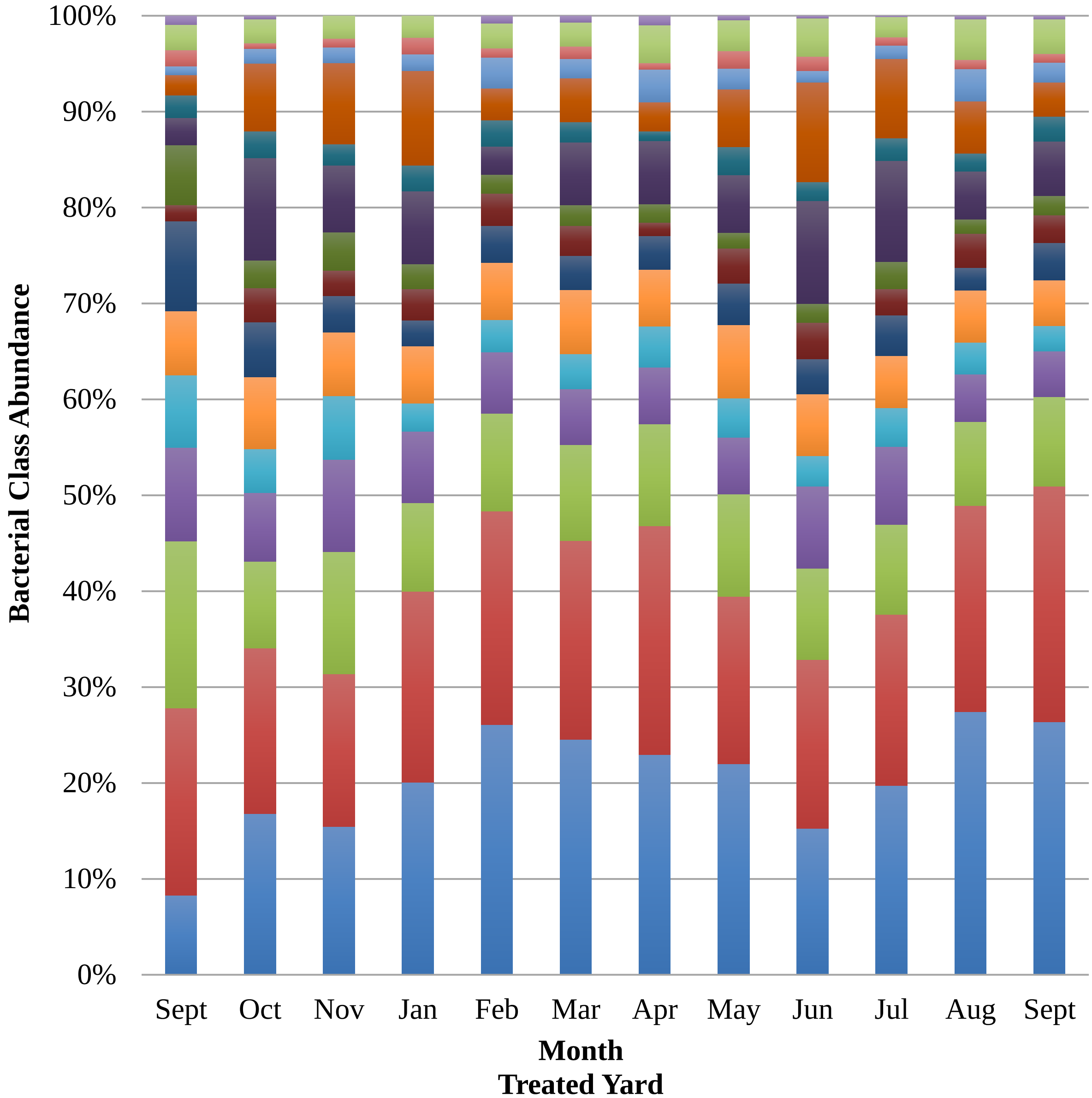


Figure E3. Bacterial class abundance changes from treated yard t-shirt soil collections over one year. T-shirts were stored at 24°C.

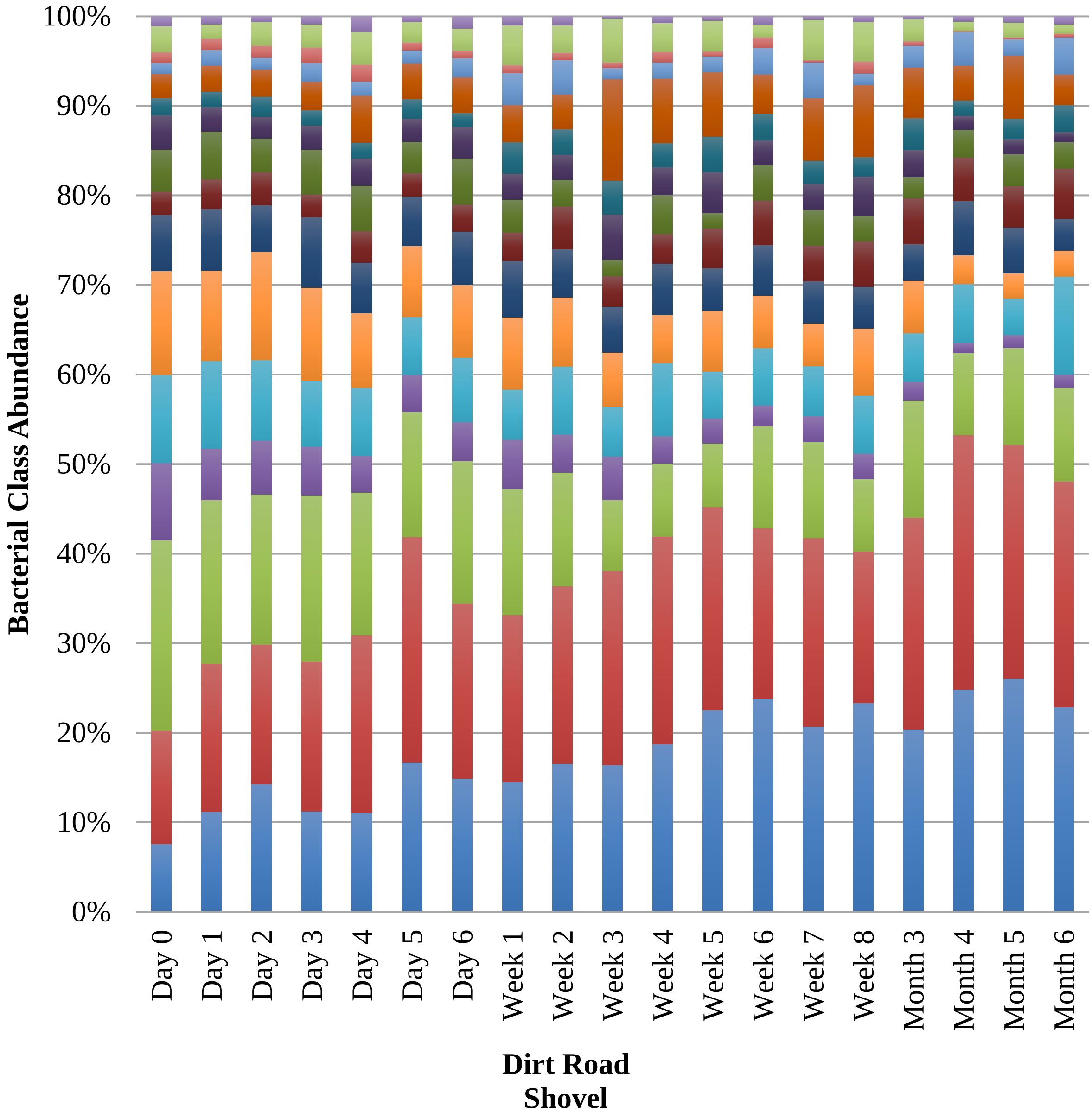


Figure E4. Bacterial class abundance changes from dirt road soil collected daily for one week, weekly for two months, and monthly up to six months from a shovel.

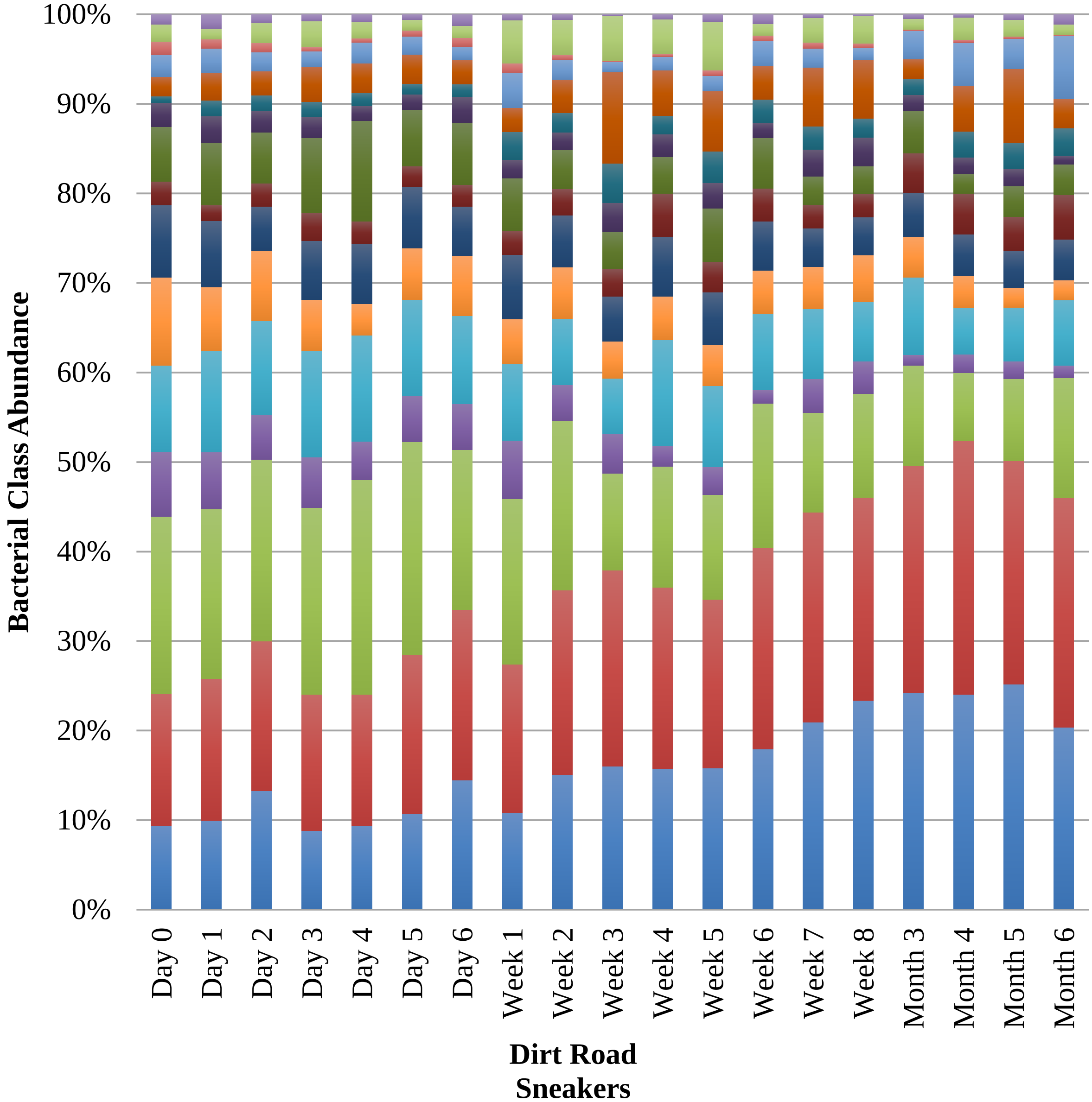


Figure E5. Bacterial class abundance changes from dirt road soil collected daily for one week, weekly for two months, and monthly up to six months from sneakers.

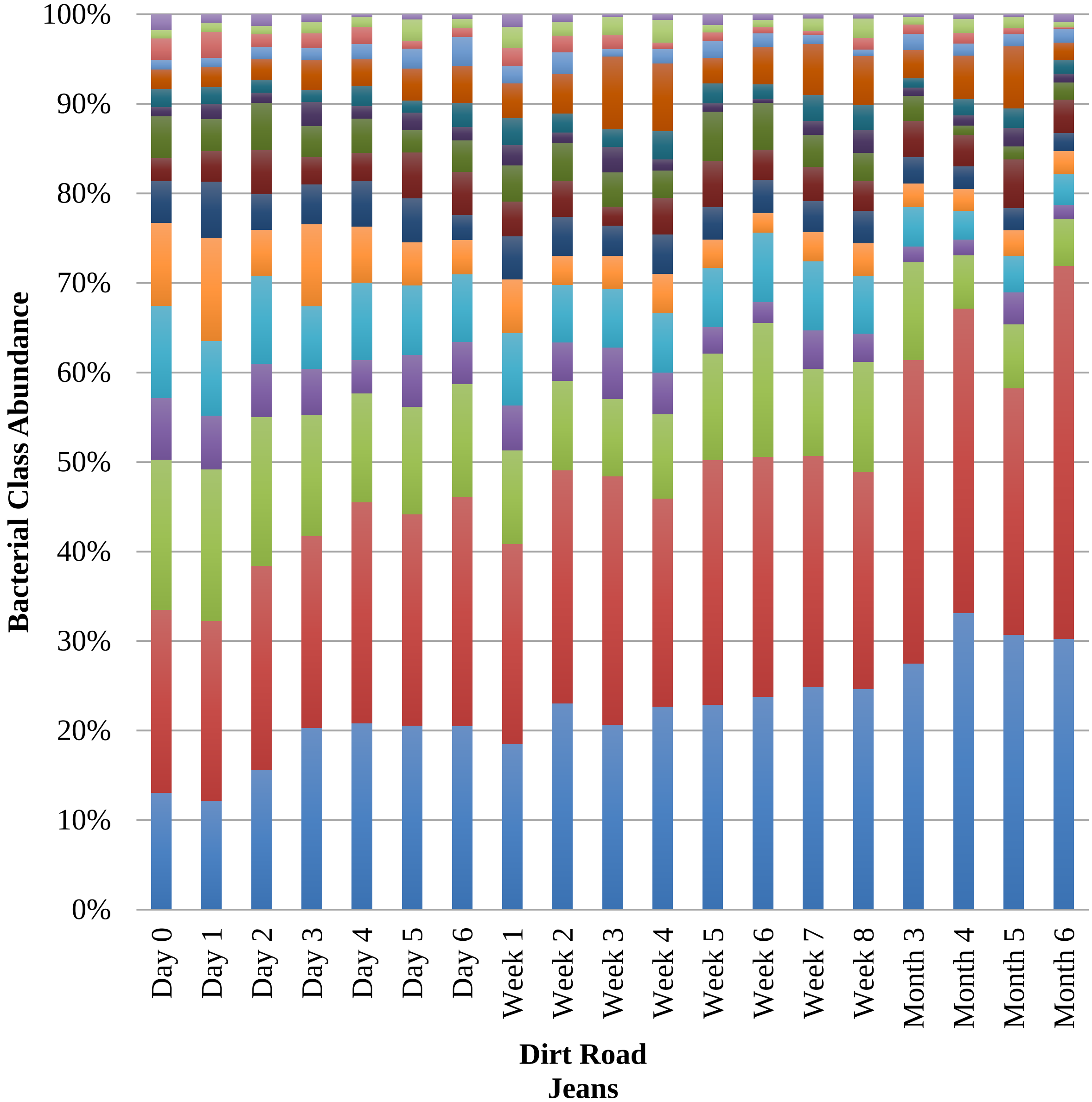


Figure E6. Bacterial class abundance changes from dirt road soil collected daily for one week, weekly for two months, and monthly up to six months from jeans.

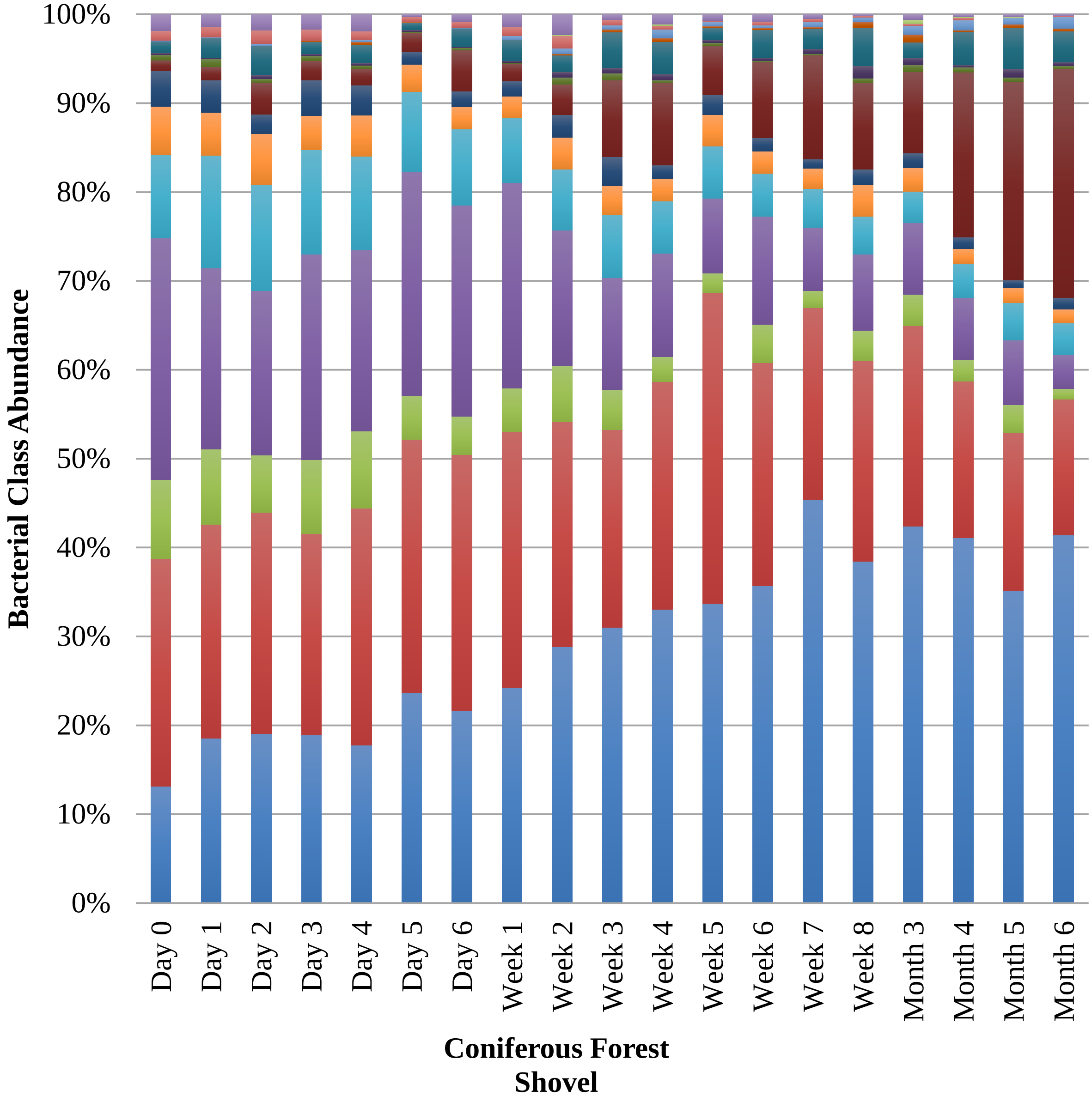


Figure E7. Bacterial class abundance changes from coniferous forest soil collected daily for one week, weekly for two months, and monthly up to six months from a shovel.

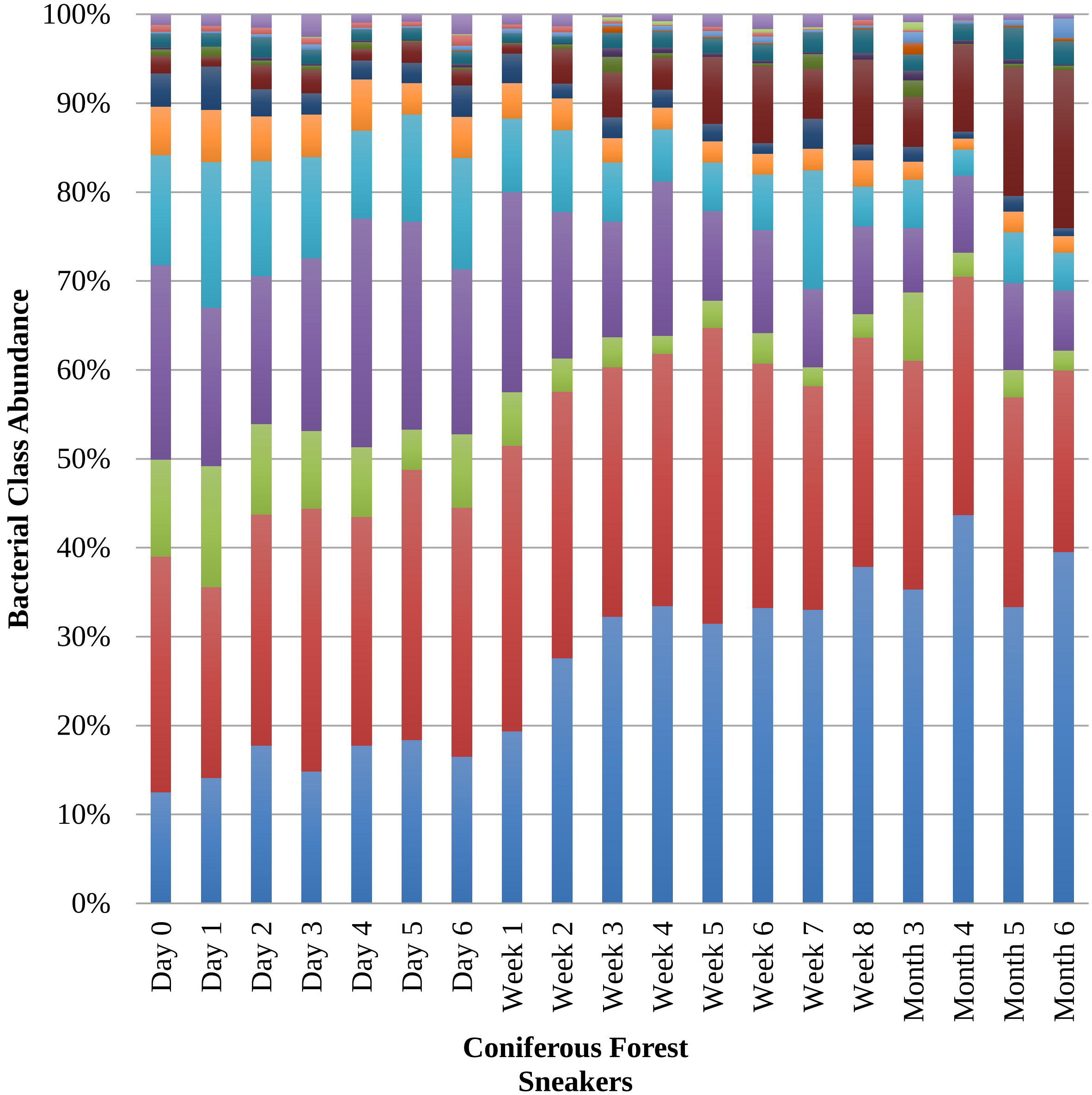


Figure E8. Bacterial class abundance changes from coniferous forest soil collected daily for one week, weekly for two months, and monthly up to six months from sneakers.

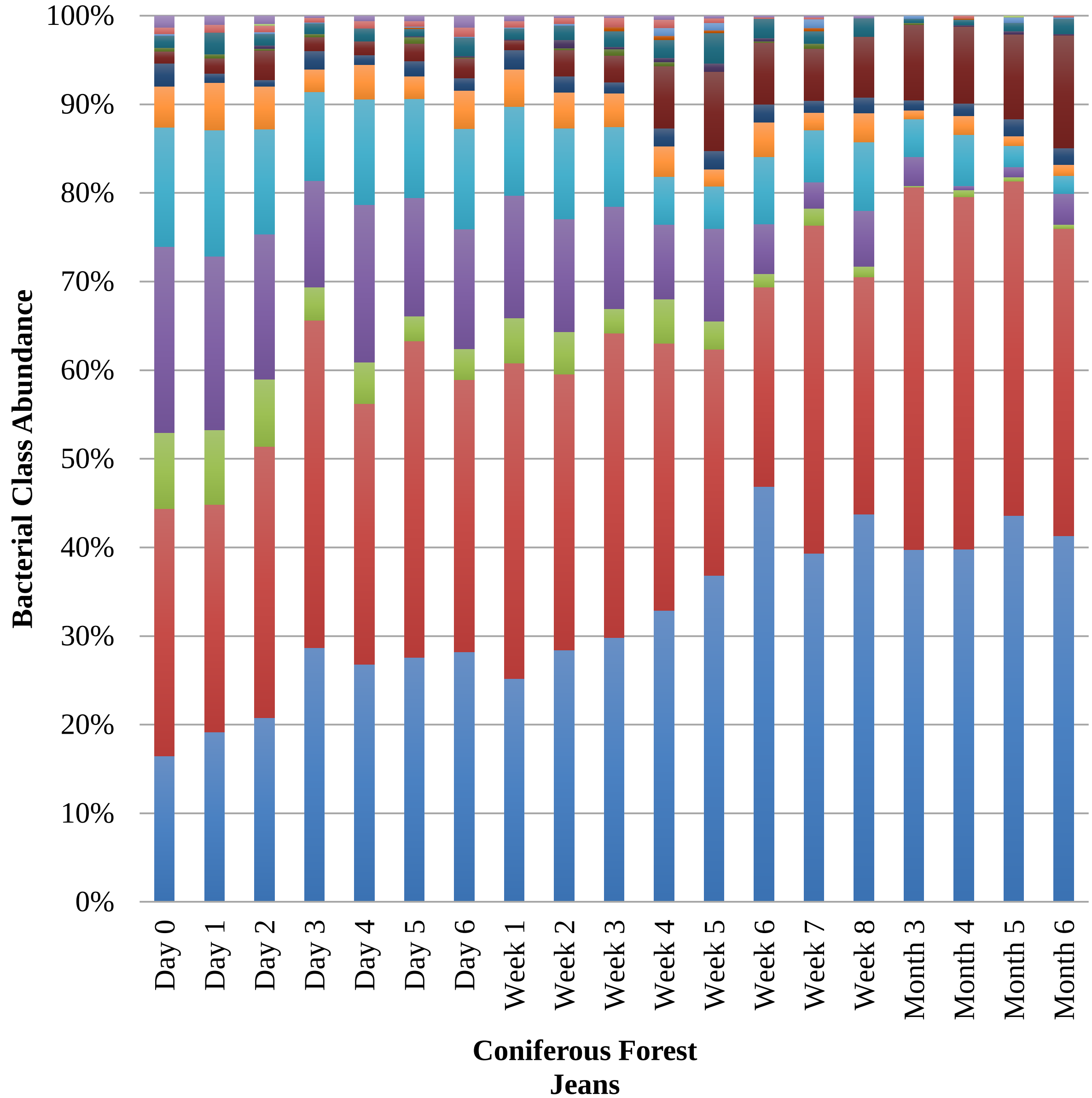


Figure E9. Bacterial class abundance changes from coniferous forest soil collected daily for one week, weekly for two months, and monthly up to six months from jeans.

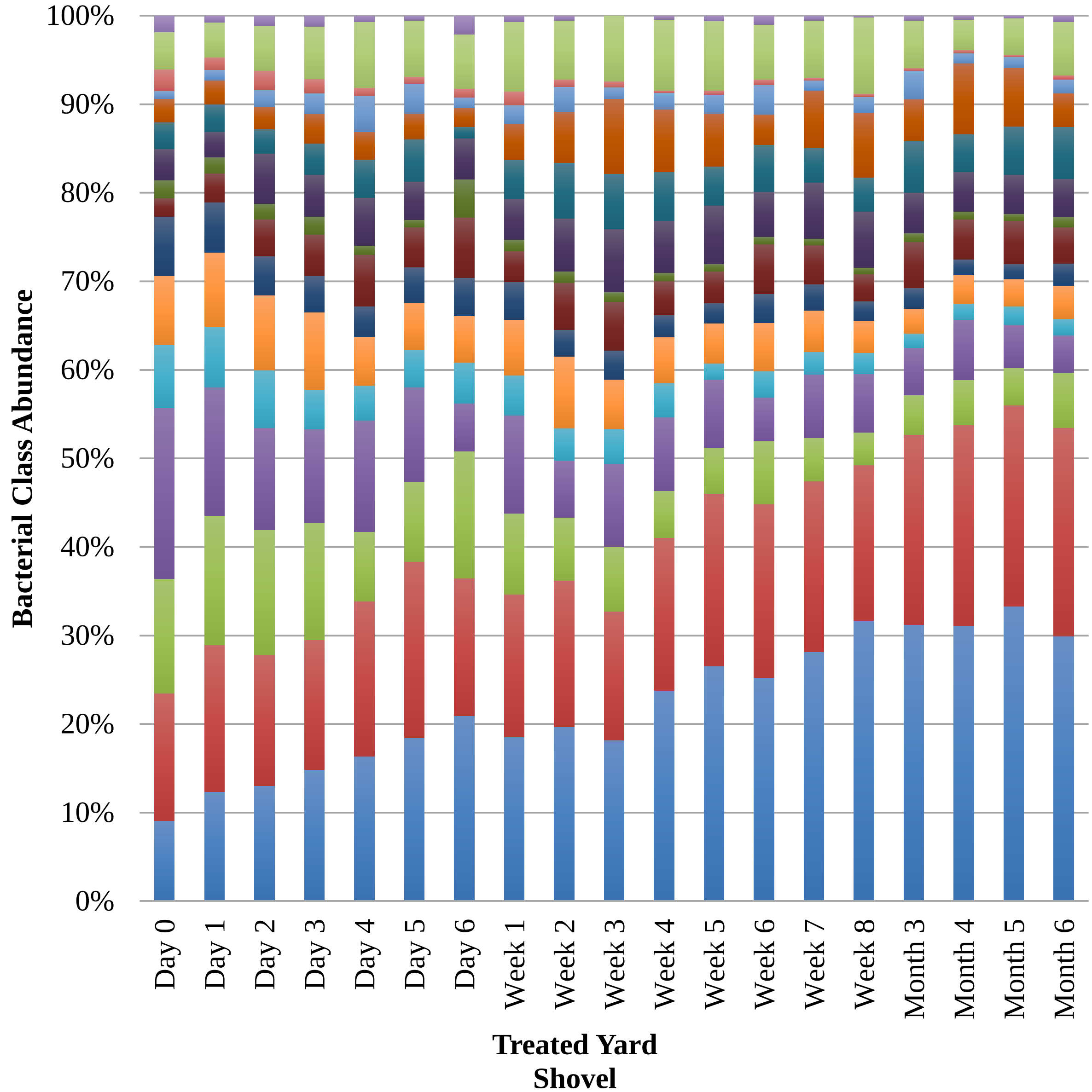


Figure E10. Bacterial class abundance changes from treated yard soil collected daily for one week, weekly for two months, and monthly up to six months from a shovel.

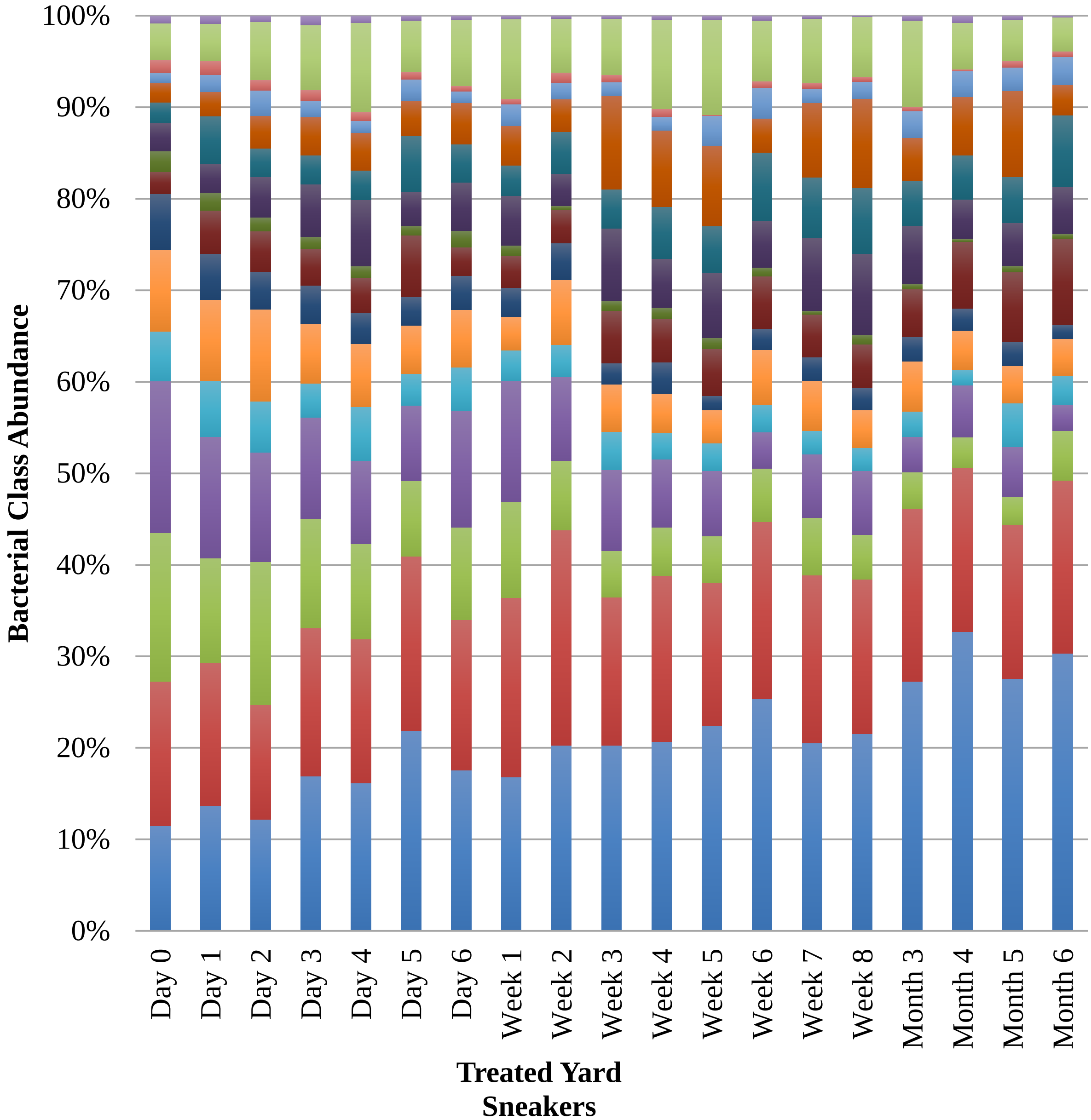


Figure E11. Bacterial class abundance changes from treated yard soil collected daily for one week, weekly for two months, and monthly up to six months from sneakers.

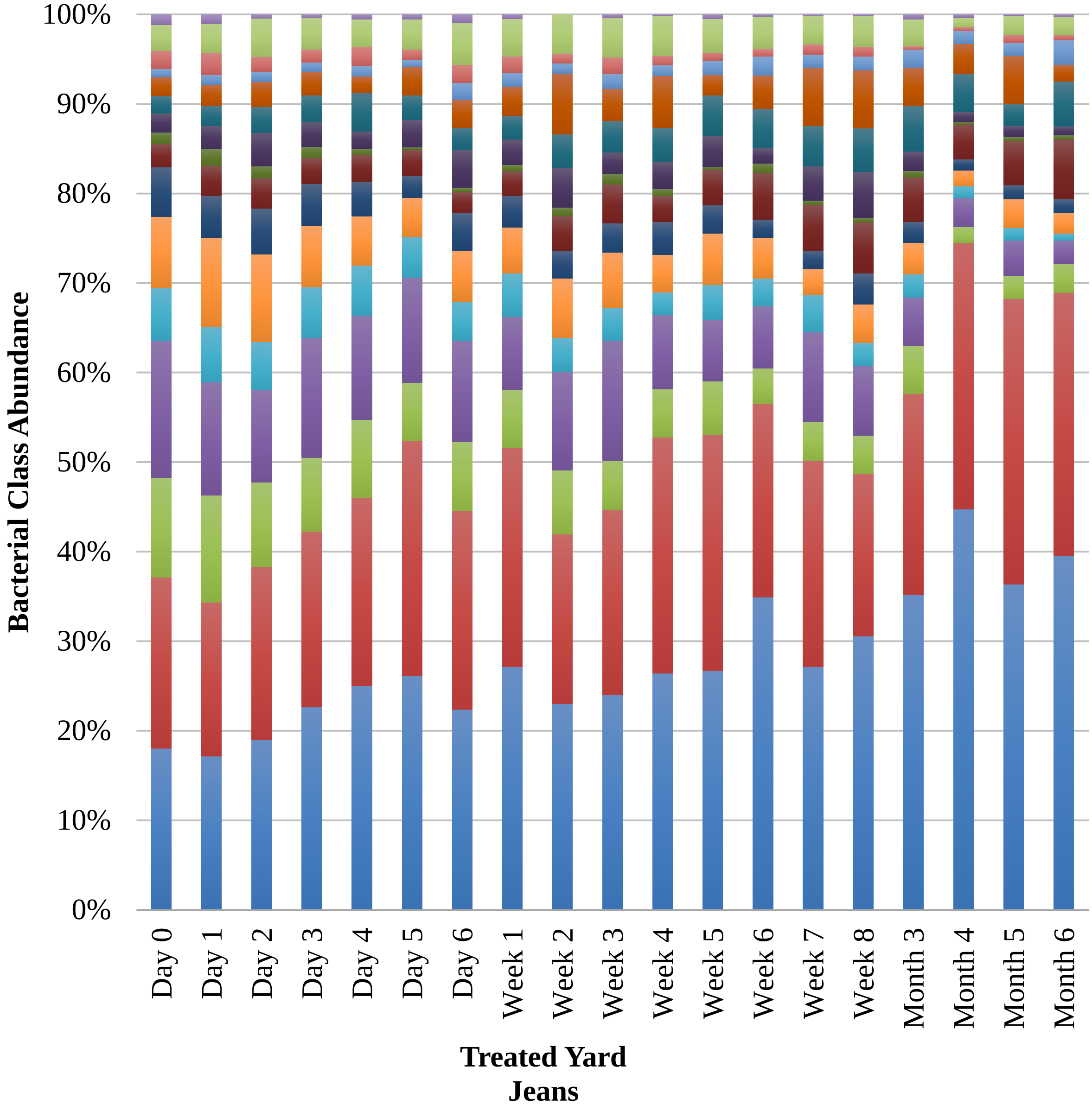


Figure E12. Bacterial class abundance changes from treated yard soil collected daily for one week, weekly for two months, and monthly up to six months from jeans.

Storage Temperature Study

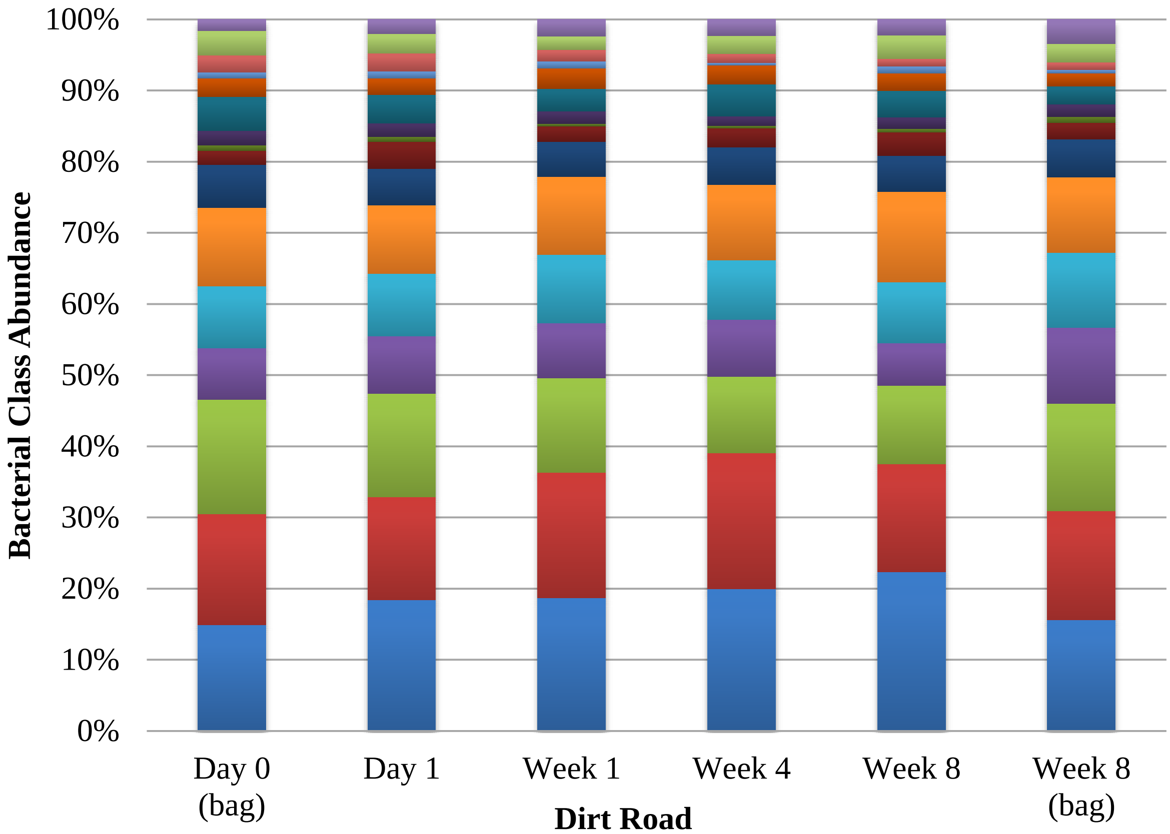


Figure E13. Bacterial class abundance changes from dirt road soils stored at room temperature. Soils were placed in open weigh boats on day zero. The bacterial composition of Day 0 and Week 8 soils kept in the bag were similar.

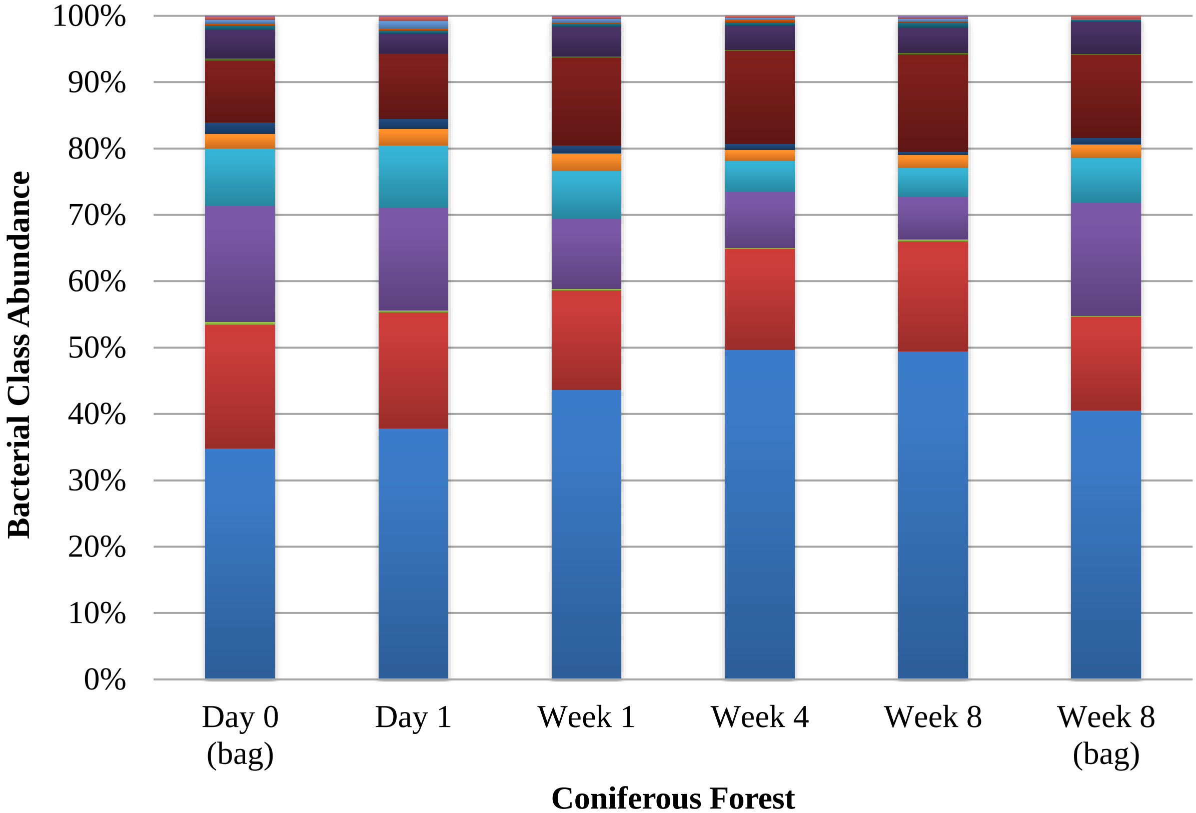


Figure E14. Bacterial class abundance changes from coniferous forest soils stored at room temperature. Soils were placed in open weigh boats on day zero. The bacterial composition of Day 0 and Week 8 soils kept in the bag were similar.

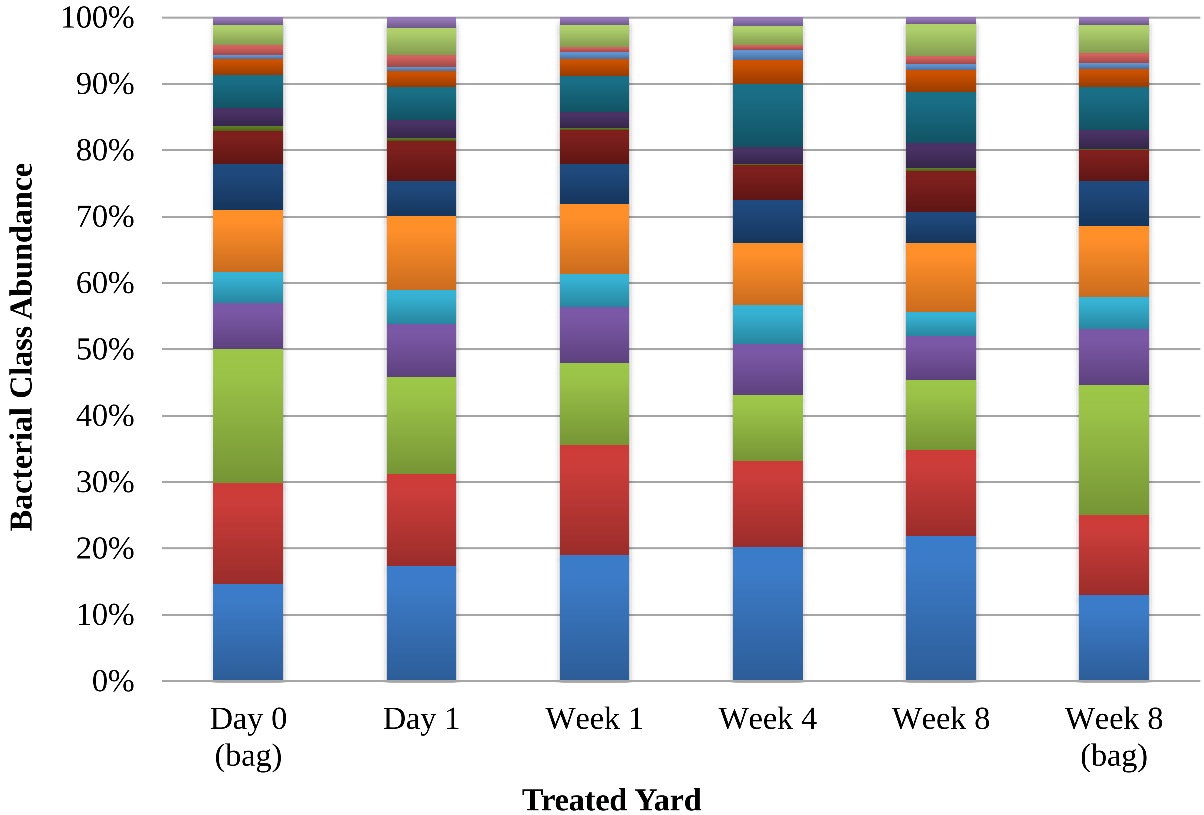


Figure E15. Bacterial class abundance changes from treated yard soils stored at room temperature. Soils were placed in open weigh boats on day zero. The bacterial composition of Day 0 and Week 8 soils kept in the bag were similar.

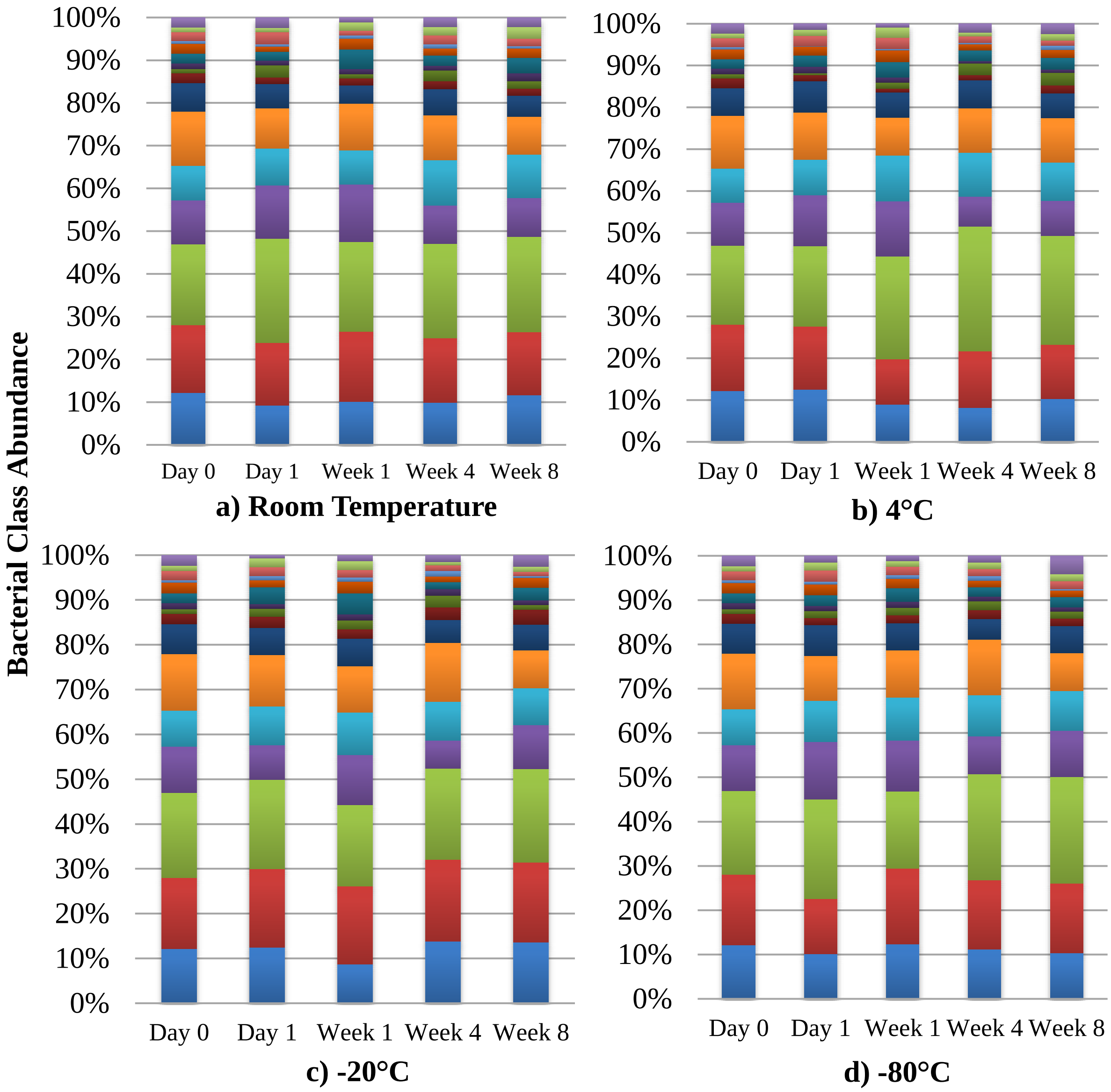


Figure E16. Bacterial composition of dirt road soils stored at room temperature, 4°C, -20°C, and -80°C. The bacterial composition of soils stored at the four temperatures did not change appreciatively.

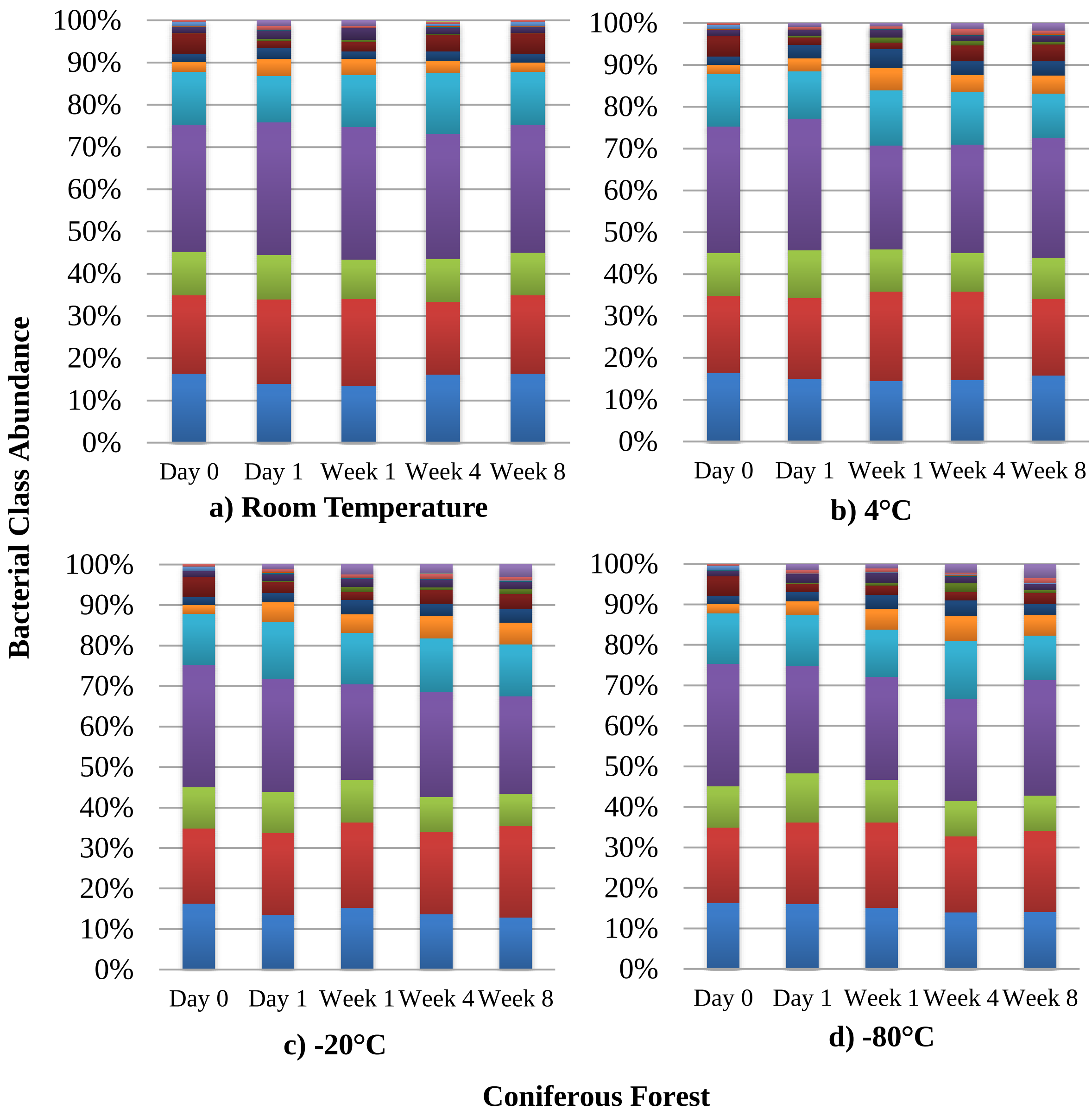


Figure E17. Bacterial composition of coniferous forest soils stored at room temperature, 4°C, -20°C, and -80°C. The bacterial composition of soils stored at the four temperatures did not change appreciatively.

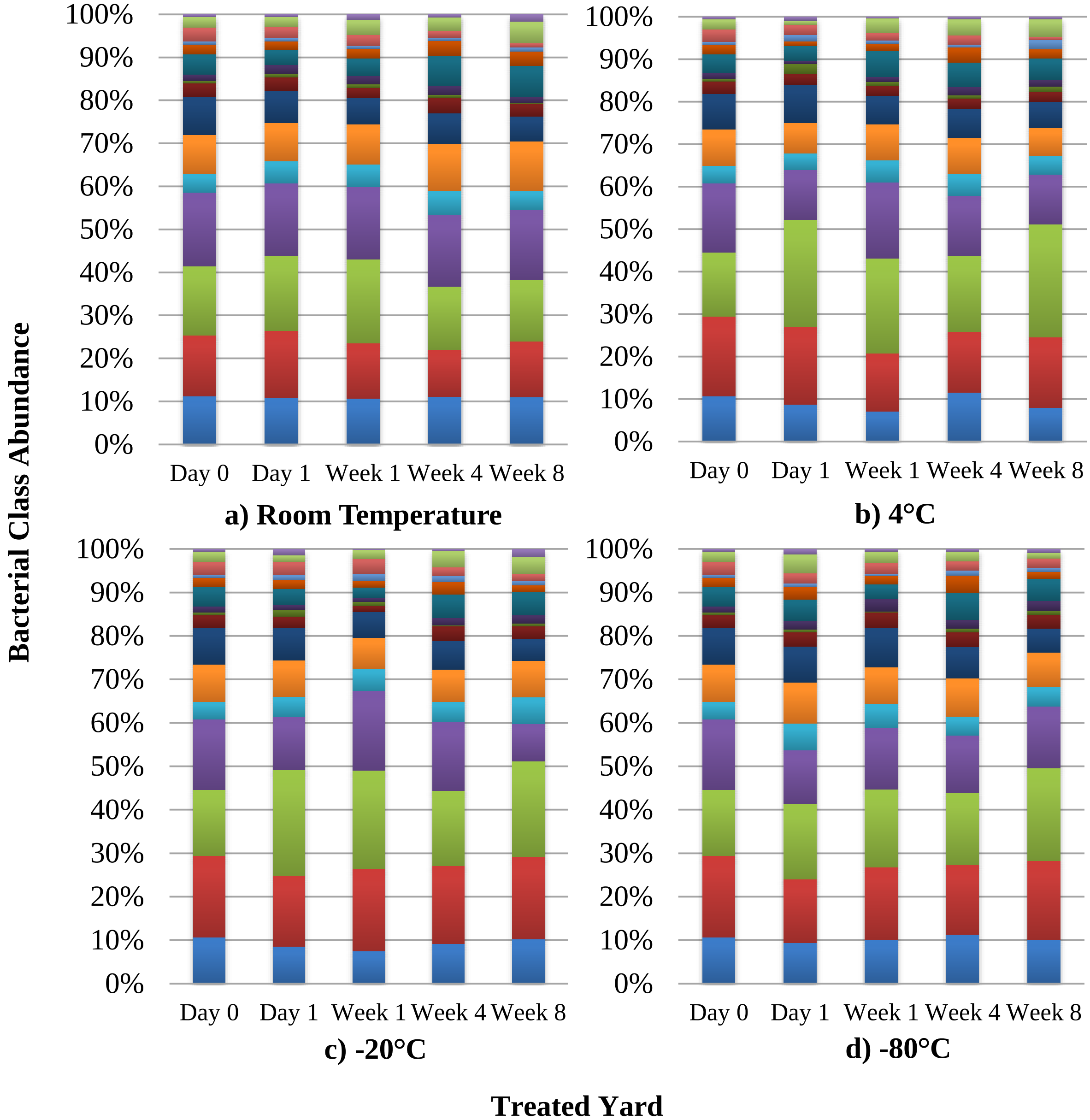


Figure E18. Bacterial composition of treated yard soils stored at room temperature, 4°C, -20°C, and -80°C. The bacterial composition of soils stored at the four temperatures did not change appreciatively.

Sensitivity Study

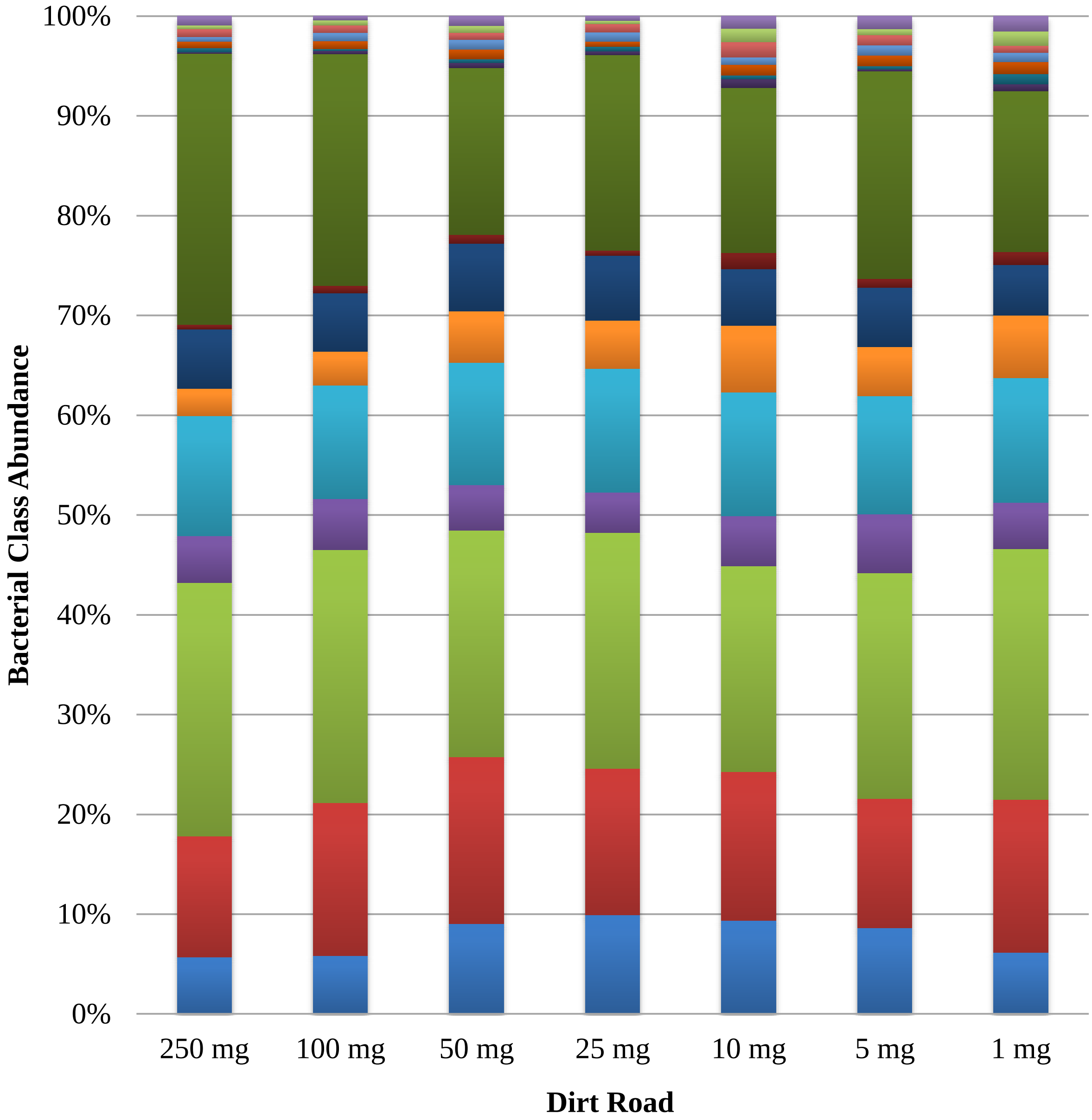


Figure E19. Bacterial class abundance from differing masses of dirt road soils. Bacterial profiles maintained a similar bacterial composition as the mass of soil decreased.

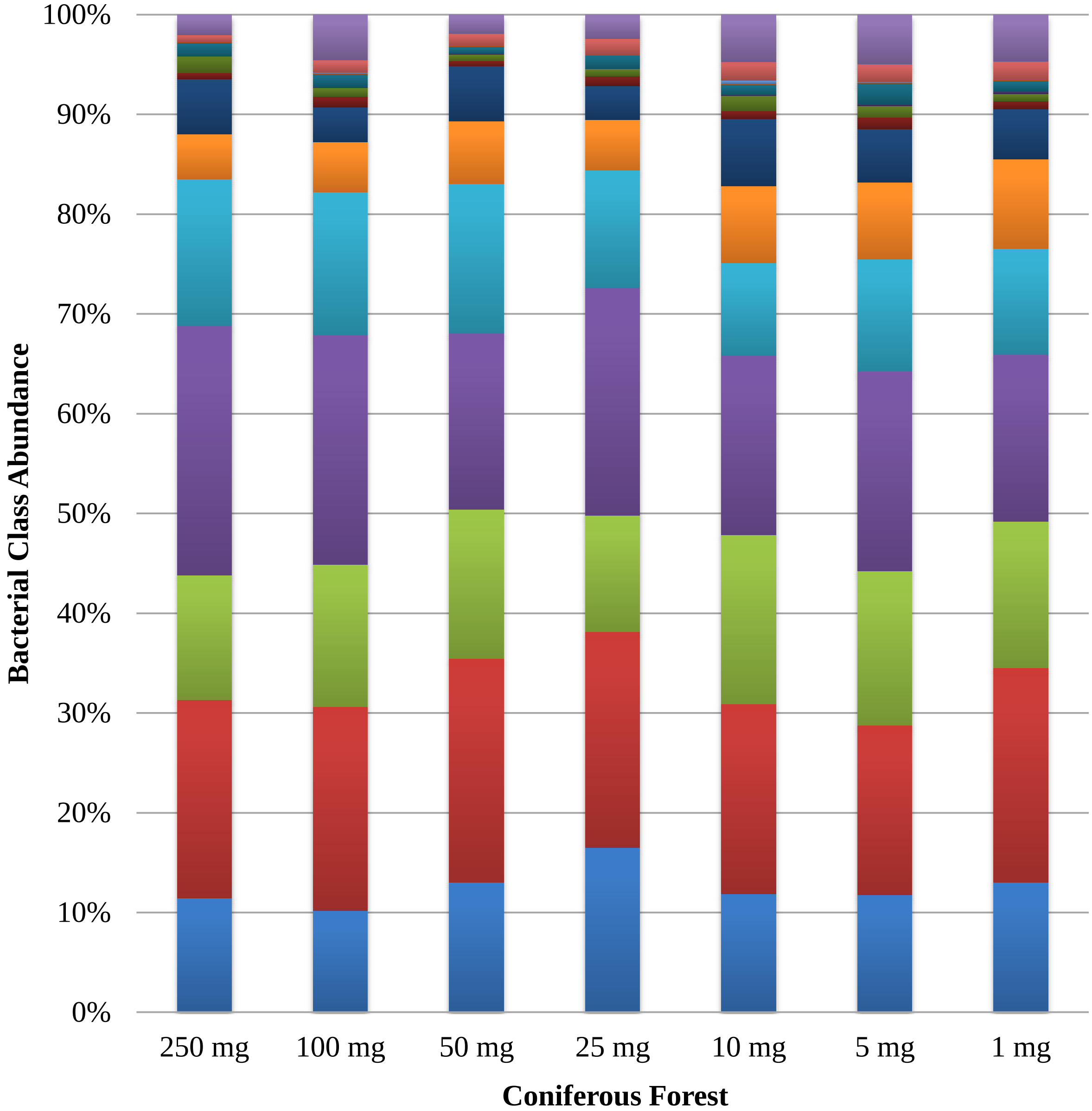


Figure E20. Bacterial class abundance from differing masses of coniferous forest soils. Bacterial profiles maintained a similar bacterial composition as the mass of soil decreased.

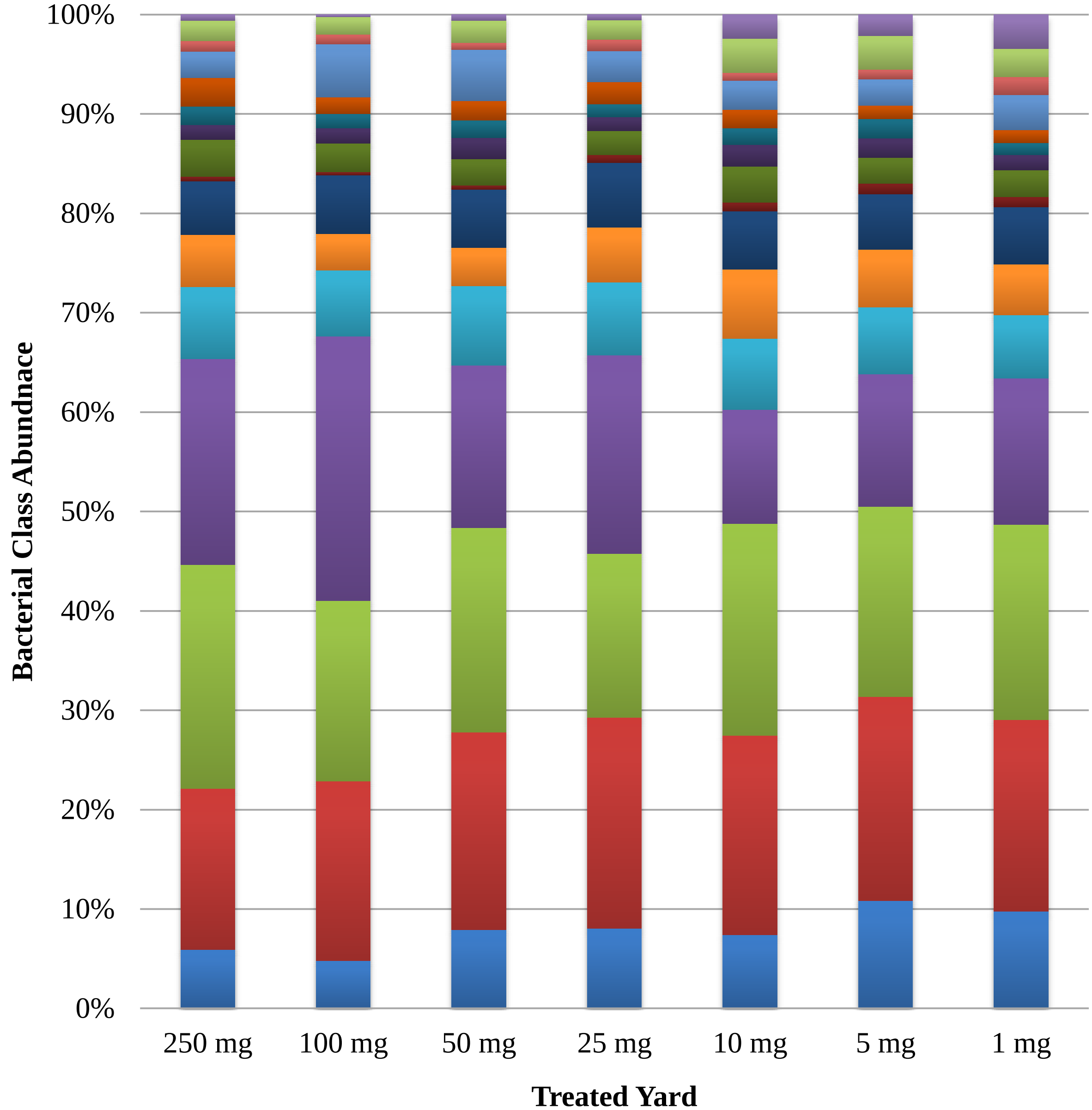


Figure E21. Bacterial class abundance from differing masses of treated yard soils. Bacterial profiles maintained a similar bacterial composition as the mass of soil decreased.

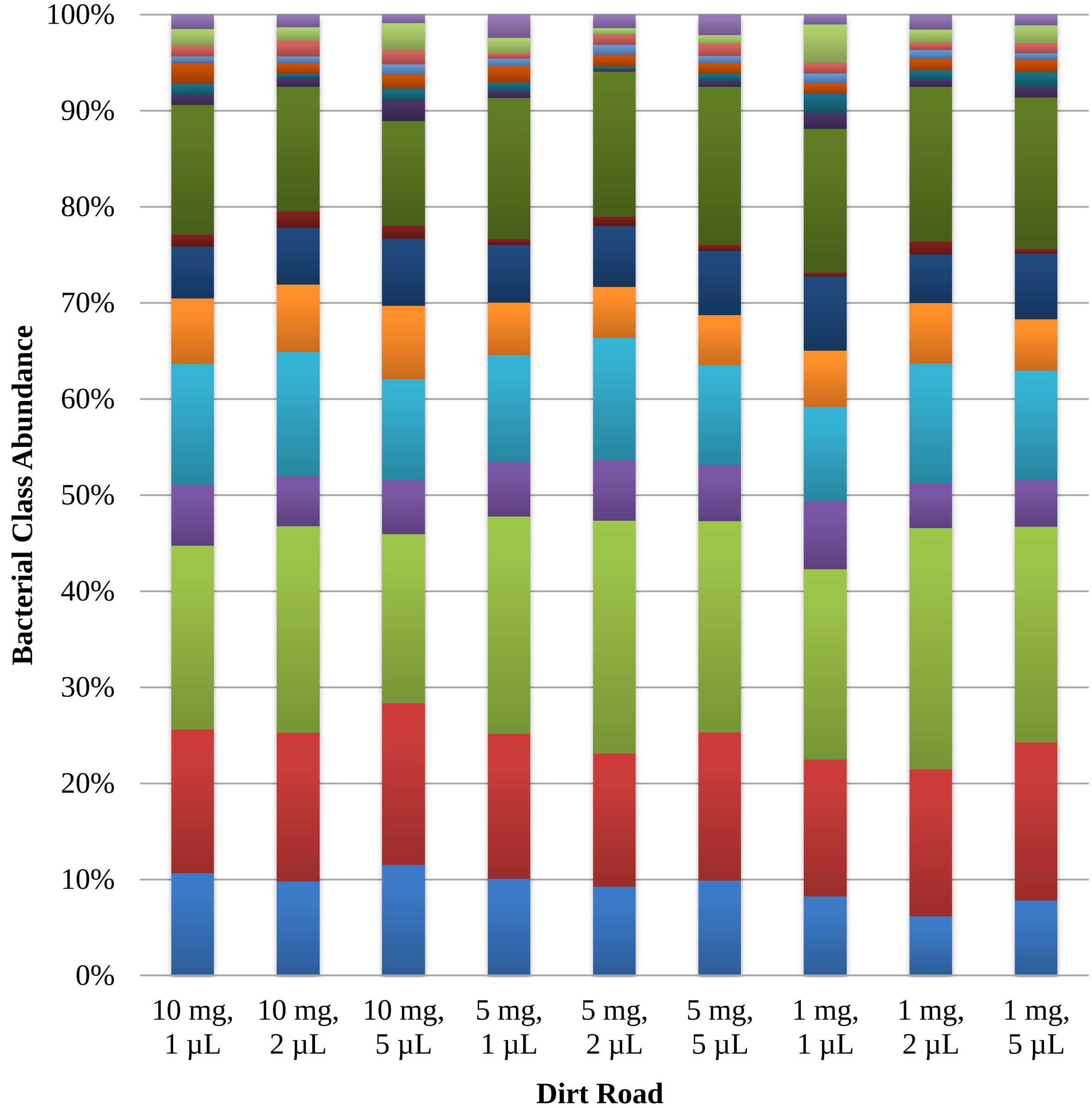


Figure E22. Bacterial class abundance from 10, 5, and 1 mg soils amplified with 1, 2, and 5 µL of DNA from the dirt road. Bacterial profiles were similar among the three input DNA volumes for each soil mass.

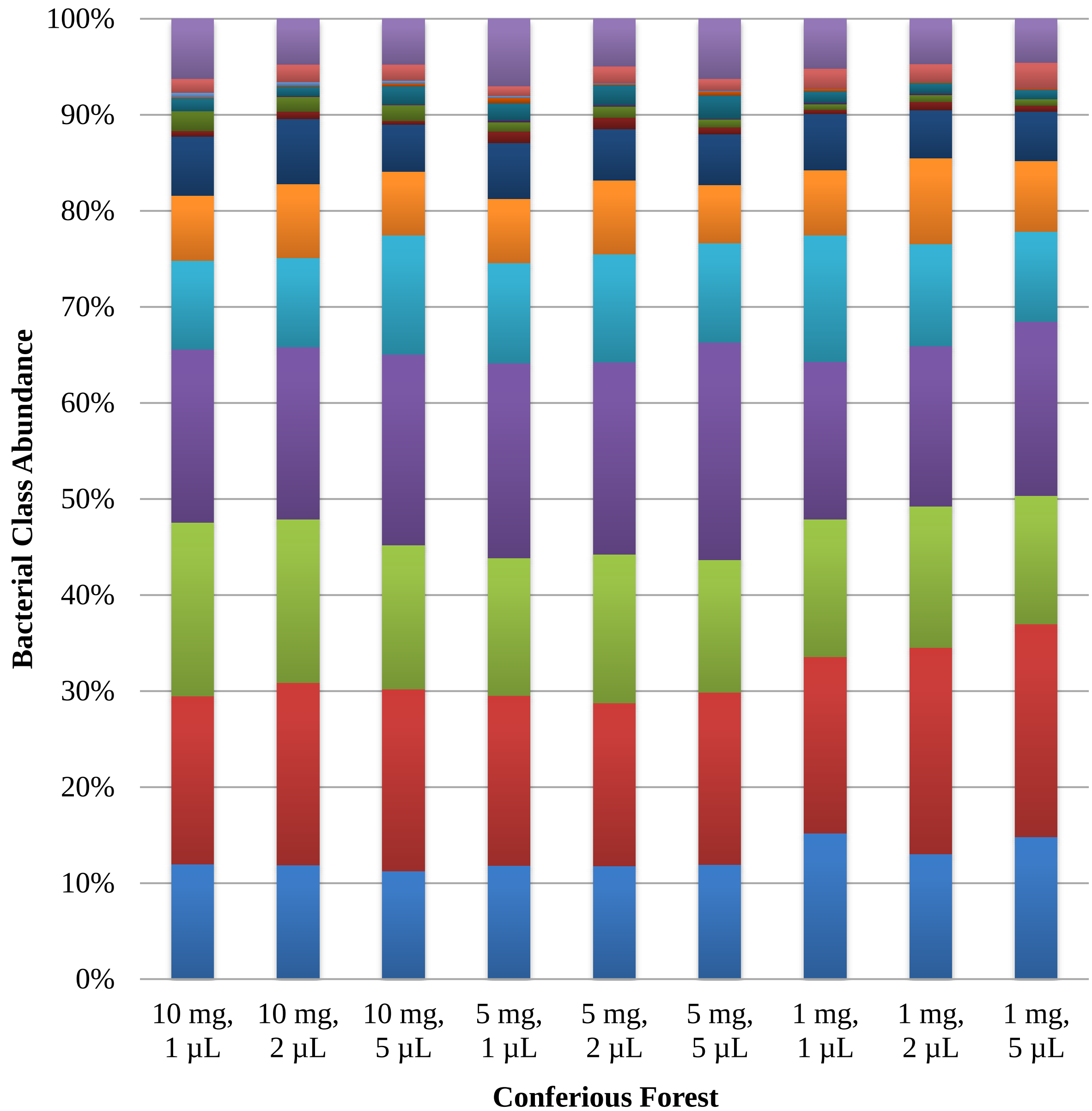


Figure E23. Bacterial class abundance from 10, 5, and 1 mg soils amplified with 1, 2, and 5 µL of DNA from the coniferous forest. Bacterial profiles were similar among the three input DNA volumes for each soil mass.

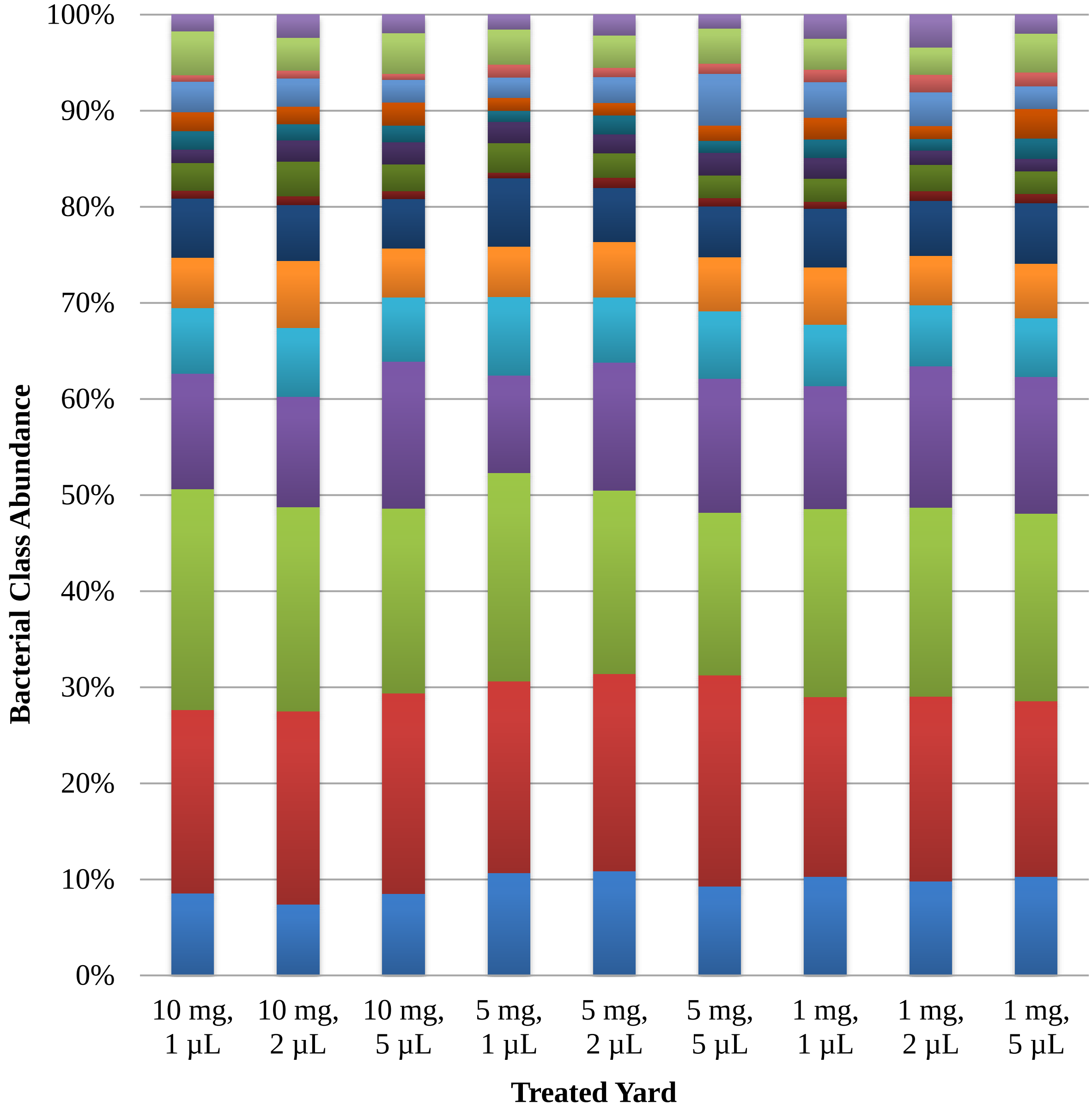


Figure E24. Bacterial class abundance from 10, 5, and 1 mg soils amplified with 1, 2, and 5 µL of DNA from the treated yard. Bacterial profiles were similar among the three input DNA volumes for each soil mass.

APPENDIX F. Supplemental Nonmetric Multidimensional Scaling Plots

Aged Soil Evidence Study

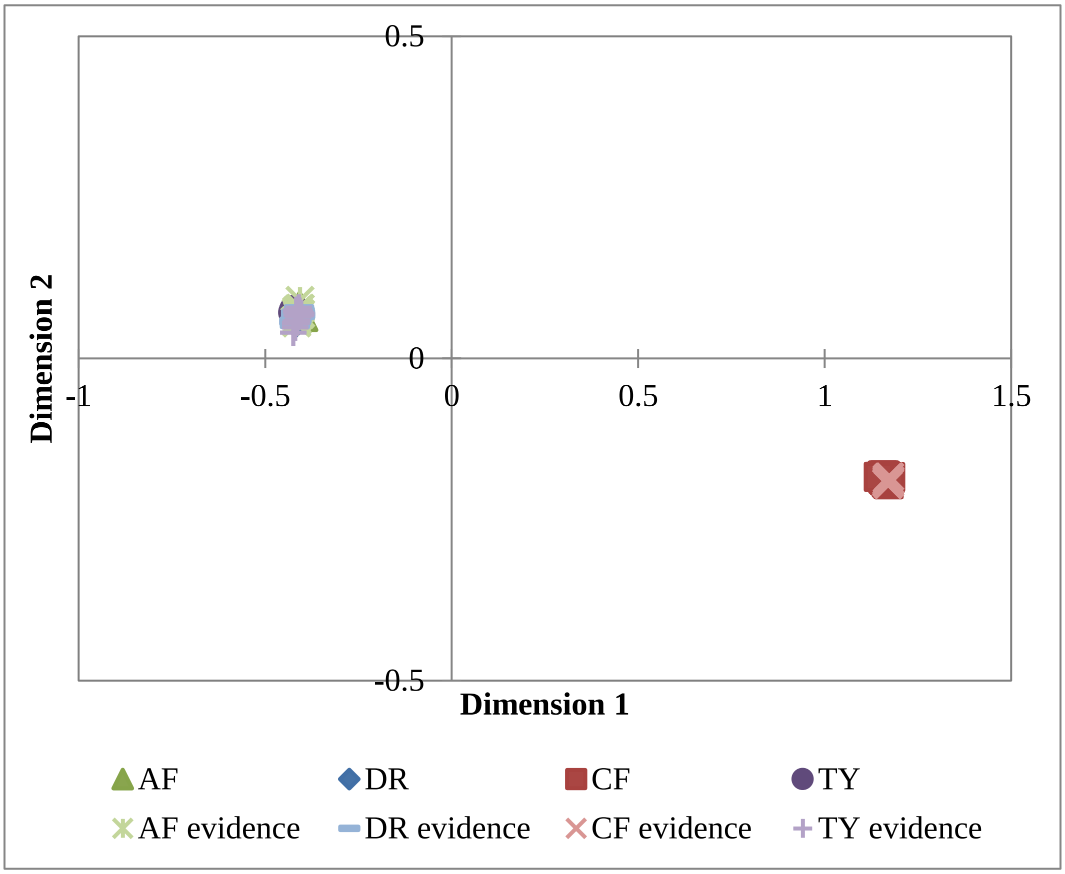


Figure F1. Habitat of origin ordination via NMDS (Kruskal's stress = 0.015) of soil evidence collected daily for one week from shovels, sneakers, and jeans (line symbols; n = 21 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

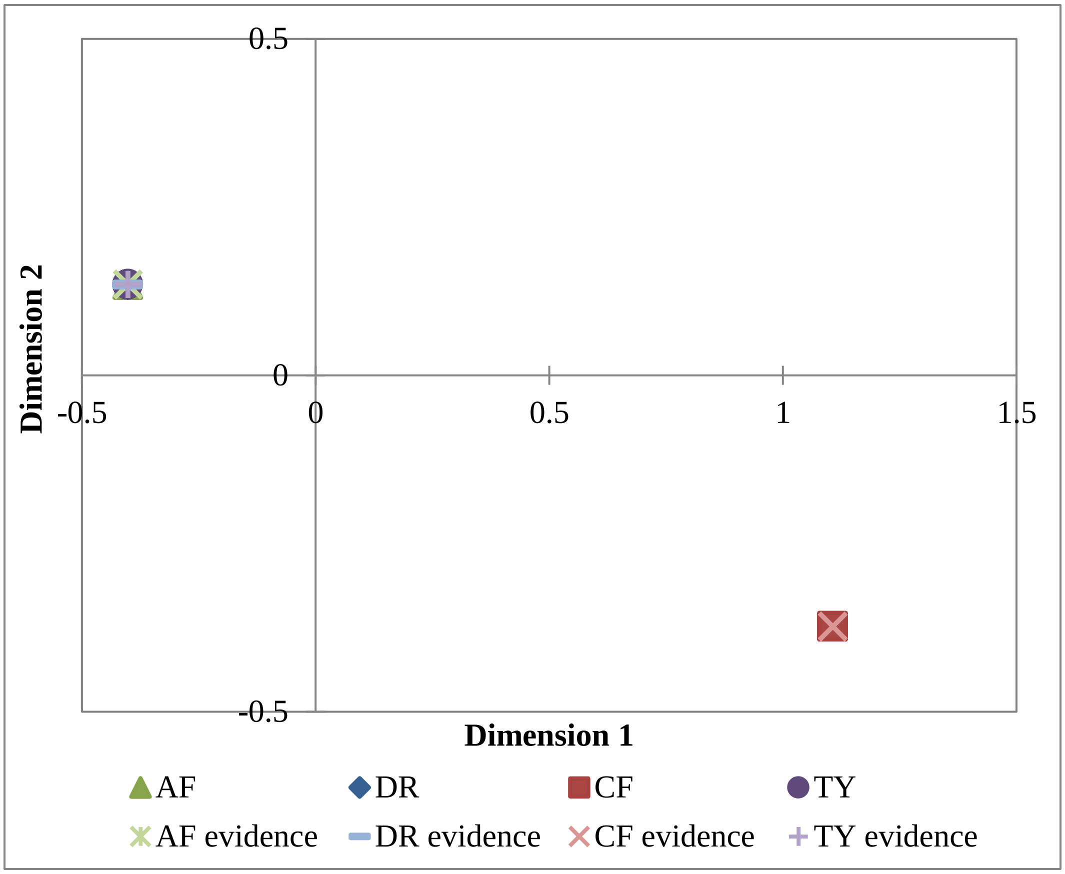


Figure F2. Habitat of origin ordination via NMDS (Kruskal's stress = 0.000) of soil evidence collected weekly for one month from shovels, sneakers, and jeans (line symbols; n = 12 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Bacterial profiles from the coniferous forest were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

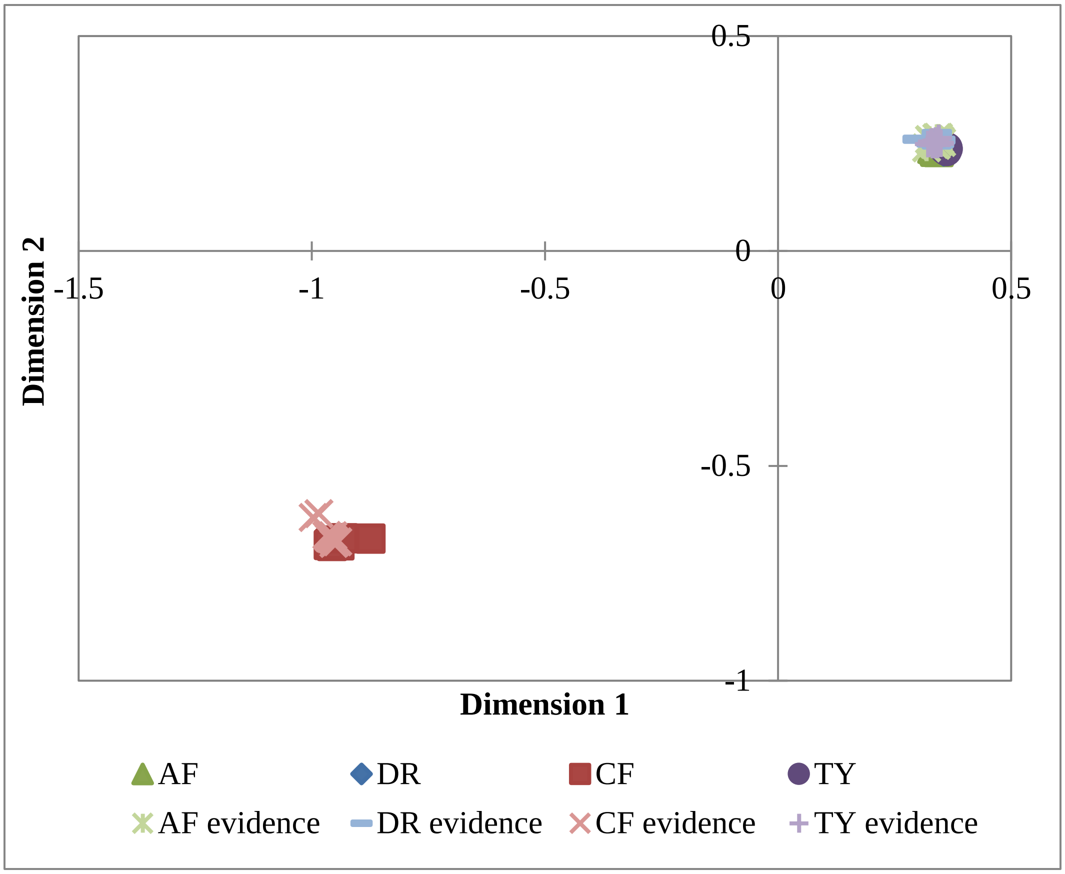


Figure F3. Habitat of origin ordination via NMDS (Kruskal's stress = 0.027) of soil evidence collected weekly during weeks 5 – 8 from shovels, sneakers, and jeans (line symbols; n = 12 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). The bacterial profiles from the coniferous forest were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

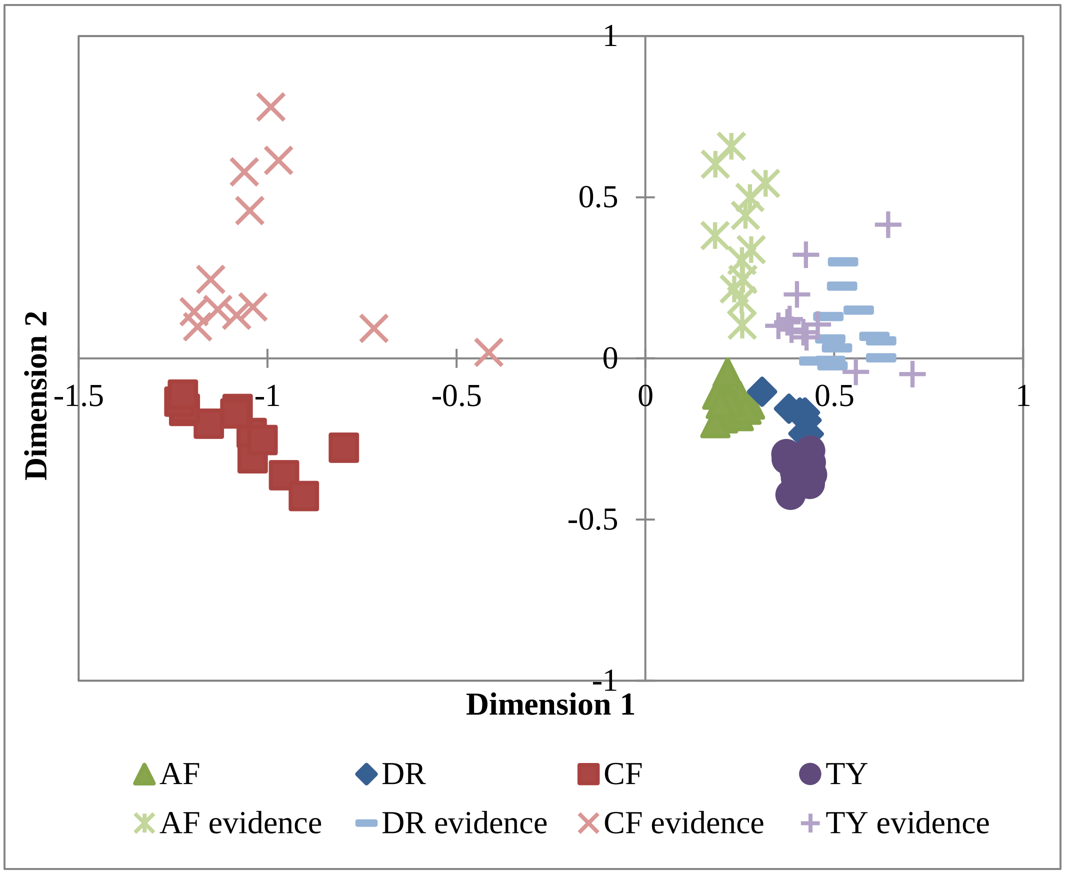


Figure F4. Habitat of origin ordination via NMDS (Kruskal's stress = 0.126) of soil evidence collected monthly from three to six months on shovels, sneakers, and jeans (line symbols; n = 12 per habitat). Training set soils (geometric symbols) were collected from each habitat in April 2015 (n = 13 per habitat, except dirt road n = 7). Profiles from the evidence drifted away from their habitat, including the coniferous forest soils. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

Storage Temperature Study

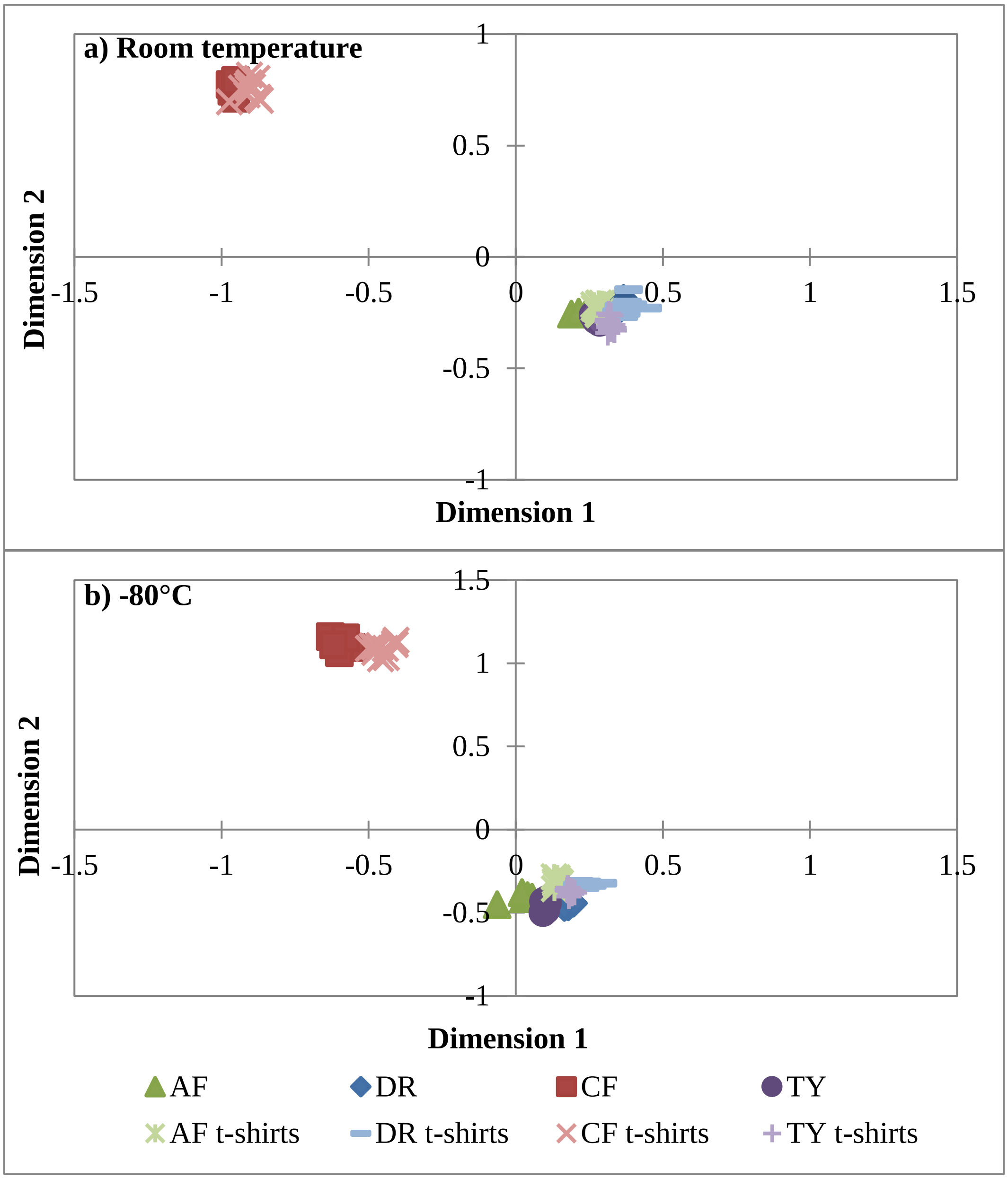


Figure F5. Habitat of origin ordination of t-shirt soils collected over one year (line symbols; n = 12 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.055 and 0.047, respectively). Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

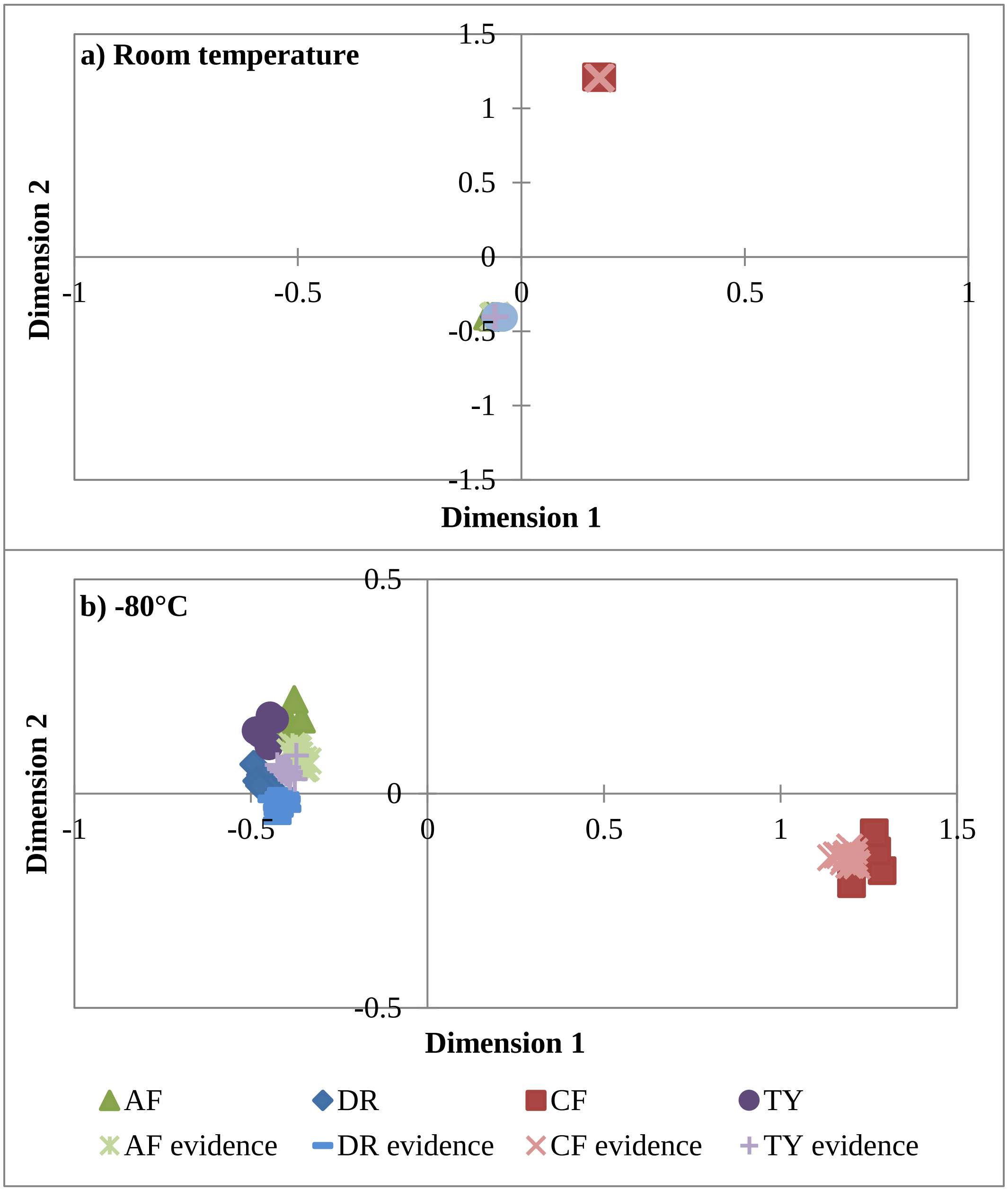


Figure F6. Habitat of origin ordination of soil evidence collected daily for one week from shovels, sneakers, and jeans (line symbols; n = 21 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.014 and 0.042, respectively). Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY

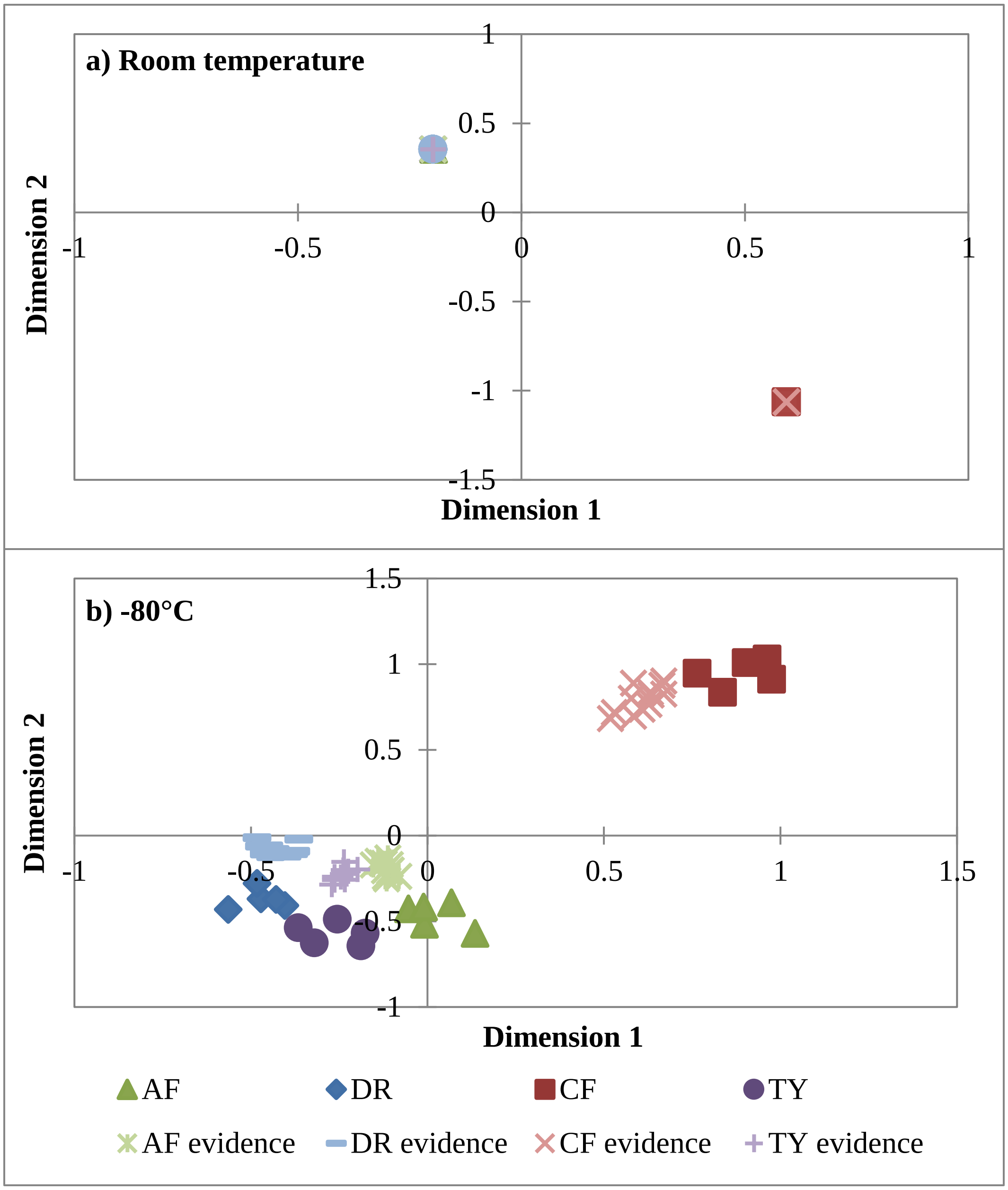


Figure F7. Habitat of origin ordination of soil evidence collected weekly for one month from shovels, sneakers, and jeans (line symbols; n = 21 per habitat) and training set soils (geometric symbols) at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.000 and 0.098, respectively). Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

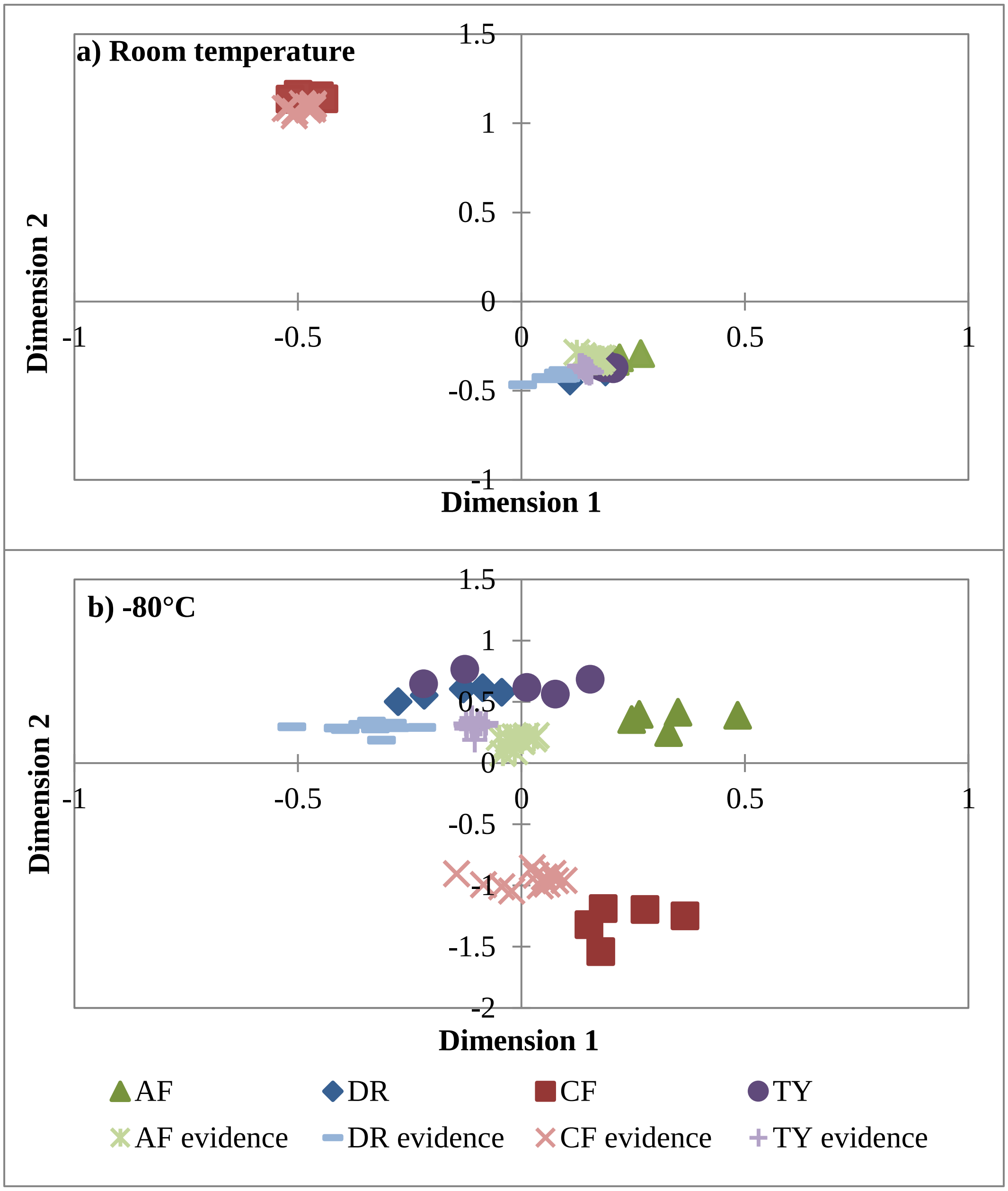


Figure F8. Habitat of origin ordination of soils collected weekly during weeks 5 – 8 from shovels, sneakers, and jeans (line symbols; n = 21 per habitat) and training set soils (geometric symbols) stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.040 and 0.100, respectively). Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

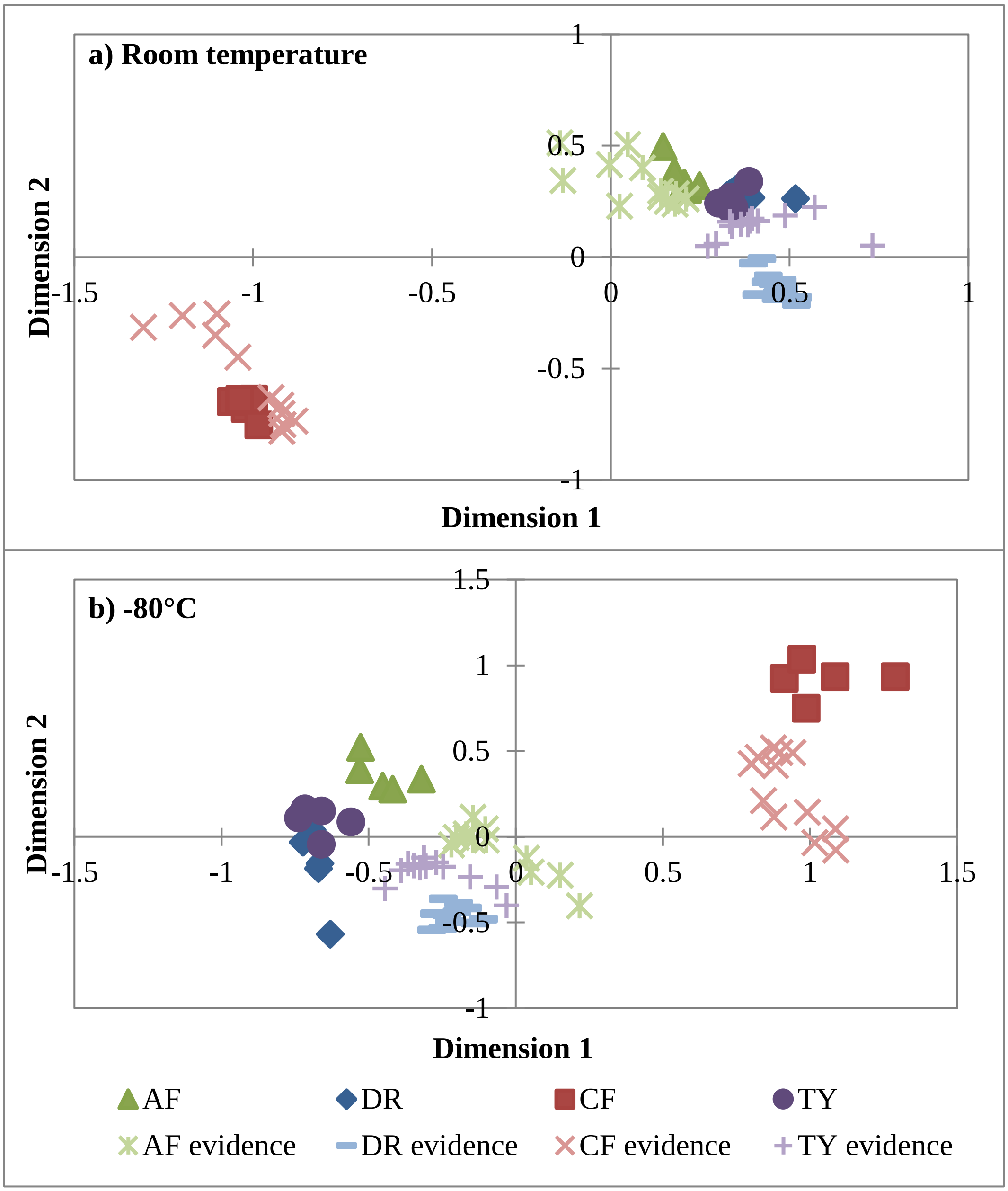


Figure F9. Habitat of origin ordination of soils collected monthly from three to six months from shovels, sneakers, and jeans (line symbols; n = 21 per habitat) and training set soils stored at a) room temperature (unbagged) and b) -80°C via NMDS (Kruskal's stress = 0.118 and 0.133, respectively). Training set soils were collected from each habitat in August 2015 (n = 5 per habitat). Profiles from the coniferous forest soils were more different than the other three habitats. AF = agricultural field, DR = dirt road, CF = coniferous forest, TY = treated yard.

APPENDIX G. Failed to Classify and Misclassified Soil Evidence

April Training Set

Table G1. Evidence that failed to classify or misclassified with support vector machines using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in April 2015.

Support Vector Machines	Failed to Classify			Misclassified		
	100 OTUs	**200 OTUS**	**500 OTUs**	**100 OTUs**	**200 OTUS**	**500 OTUs**
T-shirts	TY 11-10-14	TY 10-3-14	TY 9-4-15	TY 10-3-14	TY 7-6-15	
	TY 1-7-15	TY 11-10-14		AF 3-6-15		
		AF 3-6-15		TY 6-5-15		
		TY 5-11-15		TY 7-6-15		
		TY 6-5-15				
Shovels	TY Wk 2	TY Day 4	TY Day 5	TY Day 1	TY Day 2	TY Day 3
	TY Wk 3			TY Day 2	TY Day 3	TY Day 6
	TY Wk 24			TY Day 3	TY Day 6	
				TY Day 4	TY Day 5	
				TY Day 5	TY Wk 3	
				TY Day 6	DR Wk 8	
Sneakers	TY Day 1	TY Day 2		TY Day 2	TY Day 4	TY Day 5
	DR Wk 6	TY Wk 16		TY Day 3	TY Day 5	TY Wk 20
		TY Wk 24		TY Day 4	TY Wk 20	
				TY Day 5		
				TY Wk 16		
				TY Wk 20		
				TY Wk 24		

Table G1 (cont'd).

Support Vector Machines	Failed to Classify			Misclassified		
	100 OTUs	200 OTUS	500 OTUs	100 OTUs	200 OTUS	500 OTUs
Jeans	TY Day 0	DR Day 0	AF Wk 1	DR Day 0	TY Day 5	TY Day 2
	TY Day 1	TY Day 0	TY Wk 1	DR Day 1	TY Wk 1	TY Day 5
	TY Day 4	DR Day 1	AF Wk 2	TY Day 2	TY Wk 2	TY Wk 3
	DR Day 6	TY Day 2	TY Wk 2	DR Day 3	AF Wk 3	TY Wk 4
	TY Wk 5	DR Day 3	AF Wk 3	DR Day 4	TY Wk 3	TY Wk 5
	AF Wk 5	DR Day 4	AF Wk 4	TY Day 5	TY Wk 12	TY Wk 7
	DR Wk 8	TY Day 4	AF Wk 5	DR Wk 1	TY Wk 16	TY Wk 6
	TY Wk 8	AF Wk 1	AF Wk 7	DR Wk 2	TY Wk 20	TY Wk 8
	AF Wk 6	AF Wk 2	AF Wk 8	TY Wk 2	TY Wk 24	TY Wk 12
	TY Wk 6	TY Wk 5	TY Wk 8	DR Wk 3		TY Wk 16
	AF Wk 16	AF Wk 5	AF Wk 6	TY Wk 3		TY Wk 20
	AF Wk 24	AF Wk 7	AF Wk 12	DR Wk 4		TY Wk 24
		TY Wk 7	AF Wk 24	AF Wk 8		
		AF Wk 8		AF Wk 12		
		AF Wk 6		TY Wk 12		
		TY Wk 6		TY Wk 16		
		AF Wk 20		AF Wk 20		
		AF Wk 24		TY Wk 20		
				TY Wk 24		
				TY Wk 24		

Table G2. Evidence that failed to classify or misclassified with bagged trees using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in April 2015.

Bagged Trees using Random Forests	**Failed to Classify**			**Misclassified**		
	100 OTUs	**200 OTUS**	**500 OTUs**	**100 OTUs**	**200 OTUS**	**500 OTUs**
T-shirts	TY 10-3-14	TY 1-7-15 AF 2-10-15 AF 3-6-15 TY 3-6-15 AF 5-11-15 TY 7-6-15 TY 8-4-15 AF 9-4-15	AF 3-6-15 TY 9-4-15			
Shovels	TY Wk 4 TY Wk 5 AF Wk 16 TY Wk 16 DR Wk 24	TY Day 0 TY Wk 4 AF Wk 12 AF Wk 16 TY Wk 20 TY Wk 24	TY Wk 4	TY Day 6 TY Wk 6 TY Wk 7 AF Wk 12 DR Wk 12 DR Wk 16 TY Wk 20 TY Wk 24	TY Day 6 TY Wk 7	TY Day 6 TY Wk 7
Sneakers	TY Day 1 TY Day 4 TY Wk 3 AF Wk 4 TY Wk 7 TY Wk 12 TY Wk 16	TY Day 1	TY Day 5 TY Wk 5 TY Wk 6	TY Wk 8 AF Wk 16 TY Wk 20 DR Wk 24 TY Wk 24	TY Wk 16 TY Wk 20 TY Wk 24	
Jeans	TY Day 1 TY Wk 3 TY Wk 8 AF Wk 12 DR Wk 16	TY Day 1 TY Day 5 TY Wk 3 AF Wk 7 TY Wk 12 AF Wk 20	TY Day 5 TY Wk 5 TY Wk 6 TY Wk 12 TY Wk 16 TY Wk 24	TY Wk 5 TY Wk 7 TY Wk 12 TY Wk 16 TY Wk 20 DR Wk 24	AF Wk 6 TY Wk 16 TY Wk 20 TY Wk 24	TY Wk 2 TY Wk 3 TY Wk 8

Room Temperature Training Set

Table G3. Evidence that failed to classify or misclassified with support vector machines using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in August 2015 and stored at room temperature.

Support Vector Machines	Failed to Classify			Misclassified		
	100 OTUs	200 OTUS	500 OTUs	100 OTUs	200 OTUS	500 OTUs
T-shirts	AF 10-3-14	AF 9-5-14	DR 9-5-14	AF 9-5-14	DR 10-3-14	DR 1-7-15
	DR 4-10-15	AF 11-10-14	AF 9-5-14	DR 9-5-14	DR 1-7-15	AF 3-6-15
	AF 5-11-15	DR 3-6-15	DR 10-3-14	DR 10-3-14	AF 3-6-15	AF 4-10-15
	DR 5-11-15	TY 7-6-15	AF 11-10-14	AF 11-10-14	AF 4-10-15	DR 5-11-15
	DR 9-4-15		DR 4-10-15	DR 1-7-15	DR 4-10-15	DR 7-6-15
				DR 2-10-15		
				AF 3-6-15		
				DR 3-6-15		
				AF 4-10-15		
				DR 7-6-15		
Shovels	AF Day 3	AF Day 1	AF Wk 7	DR Day 1	AF Day 3	DR Day 6
	DR Wk 1	DR Day 4		DR Day 3	DR Day 3	TY Day 6
	DR Wk 4	TY Day 6		DR Day 4	DR Day 6	DR Wk 7
	AF Wk 5	DR Wk 3		DR Day 6	DR Wk 7	AF Wk 12
	DR Wk 6	DR Wk 4		DR Wk 3		
	TY Day 6	AF Wk 5		DR Wk 5		
	AF Wk 7	AF Wk 7		DR Wk 7		
		AF Wk 12		AF Wk 12		
		AF Wk 16		AF Wk 24		

Table G3 (cont'd).

Support Vector Machines	Failed to Classify			Misclassified		
	100 OTUs	200 OTUS	500 OTUs	100 OTUs	200 OTUS	500 OTUs
Sneakers	DR Day 0	AF Day 0	DR Wk 3	DR Day 1	DR Day 0	
	AF Day 2	DR Day 1		AF Day 1	AF Day 1	
	DR Wk 1	DR Day 4		DR Day 3	AF Day 2	
	DR Wk 5	DR Wk 3		DR Day 4	DR Day 3	
	DR Wk 7	DR Wk 4		DR Wk 3		
	AF Wk 16	AF Wk 8		DR Wk 4		
		DR Wk 24				
Jeans	DR Day 0	DR Day 0	DR Wk 1	TY Day 0	TY Day 0	TY Day 0
	DR Day 1	DR Day 5	TY Wk 1	TY Day 1	DR Day 1	TY Day 2
	DR Day 3	DR Day 6	TY Wk 3	TY Day 2	TY Day 1	TY Day 3
	DR Day 5	DR Wk 1	DR Wk 4	TY Day 3	TY Day 2	TY Day 4
	DR Day 6	TY Wk 1	TY Wk 4	TY Day 4	DR Day 3	TY Day 5
	DR Wk 1	DR Wk 2	TY Wk 8	TY Day 5	TY Day 3	TY Day 6
	TY Wk 1	TY Wk 2	TY Wk 6	TY Day 6	DR Day 4	DR Wk 2
	DR Wk 2	DR Wk 3	TY Wk 12	TY Wk 5	TY Day 4	TY Wk 5
	TY Wk 2	TY Wk 3	TY Wk 16	TY Wk 6	TY Day 5	TY Wk 7
	DR Wk 3	DR Wk 4	TY Wk 20	TY Wk 7	TY Day 6	DR Wk 12
	TY Wk 3	TY Wk 4	TY Wk 24	TY Wk 8	TY Wk 5	DR Wk 16
	DR Wk 4	TY Wk 12		DR Wk 12	TY Wk 6	DR Wk 20
	TY Wk 4	TY Wk 16		DR Wk 16	TY Wk 7	DR Wk 24
	TY Wk 12	TY Wk 20		DR Wk 20	TY Wk 8	
	TY Wk 16	TY Wk 24			DR Wk 12	
	TY Wk 20				DR Wk 16	
	DR Wk 24				DR Wk 20	
	TY Wk 24				DR Wk 24	

Table G4. Evidence that failed to classify or misclassified with bagged trees using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in August 2015 and stored at room temperature.

Bagged Trees using Random Forests	**Failed to Classify**			**Misclassified**		
	100 OTUs	**200 OTUS**	**500 OTUs**	**100 OTUs**	**200 OTUS**	**500 OTUs**
T-shirts	AF 2-10-15			AF 9-5-14		
	AF 3-6-15					
	AF 4-10-15					
Shovels	AF Day 0			TY Day 6	TY Day 6	TY Day 6
	DR Day 2			DR Wk 16		
	DR Wk 4					
	DR Wk 20					
	DR Wk 24					
Sneakers						
Jeans	AF Day 0		AF Day 0	DR Day 2	AF Wk 20	
	DR Day 5		AF Wk 20		AF Wk 24	
	DR Day 6					
	DR Wk 2					
	DR Wk 4					
	DR Wk 6					
	DR Wk 12					
	DR Wk 16					

-80°C Training Set

Table G5. Evidence that failed to classify or misclassified with support vector machines using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in August 2015 and stored at -80°C.

Support Vector Machines	**Failed to Classify**			**Misclassified**		
	100 OTUs	**200 OTUS**	**500 OTUs**	**100 OTUs**	**200 OTUS**	**500 OTUs**
T-shirts	TY 10-3-14	TY 11-10-14	DR 10-3-14	DR 10-3-14	TY 10-3-14	DR 11-10-14
	TY 11-10-14	DR 1-7-15	AF 11-10-14	DR 11-10-14	DR 10-3-14	DR 1-7-15
	AF 1-7-15	TY 1-7-15	TY 6-5-15	TY 1-7-15	DR 11-10-14	AF 3-6-15
	DR 1-7-15	TY 6-5-15		AF 3-6-15	AF 3-6-15	
	DR 4-10-15	TY 9-4-15		TY 6-5-15		
				AF 7-6-15		
				TY 7-6-15		
Shovels	DR Day 1	TY Day 6	TY Wk 3	DR Day 6	DR Wk 2	
	DR Day 3	TY Wk 3		TY Day 6	TY Wk 4	
	DR Wk 1	AF Wk 16		TY Wk 3	DR Wk 16	
	DR Wk 2			AF Wk 7		
	AF Wk 8			DR Wk 16		
	DR Wk 24					
Sneakers	DR Day 0	DR Day 4	TY Wk 3	DR Day 2	AF Wk 7	
	DR Day 1	DR Wk 1	AF Wk 7	DR Day 3	DR Wk 24	
	DR Day 4	TY Wk 3	DR Wk 24	DR Wk 2	TY Wk 20	
	DR Day 5	AF Wk 5		AF Wk 5		
	DR Wk 1	TY Wk 8		DR Wk 16		
	TY Wk 3	AF Wk 8		DR Wk 24		
	AF Wk 7	DR Wk 12				
	AF Wk 8					
	DR Wk 12					
	DR Wk 20					

Table G5 (cont'd).

Support Vector Machines	Failed to Classify			Misclassified		
	100 OTUs	200 OTUS	500 OTUs	100 OTUs	200 OTUS	500 OTUs
Jeans	TY Day 0	TY Day 0	DR Day 0	DR Day 0	DR Day 0	DR Day 1
	DR Day 1	DR Day 1	TY Day 0	TY Day 2	DR Day 2	TY Day 1
	TY Day 1	TY Day 1	TY Day 2	DR Day 5	DR Day 3	TY Day 3
	DR Day 2	TY Day 2	DR Day 3	TY Day 5	DR Wk 1	TY Day 6
	DR Day 3	TY Day 3	DR Day 4	TY Day 6	DR Wk 2	DR Wk 1
	TY Day 3	DR Day 4	DR Day 5	TY Day 4	TY Wk 2	TY Wk 2
	DR Day 4	DR Day 5	TY Day 5	DR Wk 1	DR Wk 4	TY Wk 5
	DR Day 6	TY Day 5	DR Day 6	TY Wk 1	TY Wk 5	TY Wk 7
	TY Wk 3	DR Day 6	TY Day 4	DR Wk 2	TY Wk 6	TY Wk 8
	DR Wk 4	TY Day 6	TY Wk 1	TY Wk 2	TY Wk 7	TY Wk 6
	TY Wk 4	TY Day 4	DR Wk 2	DR Wk 3	TY Wk 8	AF Wk 12
	AF Wk 6	TY Wk 1	TY Wk 3	AF Wk 5	AF Wk 12	DR Wk 16
	AF Wk 7	DR Wk 3	TY Wk 4	TY Wk 5	AF Wk 20	AF Wk 20
	AF Wk 8	TY Wk 3	AF Wk 5	TY Wk 6	AF Wk 24	AF Wk 24
	DR Wk 12	TY Wk 4	AF Wk 6	TY Wk 7	DR Wk 24	DR Wk 24
	AF Wk 16	AF Wk 5	AF Wk 7	TY Wk 8		
	DR Wk 20	AF Wk 6	AF Wk 8	AF Wk 12		
	AF Wk 24	AF Wk 7	AF Wk 16	DR Wk 16		
		AF Wk 8		AF Wk 20		
		DR Wk 12		DR Wk 24		
		DR Wk 16				

Table G6. Evidence that failed to classify or misclassified with bagged trees using 100, 200, and 500 OTUs. The training set contained the bacterial profiles from the soils collected at the four diverse habitats in August 2015 and stored at -80°C.

Bagged Trees using Random Forests	**Failed to Classify**			**Misclassified**		
	100 OTUs	**200 OTUS**	**500 OTUs**	**100 OTUs**	**200 OTUS**	**500 OTUs**
T-shirts	AF 2-10-15	AF 10-3-14	AF 10-3-14	AF 9-5-14	AF 5-11-15	AF 3-6-15
	AF 5-11-15	AF 11-10-14	AF 11-10-14			AF 2-10-15
		AF 3-6-15	AF 1-7-15			AF 5-11-15
		AF 2-10-15	AF 4-10-15			
		AF 7-6-15	AF 6-5-15			
			AF 7-6-15			
			AF 8-4-15			
Shovels	DR Day 1	AF Wk 20	AF Wk 4	TY Day 6	TY Day 6	TY Day 6
Sneakers	TY Wk 4	AF Wk 24	AF Wk 5	TY Wk 3	TY Wk 2	AF Wk 1
Jeans	AF Wk 20		AF Wk 8		TY Wk 3	AF Wk 6
	AF Wk 24		AF Wk 7			AF Wk 12
						AF Wk 16
						AF Wk 20
						AF Wk 24
	DR Day 0	TY Wk 3	AF Wk 1			AF Wk 5
	DR Day 5		AF Wk 6			AF Wk 12
	TY Wk 2		AF Wk 7			AF Wk 16
	TY Wk 3		AF Wk 8			AF Wk 20
	AF Wk 5					AF Wk 24
	AF Wk 7					
	DR Wk 12					
	DR Day 0	TY Wk 12	AF Wk 7	TY Wk 1	AF Wk 20	AF Wk 3
	DR Day 6	AF Wk 16	AF Wk 8	TY Wk 2		AF Wk 5
	AF Wk 20	TY Wk 16	AF Wk 6			AF Wk 12
		TY Wk 24				AF Wk 16
						AF Wk 20
						AF Wk 24

APPENDIX H. Classification and Scores for SVMs and Bagged Trees

Aged Soil Evidence Study

Table H1. Support vector machines classification and scores for soils collected from t-shirts over one year (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 9-5-14	'AF'	-0.02	-0.82	-0.15	-0.50	'AF'	-0.01	-0.68	-0.16	-0.38	'AF'	0.00	-0.62	-0.18	-0.38
Shirt DR 9-5-14	'DR'	-0.13	-0.67	-0.04	-0.42	'DR'	-0.15	-0.69	-0.03	-0.36	'DR'	-0.29	-0.71	0.00	-0.37
Shirt CF 9-5-14	'CF'	-0.21	0.00	-0.72	-0.42	'CF'	-0.27	0.00	-0.38	-0.50	'CF'	-0.25	0.00	-0.39	-0.41
Shirt TY 9-5-14	'TY'	-0.20	-0.60	-0.25	-0.05	'TY'	-0.15	-0.63	-0.28	-0.07	'TY'	-0.19	-0.56	-0.26	-0.05
Shirt AF 10-3-14	'AF'	0.00	-1.41	-0.18	-0.88	'AF'	0.00	-1.00	-0.17	-0.64	'AF'	0.00	-0.83	-0.20	-0.57
Shirt DR 10-3-14	'DR'	-0.15	-1.14	-0.02	-0.59	'DR'	-0.15	-1.41	-0.01	-0.46	'DR'	-0.28	-0.98	0.00	-0.45
Shirt CF 10-3-14	'CF'	-0.26	0.00	-0.74	-0.59	'CF'	-0.27	0.00	-0.48	-0.56	'CF'	-0.24	0.00	-0.42	-0.48
Shirt TY 10-3-14	**'AF'**	**-0.05**	**-1.29**	**-0.20**	**-0.25**	**'AF'**	**-0.13**	**-1.04**	**-0.21**	**-0.16**	'TY'	-0.20	-0.96	-0.21	-0.10
Shirt AF 11-10-14	'AF'	-0.04	-0.90	-0.13	-0.78	'AF'	-0.03	-0.80	-0.14	-0.61	'AF'	-0.04	-0.70	-0.13	-0.45
Shirt DR 11-10-14	'DR'	-0.21	-1.35	0.00	-0.69	'DR'	-0.18	-1.16	0.00	-0.51	'DR'	-0.27	-0.83	0.00	-0.48
Shirt CF 11-10-14	'CF'	-0.29	0.00	-0.82	-0.48	'CF'	-0.26	0.00	-0.45	-0.55	'CF'	-0.25	0.00	-0.44	-0.44
Shirt TY 11-10-14	**'AF'**	**-0.09**	**-1.33**	**-0.28**	**-0.15**	**'AF'**	**-0.08**	**-1.15**	**-0.32**	**-0.12**	'TY'	-0.16	-0.98	-0.23	-0.11
Shirt AF 1-7-15	'AF'	-0.04	-1.29	-0.12	-1.03	'AF'	-0.04	-1.01	-0.12	-0.79	'AF'	-0.04	-0.88	-0.13	-0.59
Shirt DR 1-7-15	'DR'	-0.19	-1.07	0.00	-0.82	'DR'	-0.17	-1.38	0.00	-0.54	'DR'	-0.30	-0.99	0.00	-0.50
Shirt CF 1-7-15	'CF'	-0.38	0.00	-0.75	-0.64	'CF'	-0.37	0.00	-0.31	-0.76	'CF'	-0.30	0.00	-0.39	-0.57
Shirt TY 1-7-15	**'AF'**	**-0.11**	**-1.53**	**-0.25**	**-0.16**	'TY'	-0.13	-1.17	-0.36	-0.10	'TY'	-0.17	-0.98	-0.27	-0.06
Shirt AF 2-10-15	'AF'	-0.01	-1.26	-0.15	-0.79	'AF'	-0.05	-0.98	-0.12	-0.59	'AF'	-0.04	-0.79	-0.12	-0.44
Shirt DR 2-10-15	'DR'	-0.20	-1.52	0.00	-0.98	'DR'	-0.26	-1.22	0.00	-0.67	'DR'	-0.24	-0.98	0.00	-0.52
Shirt CF 2-10-15	'CF'	-0.32	0.00	-0.97	-0.51	'CF'	-0.28	0.00	-0.46	-0.64	'CF'	-0.24	0.00	-0.47	-0.51
Shirt TY 2-10-15	'TY'	-0.16	-0.93	-0.34	-0.04	'TY'	-0.15	-0.79	-0.39	-0.06	'TY'	-0.17	-0.73	-0.31	-0.02

Table H1 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 3-6-15	**'DR'**	**-0.16**	**-1.61**	**-0.01**	**-0.96**	**'DR'**	**-0.09**	**-1.35**	**-0.08**	**-0.77**	'AF'	-0.05	-0.98	-0.12	-0.61
Shirt DR 3-6-15	'DR'	-0.18	-1.20	0.00	-0.77	'DR'	-0.20	-1.03	0.00	-0.48	'DR'	-0.24	-0.91	0.00	-0.43
Shirt CF 3-6-15	'CF'	-0.25	0.00	-0.97	-0.59	'CF'	-0.28	0.00	-0.36	-0.68	'CF'	-0.23	0.00	-0.40	-0.58
Shirt TY 3-6-15	'TY'	-0.14	-0.96	-0.29	-0.09	'TY'	-0.16	-0.87	-0.37	-0.06	'TY'	-0.20	-0.79	-0.29	-0.03
Shirt AF 4-10-15	'AF'	0.00	-1.27	-0.21	-0.72	'AF'	0.00	-1.09	-0.25	-0.68	'AF'	0.00	-0.85	-0.17	-0.44
Shirt DR 4-10-15	'DR'	-0.17	-1.24	0.00	-0.89	'DR'	-0.17	-1.06	0.00	-0.62	'DR'	-0.22	-0.88	0.00	-0.49
Shirt CF 4-10-15	'CF'	-0.36	0.00	-0.89	-0.40	'CF'	-0.31	0.00	-0.39	-0.64	'CF'	-0.27	0.00	-0.39	-0.51
Shirt TY 4-10-15	'TY'	-0.19	-1.00	-0.39	0.00	'TY'	-0.17	-0.83	-0.39	-0.01	'TY'	-0.22	-0.81	-0.34	0.00
Shirt AF 5-11-15	'AF'	0.00	-1.22	-0.16	-0.79	'AF'	0.00	-0.69	-0.38	-0.65	'AF'	0.00	-0.62	-0.25	-0.51
Shirt DR 5-11-15	'DR'	-0.19	-1.37	0.00	-0.84	'DR'	-0.22	-1.61	0.00	-0.62	'DR'	-0.26	-1.26	0.00	-0.53
Shirt CF 5-11-15	'CF'	-0.32	0.00	-1.10	-1.06	'CF'	-0.24	0.00	-0.48	-0.88	'CF'	-0.22	0.00	-0.47	-0.65
Shirt TY 5-11-15	'TY'	-0.14	-1.20	-0.26	-0.11	**'AF'**	**-0.13**	**-1.13**	**-0.28**	**-0.15**	'TY'	-0.19	-0.97	-0.24	-0.07
Shirt AF 6-5-15	'AF'	0.00	-1.42	-0.17	-0.98	'AF'	-0.01	-1.11	-0.16	-0.75	'AF'	0.00	-1.06	-0.18	-0.60
Shirt DR 6-5-15	'DR'	-0.19	-1.35	0.00	-0.82	'DR'	-0.24	-1.14	0.00	-0.57	'DR'	-0.23	-0.88	0.00	-0.47
Shirt CF 6-5-15	'CF'	-0.27	0.00	-0.92	-0.54	'CF'	-0.27	0.00	-0.30	-0.70	'CF'	-0.23	0.00	-0.37	-0.57
Shirt TY 6-5-15	**'AF'**	**-0.09**	**-1.44**	**-0.15**	**-0.26**	**'DR'**	**-0.17**	**-1.16**	**-0.16**	**-0.17**	'TY'	-0.21	-0.99	-0.14	-0.14
Shirt AF 7-6-15	'AF'	0.00	-1.48	-0.16	-1.19	'AF'	-0.02	-1.11	-0.15	-0.82	'AF'	0.00	-1.09	-0.19	-0.69
Shirt DR 7-6-15	'DR'	-0.16	-1.26	-0.01	-0.76	'DR'	-0.24	-1.17	0.00	-0.54	'DR'	-0.58	-1.23	0.00	-0.65
Shirt CF 7-6-15	'CF'	-0.27	0.00	-1.02	-0.88	'CF'	-0.22	0.00	-0.59	-0.71	'CF'	-0.20	0.00	-0.48	-0.66
Shirt TY 7-6-15	**'AF'**	**-0.11**	**-1.34**	**-0.12**	**-0.28**	**'DR'**	**-0.15**	**-1.14**	**-0.13**	**-0.22**	'TY'	-0.20	-0.99	-0.16	-0.14
Shirt AF 8-4-15	'AF'	0.00	-1.36	-0.16	-1.03	'AF'	0.00	-1.16	-0.19	-0.77	'AF'	0.00	-0.99	-0.20	-0.62
Shirt DR 8-4-15	'DR'	-0.24	-2.25	0.00	-1.75	'DR'	-0.29	-1.53	0.00	-1.04	'DR'	-0.25	-1.09	0.00	-0.72
Shirt CF 8-4-15	'CF'	-0.25	0.00	-1.31	-0.54	'CF'	-0.17	-0.02	-0.47	-0.67	'CF'	-0.24	0.00	-0.41	-0.58
Shirt TY 8-4-15	'TY'	-0.18	-1.14	-0.26	-0.08	'TY'	-0.16	-1.00	-0.28	-0.10	'TY'	-0.20	-0.92	-0.25	-0.06

Table H1 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 9-4-15	'AF'	0.00	-1.27	-0.16	-0.96	'AF'	-0.02	-1.09	-0.14	-0.75	'AF'	-0.01	-0.89	-0.15	-0.58
Shirt DR 9-4-15	'DR'	-0.24	-1.73	0.00	-1.34	'DR'	-0.26	-1.26	0.00	-0.85	'DR'	-0.26	-0.97	0.00	-0.60
Shirt CF 9-4-15	'CF'	-0.72	0.00	-0.98	-0.38	'CF'	-0.28	0.00	-0.54	-0.55	'CF'	-0.28	0.00	-0.50	-0.46
Shirt TY 9-4-15	'TY'	-0.19	-0.94	-0.29	-0.04	'TY'	-0.18	-0.94	-0.21	-0.10	**'AF'**	**-0.13**	**-1.13**	**-0.28**	**-0.15**

Table H2. Support vector machines classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 0	'AF'	-0.05	-0.37	-0.19	0.39	'AF'	-0.06	-0.38	-0.25	-0.31	'AF'	-0.06	-0.40	-0.20	-0.35
Shovel DR Day 0	'DR'	-0.21	-0.58	-0.06	-0.24	'DR'	-0.21	-0.64	-0.01	-0.29	'DR'	-0.25	-0.61	0.00	-0.26
Shovel CF Day 0	'CF'	-0.16	-0.01	-0.45	-0.55	'CF'	-0.25	0.00	-0.50	-0.26	'CF'	-0.27	0.00	-0.44	-0.31
Shovel TY Day 0	'TY'	-0.15	-0.68	-0.29	-0.07	'TY'	-0.15	-0.71	-0.32	-0.04	'TY'	-0.17	-0.66	-0.24	-0.10
Sneakers AF Day 0	'AF'	-0.05	-0.48	-0.18	-0.30	'AF'	-0.02	-0.44	-0.28	-0.26	'AF'	-0.04	-0.47	-0.20	-0.29
Sneakers DR Day 0	'DR'	-0.17	-0.59	-0.03	-0.34	'DR'	-0.14	-0.66	-0.03	-0.41	'DR'	-0.22	-0.63	0.00	-0.33
Sneakers CF Day 0	'CF'	-0.17	0.00	-0.50	-0.65	'CF'	-0.23	0.00	-0.60	-0.27	'CF'	-0.22	0.00	-0.48	-0.32
Sneakers TY Day 0	'TY'	-0.15	-0.60	-0.23	-0.15	'TY'	-0.16	-0.67	-0.28	-0.07	'TY'	-0.19	-0.58	-0.22	-0.09
Jeans AF Day 0	'AF'	-0.02	-0.73	-0.25	-0.27	'AF'	-0.02	-0.61	-0.27	-0.26	'AF'	-0.01	-0.54	-0.19	-0.30
Jeans DR Day 0	**'AF'**	**-0.07**	**-0.96**	**-0.26**	**-0.18**	**'AF'**	**-0.07**	**-0.78**	**-0.13**	**-0.30**	'DR'	-0.13	-0.74	-0.03	-0.36
Jeans CF Day 0	'CF'	-0.15	-0.04	-0.66	-0.57	'CF'	-0.17	-0.03	-0.70	-0.32	'CF'	-0.20	-0.01	-0.52	-0.30
Jeans TY Day 0	**'AF'**	**-0.08**	**-0.92**	**-0.39**	**-0.11**	**'AF'**	**-0.10**	**-0.80**	**-0.33**	**-0.11**	'TY'	-0.16	-0.66	-0.21	-0.12
Shovel AF Day 1	'AF'	0.00	-0.40	-0.23	-0.52	'AF'	0.00	-0.45	-0.23	-0.42	'AF'	0.00	-0.42	-0.18	-0.40
Shovel DR Day 1	'DR'	-0.17	-0.57	-0.04	-0.43	'DR'	-0.17	-0.62	-0.04	-0.38	'DR'	-0.24	-0.65	0.00	-0.37
Shovel CF Day 1	'CF'	-0.16	-0.01	-0.44	-0.70	'CF'	-0.19	0.00	-0.55	-0.33	'CF'	-0.22	0.00	-0.47	-0.36
Shovel TY Day 1	**'AF'**	**-0.14**	**-0.60**	**-0.17**	**-0.23**	'TY'	-0.16	-0.68	-0.23	-0.11	'TY'	-0.23	-0.63	-0.18	-0.09
Sneakers AF Day 1	'AF'	-0.04	-0.54	-0.15	-0.36	'AF'	-0.04	-0.54	-0.18	-0.30	'AF'	-0.09	-0.53	-0.17	-0.26
Sneakers DR Day 1	'DR'	-0.17	-0.65	-0.02	-0.48	'DR'	-0.10	-0.67	-0.07	-0.49	'DR'	-0.18	-0.68	0.00	-0.48
Sneakers CF Day 1	'CF'	-0.21	-0.01	-0.36	-0.93	'CF'	-0.19	-0.01	-0.44	-0.47	'CF'	-0.20	-0.01	-0.38	-0.45
Sneakers TY Day 1	**'AF'**	**-0.07**	**-0.69**	**-0.24**	**-0.22**	'TY'	-0.13	-0.81	-0.29	-0.10	'TY'	-0.22	-0.69	-0.22	-0.07

Table H2 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 1	'AF'	0.00	-1.34	-0.47	-0.37	'AF'	0.00	-0.86	-0.28	-0.42	'AF'	0.00	-0.65	-0.21	-0.37
Jeans DR Day 1	**'AF'**	**-0.03**	**-1.13**	**-0.27**	**-0.22**	**'AF'**	**-0.06**	**-0.94**	**-0.11**	**-0.37**	'DR'	-0.14	-0.81	-0.03	-0.39
Jeans CF Day 1	'CF'	-0.32	-0.03	-0.41	-0.46	'CF'	-0.28	-0.19	-0.43	-0.22	'CF'	-0.20	-0.09	-0.41	-0.30
Jeans TY Day 1	**'AF'**	**-0.10**	**-1.09**	**-0.39**	**-0.12**	'TY'	-0.12	-0.92	-0.33	-0.11	'TY'	-0.16	-0.79	-0.21	-0.13
Shovel AF Day 2	'AF'	0.00	-0.46	-0.31	-0.69	'AF'	0.00	-0.48	-0.25	-0.62	'AF'	0.00	-0.51	-0.20	-0.52
Shovel DR Day 2	'DR'	-0.18	-0.65	-0.04	-0.30	'DR'	-0.16	-0.69	-0.02	-0.39	'DR'	-0.19	-0.72	0.00	-0.42
Shovel CF Day 2	'CF'	-0.16	-0.01	-0.41	-0.84	'CF'	-0.25	-0.01	-0.36	-0.45	'CF'	-0.25	0.00	-0.40	-0.43
Shovel TY Day 2	**'AF'**	**-0.01**	**-0.75**	**-0.24**	**-0.45**	**'AF'**	**-0.08**	**-0.77**	**-0.24**	**-0.24**	'TY'	-0.17	-0.69	-0.19	-0.16
Sneakers AF Day 2	'AF'	0.00	-0.30	-0.33	-0.84	'AF'	0.00	-0.41	-0.26	-0.65	'AF'	0.00	-0.48	-0.20	-0.56
Sneakers DR Day 2	'DR'	-0.21	-0.79	0.00	-0.41	'DR'	-0.11	-0.76	-0.06	-0.49	'DR'	-0.19	-0.78	0.00	-0.50
Sneakers CF Day 2	'CF'	-0.17	0.00	-0.46	-0.71	'CF'	-0.19	0.00	-0.53	-0.35	'CF'	-0.23	0.00	-0.48	-0.34
Sneakers TY Day 2	**'AF'**	**-0.08**	**-0.72**	**-0.20**	**-0.24**	**'AF'**	**-0.11**	**-0.76**	**-0.23**	**-0.17**	'TY'	-0.22	-0.70	-0.22	-0.06
Jeans AF Day 2	'AF'	0.00	-1.01	-0.43	-0.37	'AF'	0.00	-0.74	-0.29	-0.43	'AF'	0.00	-0.59	-0.21	-0.42
Jeans DR Day 2	'DR'	-0.21	-1.09	-0.07	-0.22	'DR'	-0.13	-0.84	-0.05	-0.34	'DR'	-0.20	-0.78	0.00	-0.42
Jeans CF Day 2	'CF'	-0.92	-0.01	-0.47	-0.18	'CF'	-0.53	-0.10	-0.33	-0.15	'CF'	-0.26	-0.12	-0.35	-0.28
Jeans TY Day 2	**'AF'**	**-0.06**	**-1.32**	**-0.51**	**-0.14**	**'AF'**	**-0.07**	**-0.96**	**-0.35**	**-0.18**	**'AF'**	**-0.10**	**-0.76**	**-0.23**	**-0.17**
Shovel AF Day 3	'AF'	0.00	-0.41	-0.21	-0.58	'AF'	0.00	-0.46	-0.19	-0.53	'AF'	0.00	-0.49	-0.16	-0.46
Shovel DR Day 3	'DR'	-0.17	-0.75	-0.05	-0.31	'DR'	-0.10	-0.70	-0.07	-0.46	'DR'	-0.17	-0.68	0.00	-0.43
Shovel CF Day 3	'CF'	-0.17	0.00	-0.43	-0.74	'CF'	-0.17	0.00	-0.48	-0.42	'CF'	-0.23	0.00	-0.45	-0.38
Shovel TY Day 3	**'AF'**	**-0.10**	**-0.56**	**-0.34**	**-0.51**	**'AF'**	**-0.06**	**-0.63**	**-0.25**	**-0.35**	**'AF'**	**-0.14**	**-0.64**	**-0.18**	**-0.21**
Sneakers AF Day 3	'AF'	0.00	-0.36	-0.43	-0.76	'AF'	0.00	-0.47	-0.29	-0.63	'AF'	0.00	-0.42	-0.18	-0.57
Sneakers DR Day 3	'DR'	-0.19	-0.70	-0.02	-0.35	'DR'	-0.13	-0.61	-0.06	-0.40	'DR'	-0.21	-0.65	0.00	-0.40
Sneakers CF Day 3	'CF'	-0.18	0.00	-0.63	-0.62	'CF'	-0.26	0.00	-0.70	-0.27	'CF'	-0.23	0.00	-0.52	-0.30
Sneakers TY Day 3	**'AF'**	**-0.08**	**-0.69**	**-0.23**	**-0.21**	'TY'	-0.12	-0.69	-0.27	-0.12	'TY'	-0.21	-0.64	-0.21	-0.08

Table H2 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 3	'AF'	0.00	-1.20	-0.56	-0.21	'AF'	0.00	-0.79	-0.33	-0.33	'AF'	0.00	-0.57	-0.23	-0.31
Jeans DR Day 3	**'TY'**	**-0.14**	**-1.18**	**-0.23**	**-0.13**	**'AF'**	**-0.08**	**-0.91**	**-0.10**	**-0.33**	'DR'	-0.13	-0.76	-0.03	-0.36
Jeans CF Day 3	'CF'	-1.03	0.00	-0.71	-0.31	'CF'	-0.59	-0.06	-0.42	-0.15	'CF'	-0.36	-0.08	-0.33	-0.27
Jeans TY Day 3	'TY'	-0.12	-0.88	-0.27	-0.12	'TY'	-0.15	-0.85	-0.27	-0.09	'TY'	-0.21	-0.71	-0.20	-0.09
Shovel AF Day 4	'AF'	0.00	-0.42	-0.75	-0.99	'AF'	0.00	-0.30	-0.46	-0.91	'AF'	0.00	-0.36	-0.28	-0.70
Shovel DR Day 4	'DR'	-0.20	-0.75	-0.03	-0.32	'DR'	-0.12	-0.69	-0.05	-0.44	'DR'	-0.17	-0.66	0.00	-0.41
Shovel CF Day 4	'CF'	-0.16	0.00	-0.39	-0.71	'CF'	-0.19	-0.01	-0.46	-0.39	'CF'	-0.18	0.00	-0.42	-0.45
Shovel TY Day 4	**'AF'**	**-0.05**	**-0.92**	**-0.24**	**-0.24**	**'AF'**	**-0.09**	**-0.85**	**-0.27**	**-0.17**	'TY'	-0.17	-0.66	-0.23	-0.11
Sneakers AF Day 4	'AF'	0.00	-0.41	-0.45	-0.88	'AF'	0.00	-0.52	-0.30	-0.74	'AF'	0.00	-0.44	-0.22	-0.65
Sneakers DR Day 4	'DR'	-0.17	-0.63	-0.02	-0.44	'DR'	-0.13	-0.56	-0.06	-0.44	'DR'	-0.22	-0.56	0.00	-0.37
Sneakers CF Day 4	'CF'	-0.17	0.00	-0.40	-0.74	'CF'	-0.18	0.00	-0.45	-0.41	'CF'	-0.21	0.00	-0.43	-0.39
Sneakers TY Day 4	**'AF'**	**-0.04**	**-0.60**	**-0.15**	**-0.41**	**'AF'**	**-0.09**	**-0.67**	**-0.18**	**-0.23**	'TY'	-0.15	-0.60	-0.23	-0.12
Jeans AF Day 4	'AF'	0.00	-1.11	-0.41	-0.25	'AF'	0.00	-0.84	-0.28	-0.38	'AF'	0.00	-0.58	-0.20	-0.33
Jeans DR Day 4	**'AF'**	**-0.07**	**-1.43**	**-0.29**	**-0.19**	**'AF'**	**-0.04**	**-1.03**	**-0.13**	**-0.37**	'DR'	-0.13	-0.81	-0.03	-0.40
Jeans CF Day 4	'CF'	-0.30	-0.04	-0.23	-0.65	'CF'	-0.19	-0.18	-0.23	-0.40	'CF'	-0.17	-0.08	-0.38	-0.38
Jeans TY Day 4	**'AF'**	**-0.06**	**-1.18**	**-0.49**	**-0.10**	**'AF'**	**-0.09**	**-0.93**	**-0.33**	**-0.12**	'TY'	-0.14	-0.72	-0.24	-0.12
Shovel AF Day 5	'AF'	0.00	-0.45	-0.36	-0.58	'AF'	0.00	-0.48	-0.27	-0.56	'AF'	0.00	-0.46	-0.20	-0.51
Shovel DR Day 5	'DR'	-0.23	-0.73	-0.02	-0.26	'DR'	-0.14	-0.73	-0.02	-0.41	'DR'	-0.17	-0.71	0.00	-0.44
Shovel CF Day 5	'CF'	-0.17	0.00	-0.41	-0.76	'CF'	-0.16	-0.01	-0.46	-0.43	'CF'	-0.20	0.00	-0.42	-0.42
Shovel TY Day 5	**'AF'**	**-0.06**	**-1.11**	**-0.28**	**-0.27**	**'AF'**	**-0.10**	**-0.94**	**-0.29**	**-0.19**	**'AF'**	**-0.14**	**-0.71**	**-0.24**	**-0.14**
Sneakers AF Day 5	'AF'	0.00	-0.66	-0.22	-0.52	'AF'	0.00	-0.65	-0.21	-0.50	'AF'	-0.01	-0.54	-0.16	-0.44
Sneakers DR Day 5	'DR'	-0.21	-0.62	-0.01	-0.33	'DR'	-0.18	-0.65	-0.03	-0.37	'DR'	-0.23	-0.65	0.00	-0.39
Sneakers CF Day 5	'CF'	-0.18	0.00	-0.51	-0.64	'CF'	-0.25	0.00	-0.56	-0.28	'CF'	-0.24	0.00	-0.46	-0.34
Sneakers TY Day 5	**'AF'**	**-0.04**	**-0.78**	**-0.21**	**-0.30**	**'AF'**	**-0.08**	**-0.75**	**-0.22**	**-0.21**	**'AF'**	**-0.15**	**-0.61**	**-0.18**	**-0.19**

Table H2 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 5	'AF'	0.00	-1.60	-0.67	-0.18	'AF'	0.00	-1.00	-0.36	-0.33	'AF'	0.00	-0.67	-0.25	-0.31
Jeans DR Day 5	'DR'	-0.24	-1.30	-0.08	-0.28	'DR'	-0.13	-1.04	-0.05	-0.43	'DR'	-0.18	-0.74	-0.01	-0.40
Jeans CF Day 5	'AF'	-1.00	0.00	-0.70	-0.30	'CF'	-0.57	-0.02	-0.44	-0.20	'CF'	-0.33	-0.07	-0.34	-0.30
Jeans TY Day 5	**'AF'**	**-0.01**	**-1.34**	**-0.61**	**-0.15**	**'AF'**	**-0.01**	**-0.93**	**-0.37**	**-0.21**	**'AF'**	**-0.08**	**-0.68**	**-0.24**	**-0.18**
Shovel AF Day 6	'AF'	0.00	-0.41	-0.52	-0.91	'AF'	0.00	-0.48	-0.32	-0.79	'AF'	0.00	-0.47	-0.22	-0.61
Shovel CF Day 6	'CF'	-0.17	0.00	-0.55	-0.71	'CF'	-0.16	-0.01	-0.59	-0.41	'CF'	-0.20	0.00	-0.45	-0.42
Shovel DR Day 6	'DR'	-0.19	-0.64	-0.03	-0.29	'DR'	-0.14	-0.61	-0.03	-0.40	'DR'	-0.16	-0.59	-0.01	-0.44
Sneakers AF Day 6	'AF'	0.00	-0.39	-0.41	-0.85	'AF'	0.00	-0.50	-0.28	-0.72	'AF'	0.00	-0.49	-0.21	-0.58
Shovel TY Day 6	**'AF'**	**-0.01**	**-0.36**	**-0.36**	**-0.92**	**'AF'**	**-0.06**	**-0.48**	**-0.27**	**-0.77**	**'AF'**	**-0.20**	**-0.45**	**-0.21**	**-0.63**
Sneakers DR Day 6	'DR'	-0.19	-0.71	-0.03	-0.33	'DR'	-0.11	-0.71	-0.07	-0.40	'DR'	-0.20	-0.71	0.00	-0.41
Sneakers CF Day 6	'CF'	-0.18	0.00	-0.59	-0.58	'CF'	-0.26	0.00	-0.60	-0.28	'CF'	-0.22	0.00	-0.53	-0.34
Sneakers TY Day 6	'TY'	-0.15	-0.65	-0.25	-0.10	'TY'	-0.14	-0.69	-0.27	-0.08	'TY'	-0.20	-0.60	-0.22	-0.08
Jeans AF Day 6	'AF'	-0.10	-1.50	-0.44	-0.13	'AF'	-0.02	-1.01	-0.27	-0.30	'AF'	-0.01	-0.66	-0.21	-0.31
Jeans DR Day 6	**'AF'**	**-0.11**	**-1.31**	**-0.11**	**-0.29**	'DR'	-0.10	-1.00	-0.07	-0.45	'DR'	-0.17	-0.78	0.00	-0.40
Jeans CF Day 6	'CF'	-1.00	-0.04	-0.50	-0.14	'CF'	-0.17	-0.07	-0.30	-0.56	'CF'	-0.31	-0.16	-0.31	-0.23
Jeans TY Day 6	'TY'	-0.23	-1.45	-0.35	-0.04	'TY'	-0.14	-1.02	-0.25	-0.11	'TY'	-0.19	-0.72	-0.20	-0.11

Table H3. Support vector machines classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 1	'AF'	0.00	-0.80	-0.41	-0.31	'AF'	0.00	-0.59	-0.30	-0.34	'AF'	0.00	-0.51	-0.21	-0.36
Shovel DR Wk 1	'DR'	-0.26	-0.75	-0.02	-0.27	'DR'	-0.11	-0.88	-0.06	-0.42	'DR'	-0.15	-0.68	-0.01	-0.39
Shovel CF Wk 1	'CF'	-0.16	-0.01	-0.48	-1.03	'CF'	-0.17	0.00	-0.46	-0.58	'CF'	-0.21	0.00	-0.31	-0.50
Shovel TY Wk 1	'TY'	-0.15	-0.83	-0.29	-0.06	'TY'	-0.13	-0.90	-0.29	-0.09	'TY'	-0.26	-0.79	-0.20	-0.05
Sneakers AF Wk 1	'AF'	0.00	-0.88	-0.30	-0.35	'AF'	0.00	-0.74	-0.23	-0.38	'AF'	0.00	-0.62	-0.19	-0.37
Sneakers DR Wk 1	'DR'	-0.28	-0.82	0.00	-0.24	'DR'	-0.19	-0.76	-0.03	-0.30	'DR'	-0.21	-0.61	-0.01	-0.28
Sneakers CF Wk 1	'CF'	-0.17	0.00	-0.46	-1.14	'CF'	-0.17	0.00	-0.41	-0.62	'CF'	-0.25	0.00	-0.28	-0.51
Sneakers TY Wk 1	'TY'	-0.17	-0.80	-0.44	-0.06	'TY'	-0.16	-0.78	-0.36	-0.06	'TY'	-0.26	-0.66	-0.25	-0.02
Jeans AF Wk 1	'AF'	0.00	-3.37	-0.61	-2.34	**'DR'**	**-0.88**	**-3.51**	**-0.62**	**-2.26**	**'DR'**	**-0.29**	**-1.60**	**-0.27**	**-0.87**
Jeans DR Wk 1	**'AF'**	**-0.04**	**-2.55**	**-0.31**	**-1.52**	'DR'	-0.70	-2.69	0.00	-1.64	'DR'	-0.35	-1.37	0.00	-0.79
Jeans CF Wk 1	'CF'	-0.83	0.00	-0.56	-1.99	'CF'	-0.33	0.00	-1.08	-1.41	'CF'	-0.13	-0.06	-0.37	-0.79
Jeans TY Wk 1	'TY'	-1.68	-2.77	-0.47	0.00	**'DR'**	**-0.93**	**-3.08**	**-0.79**	**-1.61**	**'DR'**	**-0.44**	**-1.50**	**-0.42**	**-0.53**
Shovel AF Wk 2	'AF'	0.00	-0.97	-0.65	-0.36	'AF'	0.00	-0.69	-0.39	-0.30	'AF'	0.00	-0.56	-0.25	-0.34
Shovel DR Wk 2	'DR'	-0.26	-0.85	-0.02	-0.29	'DR'	-0.13	-0.97	-0.04	-0.47	'DR'	-0.17	-0.79	0.00	-0.44
Shovel CF Wk 2	'CF'	-0.16	-0.01	-0.39	-0.94	'CF'	-0.17	0.00	-0.42	-0.54	'CF'	-0.22	0.00	-0.33	-0.49
Shovel TY Wk 2	**'AF'**	**-0.09**	**-1.02**	**-0.41**	**-0.09**	'TY'	-0.09	-1.04	-0.34	-0.09	'TY'	-0.24	-0.85	-0.20	-0.05
Sneakers AF Wk 2	'AF'	0.00	-0.93	-0.32	-0.46	'AF'	0.00	-0.89	-0.24	-0.52	'AF'	0.00	-0.71	-0.19	-0.46
Sneakers DR Wk 2	'DR'	-0.23	-0.76	-0.03	-0.29	'DR'	-0.14	-0.81	-0.04	-0.40	'DR'	-0.22	-0.66	0.00	-0.34
Sneakers CF Wk 2	'CF'	-0.18	0.00	-0.41	-1.05	'CF'	-0.17	0.00	-0.48	-0.57	'CF'	-0.20	0.00	-0.32	-0.52
Sneakers TY Wk 2	'TY'	-0.13	-0.89	-0.38	-0.05	'TY'	-0.13	-0.88	-0.34	-0.05	'TY'	-0.27	-0.74	-0.19	-0.04
Jeans AF Wk 2	'AF'	0.00	-3.25	-0.60	-2.25	**'DR'**	**-0.87**	**-3.44**	**-0.71**	**-2.21**	**'DR'**	**-0.30**	**-1.57**	**-0.20**	**-0.83**
Jeans DR Wk 2	**'AF'**	**-0.10**	**-2.61**	**-0.29**	**-1.48**	'DR'	-0.69	-2.79	0.00	-1.64	'DR'	-0.37	-1.42	0.00	-0.77
Jeans CF Wk 2	'CF'	-3.87	0.00	-0.81	-3.09	'CF'	-1.15	0.00	-3.91	-2.85	'CF'	-0.41	0.00	-1.53	-1.04
Jeans TY Wk 2	**'AF'**	**-0.04**	**-2.15**	**-0.30**	**-1.02**	**'DR'**	**-0.58**	**-2.28**	**-0.22**	**-1.02**	**'DR'**	**-0.39**	**-1.33**	**-0.32**	**-0.37**

Table H3 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 3	'AF'	0.00	-1.03	-0.28	-0.39	'AF'	0.00	-1.11	-0.24	-0.59	'AF'	0.00	-0.96	-0.22	-0.56
Shovel DR Wk 3	'DR'	-0.24	-0.97	-0.04	-0.34	'DR'	-0.13	-1.02	-0.03	-0.53	'DR'	-0.18	-0.85	0.00	-0.47
Shovel CF Wk 3	'CF'	-0.15	-0.02	-0.49	-1.04	'CF'	-0.15	-0.02	-0.56	-0.56	'CF'	-0.19	0.00	-0.38	-0.56
Shovel TY Wk 3	**'AF'**	**-0.09**	**-0.93**	**-0.25**	**-0.16**	**'AF'**	**-0.09**	**-0.98**	**-0.22**	**-0.19**	'TY'	-0.20	-0.91	-0.15	-0.15
Sneakers AF Wk 3	'AF'	0.00	-1.22	-0.25	-0.47	'AF'	0.00	-1.11	-0.23	-0.58	'AF'	0.00	-0.94	-0.22	-0.54
Sneakers DR Wk 3	'DR'	-0.26	-1.01	-0.04	-0.28	'DR'	-0.09	-1.01	-0.08	-0.44	'DR'	-0.25	-0.81	0.00	-0.38
Sneakers CF Wk 3	'CF'	-0.19	0.00	-0.39	-0.98	'CF'	-0.18	0.00	-0.39	-0.57	'CF'	-0.23	0.00	-0.28	-0.54
Sneakers TY Wk 3	'TY'	-0.25	-1.07	-0.26	0.00	'TY'	-0.18	-1.03	-0.22	-0.10	'TY'	-0.31	-0.97	-0.11	-0.08
Jeans AF Wk 3	'AF'	0.00	-5.09	-0.93	-3.64	**'DR'**	**-1.53**	**-5.50**	**-0.30**	**-3.54**	**'DR'**	**-0.50**	**-2.31**	**-0.38**	**-1.26**
Jeans DR Wk 3	**'AF'**	**-0.07**	**-2.08**	**-0.19**	**-0.96**	'DR'	-0.40	-2.20	0.00	-1.07	'DR'	-0.29	-1.31	0.00	-0.65
Jeans CF Wk 3	'CF'	-3.65	0.00	-0.77	-2.71	'CF'	-1.01	0.00	-3.62	-2.39	'CF'	-0.37	0.00	-1.46	-0.92
Jeans TY Wk 3	**'AF'**	**0.00**	**-3.02**	**-0.50**	**-1.81**	**'DR'**	**-0.95**	**-3.37**	**-0.15**	**-1.80**	**'DR'**	**-0.45**	**-1.62**	**-0.39**	**-0.60**
Shovel AF Wk 4	'AF'	0.00	-1.58	-1.71	-0.57	'AF'	0.00	-1.07	-0.88	-0.50	'AF'	0.00	-0.78	-0.44	-0.36
Shovel DR Wk 4	'DR'	-0.24	-0.86	-0.03	-0.36	'DR'	-0.10	-1.72	-0.07	-0.90	'DR'	-0.14	-1.10	-0.03	-0.63
Shovel CF Wk 4	'CF'	-0.10	-0.07	-0.59	-0.76	'CF'	-0.15	-0.04	-0.50	-0.55	'CF'	-0.20	-0.01	-0.35	-0.51
Shovel TY Wk 4	'TY'	-0.17	-0.97	-0.32	-0.04	'TY'	-0.16	-0.96	-0.28	-0.06	'TY'	-0.26	-0.83	-0.17	-0.07
Sneakers AF Wk 4	'AF'	0.00	-1.13	-0.27	-0.44	'AF'	0.00	-1.09	-0.22	-0.58	'AF'	0.00	-0.87	-0.21	-0.52
Sneakers DR Wk 4	'DR'	-0.24	-0.73	0.00	-0.35	'DR'	-0.09	-1.12	-0.08	-0.67	'DR'	-0.17	-0.82	0.00	-0.48
Sneakers CF Wk 4	'CF'	-0.19	0.00	-0.45	-0.99	'CF'	-0.19	0.00	-0.47	-0.53	'CF'	-0.26	0.00	-0.33	-0.49
Sneakers TY Wk 4	'TY'	-0.17	-0.97	-0.25	-0.08	'TY'	-0.15	-0.95	-0.26	-0.09	'TY'	-0.31	-0.84	-0.13	-0.06
Jeans AF Wk 4	'AF'	0.00	-3.48	-0.65	-2.27	'AF'	0.00	-3.67	-0.80	-2.31	**'DR'**	**-0.25**	**-1.68**	**-0.22**	**-0.95**
Jeans DR Wk 4	**'AF'**	**-0.10**	**-2.17**	**-0.22**	**-1.31**	'DR'	-0.61	-2.55	0.00	-1.59	'DR'	-0.38	-1.33	0.00	-0.73
Jeans CF Wk 4	'CF'	-4.29	0.00	-0.89	-3.44	'CF'	-1.34	0.00	-4.58	-3.28	'CF'	-0.46	0.00	-1.76	-1.18
Jeans TY Wk 4	'TY'	-2.62	-4.10	-0.71	0.00	'TY'	-1.18	-4.30	-2.56	0.00	**'DR'**	**-0.51**	**-1.91**	**-0.24**	**-0.84**

Table H4. Support vector machines classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 5	'AF'	0.00	-0.74	-0.39	-1.15	'AF'	0.00	-0.64	-0.38	-0.77	'AF'	0.00	-0.55	-0.29	-0.59
Shovel DR Wk 5	'DR'	-0.24	-1.23	0.00	-0.74	'DR'	-0.19	-0.85	0.00	-0.50	'DR'	-0.23	-0.79	0.00	-0.43
Shovel CF Wk 5	'CF'	-2.74	0.00	-4.01	-2.57	'CF'	-1.14	0.00	-1.49	-1.46	'CF'	-0.59	-0.71	-0.09	-1.10
Shovel TY Wk 5	'TY'	-0.35	-1.13	-0.14	-0.06	'TY'	-0.31	-1.11	-0.23	-0.01	'TY'	-0.29	-0.87	-0.20	-0.02
Sneakers AF Wk 5	'AF'	0.00	-0.72	-0.27	-0.66	'AF'	0.00	-0.72	-0.29	-0.49	'AF'	0.00	-0.62	-0.23	-0.47
Sneakers DR Wk 5	'DR'	-0.15	-0.93	-0.01	-0.87	'DR'	-0.13	-0.63	-0.04	-0.58	'DR'	-0.18	-0.72	0.00	-0.44
Sneakers CF Wk 5	'CF'	-0.18	0.00	-1.06	-0.60	'CF'	-0.18	0.00	-0.88	-0.53	'CF'	-0.18	0.00	-0.83	-0.53
Sneakers TY Wk 5	'TY'	-0.16	-1.08	-0.22	-0.11	'TY'	-0.25	-0.99	-0.28	0.00	'TY'	-0.25	-0.82	-0.23	-0.02
Jeans AF Wk 5	**'DR'**	**-3.35**	**-5.57**	**-3.12**	**-3.53**	**'DR'**	**-1.27**	**-2.37**	**-1.16**	**-1.97**	**'DR'**	**-0.62**	**-1.24**	**-0.60**	**-1.35**
Jeans DR Wk 5	'DR'	-1.62	-2.68	0.00	-1.74	'DR'	-0.79	-1.32	0.00	-0.96	'DR'	-0.50	-0.97	0.00	-0.72
Jeans CF Wk 5	'CF'	-0.20	-0.03	-1.09	-0.66	'CF'	-0.15	-0.01	-0.92	-0.59	'CF'	-0.16	0.00	-0.71	-0.48
Jeans TY Wk 5	**'DR'**	**-2.40**	**-4.10**	**-2.12**	**-2.21**	**'DR'**	**-1.04**	**-2.08**	**-1.01**	**-1.15**	**'DR'**	**-0.57**	**-1.22**	**-0.51**	**-0.78**
Shovel AF Wk 6	'AF'	0.00	-0.67	-0.33	-0.83	'AF'	0.00	-0.55	-0.35	-0.61	'AF'	0.00	-0.52	-0.26	-0.47
Shovel DR Wk 6	'DR'	-0.18	-1.08	0.00	-0.58	'DR'	-0.18	-0.78	-0.01	-0.44	'DR'	-0.20	-0.75	0.00	-0.37
Shovel CF Wk 6	'CF'	-0.21	-0.04	-0.91	-0.52	'CF'	-0.18	-0.01	-0.85	-0.47	'CF'	-0.16	-0.01	-0.70	-0.42
Shovel TY Wk 6	'TY'	-0.18	-1.06	-0.21	-0.12	'TY'	-0.21	-1.01	-0.25	-0.05	'TY'	-0.21	-0.85	-0.21	-0.07
Sneakers AF Wk 6	'AF'	0.00	-0.65	-0.29	-0.90	'AF'	0.00	-0.61	-0.30	-0.58	'AF'	0.00	-0.56	-0.25	-0.44
Sneakers DR Wk 6	**'TY'**	**-0.23**	**-1.10**	**-0.15**	**-0.13**	'DR'	-0.18	-0.64	-0.01	-0.47	'DR'	-0.19	-0.78	-0.12	-0.44
Sneakers CF Wk 6	'CF'	-0.19	0.00	-1.09	-0.57	'CF'	-0.17	0.00	-0.93	-0.49	'CF'	-0.17	0.00	-0.72	-0.44
Sneakers TY Wk 6	'TY'	-0.19	-0.29	-1.09	-0.05	'TY'	-0.20	-0.96	-0.35	0.00	'TY'	-0.78	-0.84	-1.34	-0.51
Jeans AF Wk 6	**'DR'**	**-3.80**	**-5.66**	**-3.66**	**-3.49**	**'DR'**	**-1.51**	**-2.26**	**-1.49**	**-1.91**	**'DR'**	**-0.73**	**-1.20**	**-0.71**	**-1.29**
Jeans DR Wk 6	'DR'	-1.31	-2.24	-1.28	-1.63	'DR'	-0.73	-1.33	-0.70	-0.89	'DR'	-0.47	-1.04	-0.36	-0.72
Jeans CF Wk 6	'CF'	-3.21	0.00	-3.74	-3.01	'CF'	-1.45	0.00	-1.93	-1.36	'CF'	-0.75	0.00	-1.17	-0.90
Jeans TY Wk 6	**'DR'**	**-3.52**	**-3.52**	**-3.21**	**-3.75**	**'DR'**	**-1.50**	**-1.35**	**-1.27**	**-1.91**	**'DR'**	**-0.75**	**-0.63**	**-0.31**	**-1.36**

Table H4 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 7	'AF'	-0.01	-0.51	-0.16	-1.41	'AF'	-0.09	-0.48	-0.22	-0.95	'AF'	-0.18	-0.47	-0.20	-0.66
Shovel DR Wk 7	'DR'	-0.23	-1.27	0.00	-0.58	'DR'	-0.25	-0.88	0.00	-0.41	'DR'	-0.22	-1.07	0.00	-0.67
Shovel CF Wk 7	'CF'	-0.32	-0.02	-1.09	-0.54	'CF'	-0.17	-0.01	-0.96	-0.54	'CF'	-0.15	-0.01	-0.75	-0.44
Shovel TY Wk 7	'TY'	-0.31	-1.21	-0.13	-0.09	'TY'	-0.35	-1.22	-0.16	-0.03	'TY'	-0.30	-0.89	-0.16	-0.05
Sneakers AF Wk 7	'AF'	0.00	-0.79	-0.26	-0.62	'AF'	0.00	-0.80	-0.28	-0.49	'AF'	0.00	-0.73	-0.25	-0.47
Sneakers DR Wk 7	'DR'	-0.21	-1.04	0.00	-0.49	'DR'	-0.22	-0.83	0.00	-0.44	'DR'	-0.23	-0.87	0.00	-0.49
Sneakers CF Wk 7	'CF'	-0.18	-0.12	-0.30	-2.09	'CF'	-0.15	-0.02	-0.42	-1.24	'CF'	-0.13	-0.05	-0.46	-0.85
Sneakers TY Wk 7	'TY'	-0.17	-1.19	-0.21	-0.11	'TY'	-0.21	-1.20	-0.24	-0.05	'TY'	-0.25	-0.97	-0.18	-0.07
Jeans AF Wk 7	'AF'	0.00	-5.46	-3.94	-4.37	**'DR'**	**-1.56**	**-2.36**	**-1.23**	**-2.29**	**'DR'**	**-0.75**	**-1.23**	**-0.70**	**-1.52**
Jeans DR Wk 7	'DR'	-2.07	-3.28	0.00	-2.31	'DR'	-0.99	-1.70	0.00	-1.26	'DR'	-0.57	-1.10	0.00	-0.92
Jeans CF Wk 7	'CF'	-4.33	0.00	-5.41	-4.73	'CF'	0.00	-2.17	-1.69	-2.49	'CF'	-0.82	0.00	-1.06	-1.71
Jeans TY Wk 7	'TY'	-0.18	-0.92	-0.69	0.00	**'DR'**	**-1.06**	**-2.23**	**-1.05**	**-1.30**	**'DR'**	**-0.58**	**-1.27**	**-0.48**	**-0.87**
Shovel AF Wk 8	'AF'	0.00	-4.36	-2.50	-2.44	'AF'	-0.30	-0.80	-0.32	-0.53	'AF'	-0.24	-0.68	-0.26	-0.50
Shovel DR Wk 8	'DR'	-0.29	-0.74	0.00	-0.77	**'TY'**	**-0.38**	**-1.32**	**-0.14**	**-0.04**	'DR'	-0.16	-0.49	-0.01	-0.74
Shovel CF Wk 8	'CF'	-0.21	0.00	-1.35	-0.90	'CF'	-0.15	-0.02	-0.98	-0.69	'CF'	-0.19	0.00	-0.93	-0.56
Shovel TY Wk 8	'TY'	-0.24	-0.71	-0.94	-0.03	'TY'	-0.16	-0.63	-0.90	-0.01	'TY'	-0.34	-1.02	-0.15	-0.04
Sneakers AF Wk 8	'AF'	0.00	-0.94	-0.22	-0.64	'AF'	0.00	-1.00	-0.27	-0.57	'AF'	-0.20	-0.80	-0.25	-0.51
Sneakers DR Wk 8	'DR'	-0.16	-1.00	-0.01	-0.51	'DR'	-0.19	-0.76	-0.01	-0.40	'DR'	-0.18	-0.51	0.00	-0.84
Sneakers CF Wk 8	'CF'	-0.20	0.00	-1.14	-0.60	'CF'	-0.19	0.00	-1.01	-0.57	'CF'	-0.23	0.00	-0.78	-0.37
Sneakers TY Wk 8	'TY'	-0.39	-1.38	-0.09	-0.09	'TY'	-0.18	-1.13	-0.23	-0.09	'TY'	-0.22	-0.94	-0.18	-0.10
Jeans AF Wk 8	**'DR'**	**-2.94**	**-4.60**	**-0.10**	**-3.48**	**'DR'**	**-1.13**	**-2.13**	**-1.01**	**-1.91**	**'DR'**	**-0.54**	**-1.15**	**-0.49**	**-1.29**
Jeans DR Wk 8	**'DR'**	**-2.12**	**-3.05**	**-2.14**	**-2.36**	'DR'	-1.01	-1.60	-1.01	-1.19	'DR'	-0.60	-1.15	-0.59	-0.90
Jeans CF Wk 8	'CF'	-3.13	-0.08	-3.01	-3.43	'CF'	-1.23	-0.16	-1.79	-1.90	'CF'	-0.19	-0.04	-0.28	-0.78
Jeans TY Wk 8	**'DR'**	**-2.50**	**-3.64**	**-2.19**	**-2.38**	'TY'	-1.19	-2.06	-1.17	0.00	**'DR'**	**-0.96**	**-1.28**	**-0.78**	**-0.80**

Table H5. Support vector machines classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 12	'AF'	0.00	-0.89	-0.19	-0.47	'AF'	0.00	-0.73	-0.17	-0.43	'AF'	-0.01	-0.58	-0.16	-0.40
Shovel DR Wk 12	'DR'	-0.23	-1.04	0.00	-0.64	'DR'	-0.32	-1.02	0.00	-0.66	'DR'	-0.29	-0.84	0.00	-0.57
Shovel CF Wk 12	'CF'	-0.93	0.00	-1.07	-0.19	'CF'	-1.04	-0.03	-0.89	-0.19	'CF'	-0.37	-0.01	-0.50	-0.19
Shovel TY Wk 12	'TY'	-0.39	-0.95	-0.11	-0.05	'TY'	-0.40	-0.93	-0.13	-0.04	'TY'	-0.32	-0.80	-0.23	-0.01
Sneakers AF Wk 12	'AF'	0.00	-1.43	-0.28	-0.57	'AF'	0.00	-1.12	-0.25	-0.58	'AF'	0.00	-0.80	-0.20	-0.46
Sneakers DR Wk 12	'DR'	-0.41	-0.91	0.00	-0.62	'DR'	-0.38	-0.83	0.00	-0.54	'DR'	-0.28	-0.76	0.00	-0.56
Sneakers CF Wk 12	'CF'	-0.81	-0.04	-1.00	-0.16	'CF'	-0.96	-0.05	-0.83	-0.19	'CF'	-0.42	-0.05	-0.46	-0.16
Sneakers TY Wk 12	'TY'	-0.33	-0.98	-0.09	-0.08	'TY'	-0.30	-0.92	-0.15	-0.06	'TY'	-0.28	-0.85	-0.22	-0.02
Jeans AF Wk 12	**'DR'**	**-2.11**	**-11.10**	**-1.01**	**-8.92**	**'DR'**	**-0.20**	**-6.40**	**-0.15**	**-4.44**	**'DR'**	**-0.09**	**-2.54**	**-0.07**	**-1.81**
Jeans DR Wk 12	'DR'	-0.93	-4.48	0.00	-3.42	'DR'	-0.35	-2.76	0.00	-1.84	'DR'	-0.25	-1.36	0.00	-0.93
Jeans CF Wk 12	'CF'	-2.56	-1.56	-12.48	-10.60	'CF'	-0.17	0.00	-7.06	-5.13	'CF'	-2.66	-0.07	-0.29	-2.07
Jeans TY Wk 12	**'DR'**	**-0.86**	**-4.12**	**-0.67**	**-3.10**	**'DR'**	**-0.23**	**-2.69**	**-0.21**	**-1.53**	**'DR'**	**-0.14**	**-1.41**	**-0.03**	**-0.57**
Shovel AF Wk 16	'AF'	0.00	-1.15	-0.22	-0.49	'AF'	0.00	-0.97	-0.18	-0.53	'AF'	-0.01	-0.79	-0.16	-0.45
Shovel DR Wk 16	'DR'	-0.29	-1.46	0.00	-0.93	'DR'	-0.37	-1.31	0.00	-0.88	'DR'	-0.28	-0.93	0.00	-0.68
Shovel CF Wk 16	'CF'	-0.84	0.00	-1.55	-0.22	'CF'	-1.12	0.00	-1.24	-0.30	'CF'	-0.44	0.00	-0.64	-0.24
Shovel TY Wk 16	'TY'	-0.50	-1.11	-0.11	-0.06	'TY'	-0.44	-1.08	-0.10	-0.06	'TY'	-0.33	-0.82	-0.12	-0.05
Sneakers AF Wk 16	'AF'	0.00	-2.06	-0.20	-0.48	'AF'	0.00	-1.62	-0.23	-0.38	'AF'	0.00	-0.92	-0.18	-0.40
Sneakers DR Wk 16	'DR'	-0.41	-1.31	0.00	-0.88	'DR'	-0.36	-1.10	0.00	-0.74	'DR'	-0.26	-0.83	0.00	-0.57
Sneakers CF Wk 16	'CF'	-0.92	0.00	-1.43	-0.33	'CF'	-1.14	0.00	-1.21	-0.31	'CF'	-0.51	0.00	-0.70	-0.25
Sneakers TY Wk 16	**'DR'**	**-0.31**	**-0.90**	**-0.05**	**-0.15**	**'DR'**	**-0.30**	**-0.81**	**-0.10**	**-0.10**	'TY'	-0.30	-0.65	-0.14	-0.06
Jeans AF Wk 16	**'DR'**	**-1.19**	**-7.01**	**-1.00**	**-5.64**	'AF'	-0.08	-4.04	-0.08	-2.83	'AF'	-0.06	-1.64	-0.10	-1.23
Jeans DR Wk 16	'DR'	-1.21	-6.41	0.00	-4.71	'DR'	-0.30	-3.90	0.00	-2.51	'DR'	-0.20	-1.70	0.00	-1.16
Jeans CF Wk 16	'CF'	-2.34	-1.22	-11.78	-9.42	'CF'	-0.22	-0.01	-6.67	-4.49	'CF'	-0.10	-0.07	-2.50	-1.81
Jeans TY Wk 16	**'DR'**	**-1.60**	**-6.78**	**-0.71**	**-5.81**	**'DR'**	**-0.40**	**-4.06**	**-0.30**	**-2.91**	**'DR'**	**-0.17**	**-1.76**	**-0.16**	**-1.18**

Table H5 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 20	'AF'	0.00	-1.09	-0.18	-0.53	'AF'	0.00	-0.89	-0.16	-0.48	'AF'	-0.10	-0.80	-0.10	-0.33
Shovel DR Wk 20	'DR'	-0.41	-1.15	0.00	-0.80	'DR'	-0.42	-1.16	0.00	-0.81	'DR'	-0.29	-0.91	0.00	-0.68
Shovel CF Wk 20	'CF'	-0.68	0.00	-1.58	-0.22	'CF'	-0.90	0.00	-1.18	-0.24	'CF'	-0.40	0.00	-0.62	-0.23
Shovel TY Wk 20	'TY'	-0.55	-1.13	-0.14	-0.03	'TY'	-0.46	-0.99	-0.10	-0.07	'TY'	-0.33	-0.81	-0.16	-0.04
Sneakers AF Wk 20	'AF'	0.00	-1.23	-0.21	-0.54	'AF'	0.00	-0.97	-0.21	-0.55	'AF'	0.00	-0.69	-0.17	-0.43
Sneakers DR Wk 20	'DR'	-0.28	-1.08	0.00	-0.66	'DR'	-0.35	-1.03	0.00	-0.64	'DR'	-0.23	-0.78	0.00	-0.51
Sneakers CF Wk 20	'CF'	-0.79	0.00	-1.36	-0.27	'CF'	-0.98	0.00	-1.11	-0.29	'CF'	-0.45	0.00	-0.65	-0.23
Sneakers TY Wk 20	**'DR'**	**-0.36**	**-2.02**	**-0.25**	**-1.28**	**'DR'**	**-0.16**	**-1.53**	**-0.01**	**-0.67**	**'DR'**	**-0.13**	**-1.00**	**-0.05**	**-0.32**
Jeans AF Wk 20	**'DR'**	**-2.30**	**-12.59**	**-1.26**	**-10.05**	**'DR'**	**-0.11**	**-7.10**	**-0.05**	**-4.90**	'AF'	-0.06	-2.69	-0.10	-1.98
Jeans DR Wk 20	'DR'	-1.02	-5.27	0.00	-3.90	'DR'	-0.29	-3.31	0.00	-2.20	'DR'	-0.21	-1.56	0.00	-1.05
Jeans CF Wk 20	'CF'	-2.57	0.00	-12.56	-10.71	'CF'	-0.27	-0.01	-6.99	-4.85	'CF'	-0.12	-0.05	-2.56	-2.02
Jeans TY Wk 20	**'DR'**	**-2.07**	**-2.00**	**-0.71**	**-7.50**	**'DR'**	**-0.42**	**-5.74**	**-0.30**	**-3.72**	**'DR'**	**-0.19**	**-2.43**	**-0.17**	**-1.48**
Shovel AF Wk 24	'AF'	0.00	-1.47	-0.22	-0.51	'AF'	0.00	-1.23	-0.22	-0.56	'AF'	0.00	-0.80	-0.17	-0.45
Shovel DR Wk 24	'DR'	-0.35	-1.05	0.00	-0.62	'DR'	-0.36	-1.01	0.00	-0.66	'DR'	-0.32	-0.89	0.00	-0.67
Shovel CF Wk 24	'CF'	-0.91	0.00	-1.38	-0.26	'CF'	-1.09	0.00	-1.15	-0.27	'CF'	-0.43	0.00	-0.58	-0.23
Shovel TY Wk 24	**'DR'**	**-0.42**	**-1.05**	**-0.08**	**-0.09**	'TY'	-0.41	-0.98	-0.09	-0.08	'TY'	-0.37	-0.85	-0.15	-0.04
Sneakers AF Wk 24	'AF'	0.00	-1.24	-0.19	-0.50	'AF'	0.00	-1.08	-0.23	-0.62	'AF'	0.00	-0.76	-0.16	-0.50
Sneakers DR Wk 24	'DR'	-0.37	-1.17	0.00	-0.67	'DR'	-0.41	-0.99	0.00	-0.57	'DR'	-0.26	-0.79	0.00	-0.52
Sneakers CF Wk 24	'CF'	-0.75	0.00	-1.64	-0.30	'CF'	-1.03	0.00	-1.30	-0.34	'CF'	-0.47	0.00	-0.69	-0.25
Sneakers TY Wk 24	**'DR'**	**-0.26**	**-1.42**	**-0.20**	**-0.48**	**'DR'**	**-0.23**	**-1.13**	**-0.21**	**-0.29**	'TY'	-0.25	-0.88	-0.17	-0.08
Jeans AF Wk 24	**'DR'**	**-2.32**	**-11.92**	**-1.95**	**-9.52**	**'DR'**	**-0.21**	**-6.85**	**-0.20**	**-4.75**	**'DR'**	**-0.09**	**-2.69**	**-0.07**	**-1.91**
Jeans DR Wk 24	'DR'	-1.24	-7.37	0.00	-4.80	'DR'	-0.11	-4.35	-0.06	-2.53	'DR'	-0.14	-1.82	-0.03	-1.13
Jeans CF Wk 24	'CF'	-1.73	0.00	-9.45	-7.05	'CF'	-5.41	-0.02	-0.14	-3.25	'CF'	-2.00	-0.04	-0.13	-1.39
Jeans TY Wk 24	**'DR'**	**-1.80**	**-9.50**	**-1.49**	**-7.53**	**'DR'**	**-0.23**	**-5.45**	**-0.22**	**-3.67**	**'DR'**	**-0.13**	**-2.26**	**-0.04**	**-1.45**

Table H6. Bagged trees using random forests classification and scores for the soils collected from t-shirts over one year (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples bolded indicate the evidence failed to classify. Samples bolded and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shirt AF 9-5-14	'AF'	0.56	0.11	0.21	0.12	'AF'	0.61	0.06	0.22	0.11	'AF'	0.70	0.05	0.16	0.10
Shirt DR 9-5-14	'DR'	0.14	0.05	0.74	0.07	'DR'	0.22	0.04	0.63	0.12	'DR'	0.11	0.04	0.68	0.17
Shirt CF 9-5-14	'CF'	0.03	0.91	0.03	0.03	'CF'	0.05	0.90	0.04	0.01	'CF'	0.08	0.80	0.08	0.04
Shirt TY 9-5-14	'TY'	0.07	0.02	0.18	0.73	'TY'	0.12	0.02	0.25	0.62	'TY'	0.18	0.03	0.23	0.56
Shirt AF 10-3-14	'AF'	0.40	0.18	0.22	0.20	'AF'	0.48	0.12	0.29	0.11	'AF'	0.49	0.10	0.25	0.16
Shirt CF10-3-14	'CF'	0.08	0.80	0.05	0.06	'CF'	0.06	0.84	0.07	0.02	'CF'	0.10	0.76	0.10	0.05
Shirt DR 10-3-14	'DR'	0.22	0.17	0.44	0.17	'DR'	0.24	0.09	0.50	0.17	'DR'	0.18	0.11	0.52	0.19
Shirt TY 10-3-14	**'DR'**	**0.17**	**0.04**	**0.40**	**0.39**	'TY'	0.20	0.06	0.32	0.42	'TY'	0.22	0.07	0.29	0.43
Shirt AF 11-10-14	'AF'	0.38	0.19	0.24	0.20	'AF'	0.36	0.18	0.29	0.17	'AF'	0.38	0.13	0.32	0.18
Shirt DR 11-10-14	'DR'	0.17	0.17	0.50	0.17	'DR'	0.23	0.11	0.51	0.15	'DR'	0.23	0.11	0.49	0.18
Shirt CF 11-10-14	'CF'	0.09	0.74	0.10	0.07	'CF'	0.10	0.76	0.11	0.04	'CF'	0.14	0.65	0.14	0.07
Shirt TY 11-10-14	'TY'	0.17	0.03	0.29	0.51	'TY'	0.20	0.02	0.23	0.55	'TY'	0.25	0.05	0.25	0.45
Shirt AF 1-7-15	'AF'	0.35	0.21	0.28	0.15	'AF'	0.34	0.20	0.33	0.13	'AF'	0.44	0.14	0.28	0.14
Shirt DR 1-7-15	'DR'	0.19	0.06	0.55	0.20	'DR'	0.30	0.07	0.47	0.16	'DR'	0.24	0.09	0.48	0.19
Shirt CF 1-7-15	'CF'	0.12	0.65	0.15	0.08	'CF'	0.14	0.67	0.15	0.05	'CF'	0.17	0.56	0.19	0.08
Shirt TY 1-7-15	'TY'	0.20	0.03	0.34	0.43	**'DR'**	**0.21**	**0.05**	**0.38**	**0.36**	'TY'	0.24	0.06	0.26	0.45
Shirt AF 2-10-15	'AF'	0.33	0.14	0.29	0.23	**'DR'**	**0.31**	**0.16**	**0.34**	**0.19**	'AF'	0.37	0.11	0.35	0.18
Shirt DR 2-10-15	'DR'	0.26	0.10	0.51	0.14	'DR'	0.28	0.10	0.51	0.10	'DR'	0.21	0.10	0.57	0.13
Shirt CF 2-10-15	'CF'	0.09	0.75	0.07	0.09	'CF'	0.07	0.82	0.08	0.04	'CF'	0.13	0.69	0.12	0.06
Shirt TY 2-10-15	'TY'	0.20	0.06	0.26	0.47	'TY'	0.21	0.07	0.35	0.36	'TY'	0.22	0.06	0.29	0.43

Table H6 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 3-6-15	'AF'	0.31	0.22	0.27	0.20	**'DR'**	**0.31**	**0.20**	**0.33**	**0.16**	**'DR'**	**0.34**	**0.16**	**0.34**	**0.17**
Shirt DR 3-6-15	'DR'	0.28	0.08	0.48	0.16	'DR'	0.31	0.07	0.47	0.15	'DR'	0.31	0.08	0.47	0.15
Shirt CF 3-6-15	'CF'	0.08	0.78	0.07	0.08	'CF'	0.08	0.80	0.08	0.04	'CF'	0.14	0.66	0.13	0.07
Shirt TY 3-6-15	'TY'	0.24	0.09	0.32	0.35	**'DR'**	**0.24**	**0.09**	**0.34**	**0.33**	'TY'	0.23	0.07	0.30	0.41
Shirt AF 4-10-15	'AF'	0.34	0.21	0.20	0.24	'AF'	0.33	0.18	0.31	0.18	'AF'	0.40	0.15	0.29	0.17
Shirt DR 4-10-15	'DR'	0.24	0.14	0.51	0.11	'DR'	0.29	0.09	0.48	0.14	'DR'	0.24	0.10	0.49	0.18
Shirt CF 4-10-15	'CF'	0.09	0.74	0.08	0.08	'CF'	0.10	0.75	0.09	0.05	'CF'	0.13	0.68	0.13	0.06
Shirt TY 4-10-15	'TY'	0.19	0.10	0.23	0.48	'TY'	0.18	0.08	0.36	0.38	'TY'	0.19	0.08	0.28	0.44
Shirt AF 5-11-15	'AF'	0.31	0.20	0.24	0.25	**'DR'**	**0.31**	**0.18**	**0.31**	**0.19**	'AF'	0.37	0.14	0.29	0.19
Shirt DR 5-11-15	'DR'	0.25	0.13	0.48	0.15	'DR'	0.29	0.10	0.49	0.12	'DR'	0.27	0.12	0.45	0.16
Shirt CF 5-11-15	'CF'	0.12	0.67	0.10	0.10	'CF'	0.11	0.65	0.17	0.08	'CF'	0.17	0.57	0.17	0.09
Shirt TY 5-11-15	'TY'	0.21	0.12	0.31	0.36	'TY'	0.20	0.09	0.31	0.39	'TY'	0.20	0.07	0.29	0.44
Shirt AF 6-5-15	'AF'	0.39	0.13	0.24	0.25	'AF'	0.32	0.08	0.31	0.29	'AF'	0.45	0.09	0.27	0.20
Shirt DR 6-5-15	'DR'	0.25	0.08	0.56	0.10	'DR'	0.29	0.06	0.53	0.12	'DR'	0.23	0.06	0.53	0.18
Shirt CF 6-5-15	'CF'	0.09	0.75	0.07	0.09	'CF'	0.09	0.77	0.10	0.04	'CF'	0.15	0.64	0.14	0.07
Shirt TY 6-5-15	'TY'	0.19	0.07	0.28	0.45	'TY'	0.20	0.07	0.33	0.40	'TY'	0.21	0.06	0.28	0.46
Shirt AF 7-6-15	'AF'	0.45	0.12	0.27	0.16	'AF'	0.44	0.09	0.32	0.15	'AF'	0.54	0.07	0.25	0.14
Shirt DR 7-6-15	'DR'	0.27	0.20	0.43	0.10	'DR'	0.27	0.16	0.48	0.08	'DR'	0.26	0.15	0.45	0.14
Shirt CF 7-6-15	'CF'	0.11	0.67	0.12	0.10	'CF'	0.15	0.59	0.18	0.08	'CF'	0.20	0.49	0.21	0.11
Shirt TY 7-6-15	'TY'	0.25	0.08	0.28	0.39	**'DR'**	**0.23**	**0.07**	**0.36**	**0.34**	'TY'	0.30	0.06	0.25	0.38
Shirt AF 8-4-15	'AF'	0.34	0.19	0.24	0.23	'AF'	0.31	0.19	0.31	0.19	'AF'	0.45	0.12	0.28	0.15
Shirt DR 8-4-15	'DR'	0.21	0.20	0.51	0.08	'DR'	0.24	0.12	0.56	0.08	'DR'	0.23	0.14	0.50	0.13
Shirt CF 8-4-15	'CF'	0.12	0.68	0.09	0.12	'CF'	0.13	0.66	0.13	0.08	'CF'	0.19	0.56	0.15	0.10
Shirt TY 8-4-15	'TY'	0.23	0.09	0.28	0.40	**'DR'**	**0.22**	**0.09**	**0.36**	**0.32**	'TY'	0.26	0.08	0.28	0.38

Table H6 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shirt AF 9-4-15	'AF'	0.33	0.19	0.24	0.24	**'DR'**	**0.32**	**0.14**	**0.35**	**0.19**	'AF'	0.40	0.10	0.30	0.20
Shirt DR 9-4-15	'DR'	0.24	0.17	0.44	0.14	'DR'	0.28	0.11	0.48	0.12	'DR'	0.26	0.12	0.45	0.17
Shirt CF 9-4-15	'CF'	0.09	0.71	0.12	0.08	'CF'	0.13	0.68	0.13	0.06	'CF'	0.14	0.61	0.18	0.08
Shirt TY 9-4-15	'TY'	0.17	0.15	0.25	0.43	'TY'	0.21	0.09	0.33	0.37	**'AF'**	**0.30**	**0.21**	**0.28**	**0.22**

Table H7. Bagged trees using random forests classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 0	'AF'	0.60	0.09	0.19	0.12	'AF'	0.68	0.06	0.17	0.09	'AF'	0.71	0.08	0.13	0.08
Shovel DR Day 0	'DR'	0.19	0.02	0.61	0.19	'DR'	0.25	0.03	0.60	0.12	'DR'	0.16	0.02	0.65	0.17
Shovel CF Day 0	'CF'	0.01	0.96	0.01	0.02	'CF'	0.02	0.95	0.02	0.01	'CF'	0.01	0.96	0.02	0.01
Shovel TY Day 0	'TY'	0.37	0.04	0.21	0.38	**'AF'**	**0.42**	**0.05**	**0.15**	**0.38**	'TY'	0.32	0.04	0.23	0.42
Sneakers AF Day 0	'AF'	0.70	0.05	0.12	0.13	'AF'	0.73	0.08	0.12	0.07	'AF'	0.76	0.08	0.10	0.06
Sneakers DR Day 0	'DR'	0.09	0.00	0.78	0.12	'DR'	0.15	0.05	0.69	0.12	'DR'	0.10	0.05	0.64	0.22
Sneakers CF Day 0	'CF'	0.00	0.99	0.00	0.01	'CF'	0.00	0.99	0.00	0.01	'CF'	0.01	0.98	0.01	0.00
Sneakers TY Day 0	'TY'	0.29	0.01	0.18	0.52	'TY'	0.30	0.03	0.17	0.50	'TY'	0.22	0.04	0.21	0.54
Jeans AF Day 0	'AF'	0.64	0.02	0.12	0.23	'AF'	0.72	0.05	0.11	0.12	'AF'	0.75	0.08	0.10	0.08
Jeans DR Day 0	'DR'	0.22	0.01	0.58	0.19	'DR'	0.21	0.04	0.63	0.12	'DR'	0.19	0.05	0.62	0.14
Jeans CF Day 0	'CF'	0.00	0.99	0.01	0.00	'CF'	0.02	0.97	0.01	0.00	'CF'	0.01	0.97	0.01	0.01
Jeans TY Day 0	'TY'	0.21	0.04	0.29	0.46	'TY'	0.29	0.04	0.28	0.39	'TY'	0.25	0.06	0.31	0.39
Shovel AF Day 1	'AF'	0.60	0.06	0.17	0.17	'AF'	0.65	0.09	0.16	0.10	'AF'	0.65	0.11	0.13	0.11
Shovel DR Day 1	'DR'	0.16	0.01	0.59	0.24	'DR'	0.20	0.03	0.57	0.19	'DR'	0.15	0.05	0.63	0.17
Shovel CF Day 1	'CF'	0.00	0.99	0.00	0.01	'CF'	0.00	0.97	0.02	0.00	'CF'	0.01	0.97	0.02	0.00
Shovel TY Day 1	'TY'	0.19	0.02	0.26	0.54	'TY'	0.29	0.02	0.25	0.44	'TY'	0.24	0.03	0.22	0.52
Sneakers AF Day 1	'AF'	0.61	0.02	0.17	0.20	'AF'	0.69	0.04	0.16	0.11	'AF'	0.70	0.05	0.14	0.11
Sneakers DR Day 1	'DR'	0.11	0.01	0.68	0.20	'DR'	0.16	0.04	0.66	0.14	'DR'	0.13	0.06	0.64	0.18
Sneakers CF Day 1	'CF'	0.01	0.96	0.02	0.02	'CF'	0.01	0.96	0.01	0.01	'CF'	0.01	0.96	0.02	0.01
Sneakers TY Day 1	**'AF'**	**0.42**	**0.05**	**0.14**	**0.39**	**'AF'**	**0.46**	**0.02**	**0.13**	**0.38**	'TY'	0.32	0.03	0.17	0.49

Table H7 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Jeans AF Day 1	'AF'	0.49	0.17	0.26	0.08	'AF'	0.54	0.11	0.26	0.09	'AF'	0.63	0.11	0.17	0.09
Jeans DR Day 1	'DR'	0.17	0.02	0.67	0.15	'DR'	0.18	0.03	0.70	0.09	'DR'	0.14	0.04	0.70	0.12
Jeans CF Day 1	'CF'	0.02	0.94	0.02	0.02	'CF'	0.05	0.90	0.04	0.02	'CF'	0.02	0.93	0.04	0.01
Jeans TY Day 1	**'AF'**	**0.41**	**0.02**	**0.19**	**0.37**	**'AF'**	**0.40**	**0.02**	**0.20**	**0.38**	'TY'	0.27	0.03	0.23	0.48
Shovel AF Day 2	'AF'	0.58	0.02	0.14	0.26	'AF'	0.63	0.07	0.17	0.12	'AF'	0.69	0.07	0.13	0.11
Shovel DR Day 2	'DR'	0.14	0.01	0.67	0.19	'DR'	0.21	0.01	0.67	0.11	'DR'	0.17	0.03	0.66	0.14
Shovel CF Day 2	'CF'	0.02	0.96	0.01	0.02	'CF'	0.03	0.94	0.02	0.01	'CF'	0.01	0.96	0.02	0.01
Shovel TY Day 2	'TY'	0.19	0.01	0.20	0.60	'TY'	0.26	0.02	0.20	0.52	'TY'	0.24	0.03	0.24	0.49
Sneakers AF Day 2	'AF'	0.59	0.01	0.21	0.19	'AF'	0.67	0.02	0.21	0.09	'AF'	0.67	0.05	0.16	0.13
Sneakers DR Day 2	'DR'	0.13	0.01	0.63	0.24	'DR'	0.19	0.04	0.63	0.14	'DR'	0.15	0.04	0.64	0.17
Sneakers CF Day 2	'CF'	0.00	0.99	0.00	0.01	'CF'	0.00	0.98	0.01	0.01	'CF'	0.01	0.98	0.01	0.01
Sneakers TY Day 2	'TY'	0.22	0.02	0.21	0.55	'TY'	0.30	0.01	0.20	0.49	'TY'	0.23	0.06	0.25	0.46
Jeans AF Day 2	'AF'	0.45	0.22	0.23	0.10	'AF'	0.55	0.12	0.26	0.07	'AF'	0.61	0.12	0.19	0.08
Jeans DR Day 2	'DR'	0.15	0.02	0.64	0.19	'DR'	0.17	0.09	0.60	0.14	'DR'	0.14	0.09	0.63	0.14
Jeans CF Day 2	'CF'	0.04	0.84	0.06	0.05	'CF'	0.07	0.83	0.07	0.03	'CF'	0.05	0.83	0.07	0.05
Jeans TY Day 2	'TY'	0.24	0.02	0.36	0.39	'TY'	0.23	0.05	0.32	0.40	'TY'	0.26	0.09	0.27	0.39
Shovel AF Day 3	'AF'	0.59	0.02	0.23	0.16	'AF'	0.68	0.04	0.21	0.08	'AF'	0.69	0.05	0.16	0.10
Shovel DR Day 3	'DR'	0.18	0.02	0.63	0.17	'DR'	0.19	0.05	0.62	0.15	'DR'	0.15	0.07	0.64	0.14
Shovel CF Day 3	'CF'	0.01	0.96	0.01	0.02	'CF'	0.01	0.97	0.01	0.01	'CF'	0.01	0.97	0.02	0.01
Shovel TY Day 3	'TY'	0.20	0.02	0.21	0.56	'TY'	0.19	0.03	0.21	0.58	'TY'	0.23	0.03	0.23	0.52
Sneakers AF Day 3	'AF'	0.48	0.08	0.23	0.21	'AF'	0.58	0.06	0.26	0.10	'AF'	0.64	0.08	0.18	0.10
Sneakers DR Day 3	'DR'	0.09	0.02	0.67	0.22	'DR'	0.13	0.08	0.64	0.15	'DR'	0.12	0.09	0.61	0.17
Sneakers CF Day 3	'CF'	0.00	0.98	0.00	0.01	'CF'	0.01	0.99	0.00	0.00	'CF'	0.01	0.97	0.01	0.01
Sneakers TY Day 3	'TY'	0.23	0.03	0.27	0.48	'TY'	0.16	0.06	0.29	0.49	'TY'	0.20	0.05	0.22	0.53

Table H7 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Jeans AF Day 3	'AF'	0.54	0.12	0.20	0.15	'AF'	0.59	0.12	0.21	0.08	'AF'	0.57	0.12	0.19	0.12
Jeans DR Day 3	'DR'	0.12	0.02	0.53	0.33	'DR'	0.16	0.04	0.62	0.18	'DR'	0.17	0.06	0.59	0.19
Jeans CF Day 3	'CF'	0.04	0.87	0.05	0.04	'CF'	0.07	0.83	0.08	0.02	'CF'	0.07	0.81	0.08	0.04
Jeans TY Day 3	'TY'	0.23	0.01	0.28	0.49	'TY'	0.30	0.03	0.30	0.36	'TY'	0.26	0.07	0.31	0.36
Shovel AF Day 4	'AF'	0.57	0.03	0.25	0.15	'AF'	0.58	0.08	0.28	0.06	'AF'	0.59	0.11	0.19	0.12
Shovel DR Day 4	'DR'	0.18	0.01	0.59	0.22	'DR'	0.27	0.05	0.52	0.16	'DR'	0.19	0.08	0.55	0.18
Shovel CF Day 4	'CF'	0.02	0.95	0.02	0.01	'CF'	0.03	0.95	0.01	0.01	'CF'	0.02	0.95	0.02	0.02
Shovel TY Day 4	'TY'	0.13	0.06	0.27	0.54	'TY'	0.22	0.06	0.31	0.41	'TY'	0.21	0.07	0.32	0.40
Sneakers AF Day 4	'AF'	0.47	0.02	0.17	0.34	'AF'	0.59	0.05	0.20	0.16	'AF'	0.60	0.09	0.18	0.14
Sneakers DR Day 4	'DR'	0.10	0.04	0.69	0.17	'DR'	0.16	0.08	0.67	0.09	'DR'	0.10	0.08	0.68	0.15
Sneakers CF Day 4	'CF'	0.00	0.99	0.00	0.01	'CF'	0.01	0.97	0.01	0.01	'CF'	0.01	0.98	0.02	0.00
Sneakers TY Day 4	**'DR'**	**0.26**	**0.04**	**0.35**	**0.35**	'TY'	0.23	0.08	0.32	0.37	'TY'	0.28	0.09	0.28	0.34
Jeans AF Day 4	'AF'	0.45	0.10	0.31	0.14	'AF'	0.52	0.09	0.29	0.10	'AF'	0.57	0.14	0.19	0.10
Jeans DR Day 4	'DR'	0.14	0.03	0.62	0.20	'DR'	0.15	0.05	0.63	0.16	'DR'	0.15	0.07	0.63	0.15
Jeans CF Day 4	'CF'	0.01	0.96	0.01	0.02	'CF'	0.05	0.90	0.04	0.01	'CF'	0.04	0.91	0.04	0.02
Jeans TY Day 4	'TY'	0.27	0.09	0.26	0.39	'TY'	0.31	0.07	0.28	0.34	'TY'	0.27	0.06	0.30	0.36
Shovel AF Day 5	'AF'	0.53	0.04	0.14	0.29	'AF'	0.64	0.08	0.19	0.08	'AF'	0.66	0.09	0.16	0.09
Shovel DR Day 5	'DR'	0.17	0.03	0.56	0.24	'DR'	0.25	0.06	0.55	0.14	'DR'	0.19	0.08	0.56	0.17
Shovel CF Day 5	'CF'	0.01	0.96	0.01	0.02	'CF'	0.02	0.94	0.03	0.01	'CF'	0.02	0.94	0.03	0.01
Shovel TY Day 5	'TY'	0.24	0.06	0.26	0.44	'TY'	0.30	0.06	0.28	0.36	'TY'	0.21	0.08	0.25	0.46
Sneakers AF Day 5	'AF'	0.37	0.08	0.23	0.32	'AF'	0.48	0.07	0.28	0.18	'AF'	0.54	0.10	0.21	0.15
Sneakers DR Day 5	'DR'	0.06	0.01	0.72	0.21	'DR'	0.11	0.05	0.67	0.16	'DR'	0.13	0.06	0.64	0.17
Sneakers CF Day 5	'CF'	0.01	0.95	0.02	0.02	'CF'	0.02	0.94	0.03	0.01	'CF'	0.02	0.94	0.03	0.01
Sneakers TY Day 5	'TY'	0.15	0.07	0.30	0.48	'TY'	0.21	0.09	0.30	0.40	**'DR'**	**0.23**	**0.11**	**0.34**	**0.32**

Table H7 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Jeans AF Day 5	'AF'	0.35	0.25	0.27	0.13	'AF'	0.45	0.17	0.30	0.08	'AF'	0.45	0.19	0.23	0.13
Jeans DR Day 5	'DR'	0.16	0.01	0.52	0.31	'DR'	0.19	0.05	0.62	0.15	'DR'	0.18	0.07	0.58	0.17
Jeans CF Day 5	'CF'	0.05	0.83	0.08	0.04	'CF'	0.07	0.79	0.11	0.03	'CF'	0.07	0.82	0.08	0.04
Jeans TY Day 5	'TY'	0.22	0.07	0.30	0.40	**'DR'**	**0.28**	**0.09**	**0.34**	**0.28**	**'DR'**	**0.28**	**0.10**	**0.32**	**0.31**
Shovel AF Day 6	'AF'	0.42	0.07	0.18	0.33	'AF'	0.56	0.06	0.19	0.19	'AF'	0.56	0.12	0.18	0.15
Shovel CF Day 6	'CF'	0.01	0.96	0.01	0.02	'CF'	0.02	0.92	0.05	0.02	'CF'	0.02	0.92	0.05	0.02
Shovel DR Day 6	'DR'	0.21	0.06	0.49	0.24	'DR'	0.24	0.08	0.55	0.12	'DR'	0.21	0.08	0.55	0.17
Sneakers AF Day 6	'AF'	0.47	0.05	0.28	0.20	'AF'	0.52	0.06	0.27	0.15	'AF'	0.60	0.06	0.22	0.12
Shovel TY Day 6	**'DR'**	**0.34**	**0.07**	**0.35**	**0.24**	**'AF'**	**0.45**	**0.08**	**0.33**	**0.14**	**'AF'**	**0.48**	**0.13**	**0.25**	**0.14**
Sneakers DR Day 6	'DR'	0.09	0.01	0.72	0.18	'DR'	0.12	0.03	0.76	0.09	'DR'	0.12	0.04	0.73	0.11
Sneakers CF Day 6	'CF'	0.02	0.89	0.03	0.06	'CF'	0.02	0.95	0.01	0.01	'CF'	0.02	0.95	0.02	0.01
Sneakers TY Day 6	'TY'	0.22	0.04	0.22	0.52	'TY'	0.16	0.03	0.29	0.52	'TY'	0.17	0.07	0.21	0.55
Jeans AF Day 6	'AF'	0.59	0.06	0.22	0.13	'AF'	0.58	0.12	0.24	0.06	'AF'	0.58	0.12	0.21	0.09
Jeans DR Day 6	'DR'	0.15	0.04	0.60	0.22	'DR'	0.19	0.06	0.65	0.10	'DR'	0.15	0.08	0.62	0.15
Jeans CF Day 6	'CF'	0.03	0.91	0.04	0.02	'CF'	0.06	0.87	0.04	0.02	'CF'	0.06	0.86	0.06	0.03
Jeans TY Day 6	'TY'	0.17	0.02	0.27	0.54	'TY'	0.23	0.07	0.32	0.38	'TY'	0.23	0.08	0.32	0.37

Table H8 Bagged trees using random forests classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 1	'AF'	0.38	0.17	0.31	0.13	'AF'	0.46	0.12	0.29	0.13	'AF'	0.56	0.12	0.22	0.10
Shovel DR Wk 1	'DR'	0.38	0.09	0.46	0.07	'DR'	0.28	0.09	0.45	0.18	'DR'	0.30	0.07	0.47	0.15
Shovel CF Wk 1	'CF'	0.01	0.95	0.02	0.02	'CF'	0.01	0.94	0.05	0.00	'CF'	0.05	0.87	0.06	0.03
Shovel TY Wk 1	'TY'	0.21	0.05	0.29	0.45	'TY'	0.23	0.09	0.23	0.45	'TY'	0.19	0.06	0.25	0.50
Sneakers AF Wk 1	'AF'	0.40	0.12	0.31	0.17	'AF'	0.51	0.10	0.23	0.16	'AF'	0.64	0.09	0.18	0.10
Sneakers DR Wk 1	'DR'	0.27	0.04	0.53	0.16	'DR'	0.22	0.08	0.57	0.14	'DR'	0.18	0.05	0.60	0.17
Sneakers CF Wk 1	'CF'	0.01	0.96	0.02	0.02	'CF'	0.01	0.97	0.03	0.00	'CF'	0.02	0.94	0.03	0.01
Sneakers TY Wk 1	'TY'	0.18	0.06	0.26	0.50	'TY'	0.20	0.08	0.25	0.46	'TY'	0.21	0.05	0.24	0.50
Jeans AF Wk 1	'AF'	0.39	0.16	0.33	0.11	'AF'	0.47	0.14	0.29	0.10	'AF'	0.51	0.13	0.24	0.12
Jeans DR Wk 1	'DR'	0.30	0.06	0.45	0.19	'DR'	0.24	0.09	0.50	0.17	'DR'	0.30	0.06	0.52	0.12
Jeans CF Wk 1	'CF'	0.02	0.91	0.05	0.02	'CF'	0.01	0.94	0.05	0.00	'CF'	0.02	0.93	0.03	0.02
Jeans TY Wk 1	'TY'	0.28	0.09	0.28	0.35	'TY'	0.26	0.07	0.33	0.34	'TY'	0.23	0.07	0.31	0.39
Shovel AF Wk 2	'AF'	0.42	0.19	0.26	0.12	'AF'	0.44	0.14	0.26	0.16	'AF'	0.50	0.13	0.25	0.13
Shovel DR Wk 2	'DR'	0.30	0.12	0.42	0.16	'DR'	0.25	0.18	0.40	0.17	'DR'	0.26	0.14	0.46	0.15
Shovel CF Wk 2	'CF'	0.01	0.95	0.02	0.02	'CF'	0.00	0.94	0.06	0.00	'CF'	0.04	0.92	0.02	0.02
Shovel TY Wk 2	'TY'	0.27	0.09	0.29	0.34	'TY'	0.25	0.10	0.31	0.34	'TY'	0.30	0.08	0.29	0.34
Sneakers AF Wk 2	'AF'	0.45	0.20	0.24	0.12	'AF'	0.47	0.14	0.24	0.15	'AF'	0.52	0.12	0.21	0.16
Sneakers DR Wk 2	'DR'	0.27	0.06	0.51	0.16	'DR'	0.22	0.10	0.51	0.17	'DR'	0.21	0.08	0.56	0.15
Sneakers CF Wk 2	'CF'	0.04	0.85	0.07	0.04	'CF'	0.01	0.91	0.06	0.01	'CF'	0.03	0.91	0.05	0.01
Sneakers TY Wk 2	'TY'	0.21	0.07	0.32	0.40	'TY'	0.21	0.09	0.29	0.41	'TY'	0.26	0.07	0.27	0.40
Jeans AF Wk 2	'AF'	0.42	0.13	0.34	0.12	'AF'	0.49	0.12	0.26	0.12	'AF'	0.60	0.08	0.22	0.11
Jeans DR Wk 2	'DR'	0.18	0.08	0.50	0.23	'DR'	0.21	0.10	0.53	0.16	'DR'	0.25	0.08	0.53	0.14
Jeans CF Wk 2	'CF'	0.06	0.78	0.10	0.07	'CF'	0.05	0.86	0.08	0.01	'CF'	0.07	0.81	0.08	0.05
Jeans TY Wk 2	'TY'	0.33	0.06	0.24	0.36	'TY'	0.29	0.10	0.30	0.32	**'AF'**	**0.35**	**0.07**	**0.29**	**0.29**

Table H8 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 3	'AF'	0.42	0.19	0.21	0.18	'AF'	0.43	0.17	0.25	0.15	'AF'	0.55	0.14	0.22	0.10
Shovel DR Wk 3	'DR'	0.19	0.14	0.51	0.16	'DR'	0.20	0.14	0.54	0.11	'DR'	0.23	0.10	0.54	0.13
Shovel CF Wk 3	'CF'	0.05	0.79	0.09	0.06	'CF'	0.04	0.85	0.08	0.02	'CF'	0.06	0.84	0.08	0.03
Shovel TY Wk 3	'TY'	0.25	0.08	0.30	0.36	'TY'	0.24	0.07	0.31	0.38	'TY'	0.28	0.08	0.27	0.37
Sneakers AF Wk 3	'AF'	0.51	0.13	0.24	0.12	'AF'	0.41	0.12	0.32	0.15	'AF'	0.55	0.09	0.26	0.10
Sneakers DR Wk 3	'DR'	0.18	0.08	0.58	0.16	'DR'	0.24	0.10	0.51	0.16	'DR'	0.27	0.08	0.51	0.15
Sneakers CF Wk 3	'CF'	0.03	0.84	0.08	0.05	'CF'	0.03	0.88	0.08	0.01	'CF'	0.04	0.87	0.07	0.03
Sneakers TY Wk 3	**'DR'**	**0.20**	**0.11**	**0.35**	**0.34**	'TY'	0.24	0.08	0.31	0.36	'TY'	0.27	0.07	0.33	0.33
Jeans AF Wk 3	'AF'	0.37	0.26	0.27	0.09	'AF'	0.40	0.19	0.32	0.09	'AF'	0.52	0.17	0.22	0.09
Jeans DR Wk 3	'DR'	0.29	0.09	0.41	0.21	'DR'	0.27	0.07	0.45	0.21	'DR'	0.28	0.06	0.47	0.19
Jeans CF Wk 3	'CF'	0.08	0.71	0.13	0.08	'CF'	0.08	0.76	0.13	0.03	'CF'	0.10	0.72	0.12	0.06
Jeans TY Wk 3	**'AF'**	**0.35**	**0.07**	**0.24**	**0.34**	**'AF'**	**0.30**	**0.10**	**0.30**	**0.30**	**'AF'**	**0.36**	**0.07**	**0.30**	**0.28**
Shovel AF Wk 4	'AF'	0.32	0.20	0.32	0.16	'AF'	0.39	0.16	0.34	0.10	'AF'	0.45	0.15	0.26	0.14
Shovel DR Wk 4	'DR'	0.32	0.14	0.40	0.14	'DR'	0.27	0.13	0.46	0.14	'DR'	0.29	0.11	0.47	0.13
Shovel CF Wk 4	'CF'	0.04	0.83	0.08	0.05	'CF'	0.03	0.89	0.07	0.01	'CF'	0.06	0.84	0.07	0.04
Shovel TY Wk 4	**'DR'**	**0.19**	**0.10**	**0.36**	**0.36**	**'DR'**	**0.22**	**0.12**	**0.36**	**0.30**	**'DR'**	**0.27**	**0.07**	**0.34**	**0.33**
Sneakers AF Wk 4	**'DR'**	**0.30**	**0.18**	**0.32**	**0.20**	'AF'	0.36	0.15	0.30	0.18	'AF'	0.43	0.14	0.26	0.18
Sneakers DR Wk 4	'DR'	0.24	0.13	0.49	0.14	'DR'	0.22	0.13	0.51	0.14	'DR'	0.26	0.12	0.49	0.13
Sneakers CF Wk 4	'CF'	0.03	0.84	0.08	0.05	'CF'	0.03	0.89	0.07	0.01	'CF'	0.04	0.88	0.06	0.03
Sneakers TY Wk 4	'TY'	0.21	0.15	0.29	0.35	'TY'	0.26	0.12	0.28	0.35	'TY'	0.30	0.12	0.27	0.32
Jeans AF Wk 4	'AF'	0.39	0.18	0.33	0.11	'AF'	0.45	0.12	0.35	0.08	'AF'	0.53	0.10	0.28	0.09
Jeans DR Wk 4	'DR'	0.18	0.10	0.51	0.21	'DR'	0.20	0.12	0.54	0.13	'DR'	0.25	0.08	0.54	0.14
Jeans CF Wk 4	'CF'	0.09	0.65	0.17	0.09	'CF'	0.07	0.75	0.16	0.03	'CF'	0.10	0.70	0.14	0.07
Jeans TY Wk 4	'AF'	0.32	0.14	0.23	0.31	'TY'	0.26	0.13	0.30	0.31	'TY'	0.29	0.10	0.29	0.32

Table H9. Bagged trees using random forests classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 5	'AF'	0.46	0.22	0.25	0.06	'AF'	0.48	0.20	0.23	0.08	'AF'	0.50	0.17	0.26	0.08
Shovel CF Wk 5	'CF'	0.14	0.68	0.14	0.05	'CF'	0.11	0.69	0.15	0.05	'CF'	0.11	0.72	0.12	0.06
Shovel DR Wk 5	'DR'	0.29	0.23	0.38	0.10	'DR'	0.25	0.18	0.43	0.14	'DR'	0.26	0.18	0.43	0.13
Shovel TY Wk 5	**'DR'**	**0.24**	**0.10**	**0.35**	**0.31**	'TY'	0.25	0.09	0.29	0.37	'TY'	0.28	0.09	0.26	0.37
Sneakers AF Wk 5	'AF'	0.53	0.14	0.22	0.11	'AF'	0.51	0.14	0.22	0.13	'AF'	0.52	0.12	0.24	0.12
Sneakers DR Wk 5	'DR'	0.22	0.14	0.53	0.11	'DR'	0.22	0.13	0.50	0.15	'DR'	0.21	0.13	0.52	0.14
Sneakers CF Wk 5	'CF'	0.05	0.87	0.06	0.02	'CF'	0.05	0.86	0.06	0.03	'CF'	0.06	0.85	0.06	0.03
Sneakers TY Wk 5	'TY'	0.26	0.11	0.24	0.39	'TY'	0.24	0.08	0.23	0.44	**'AF'**	**0.34**	**0.08**	**0.24**	**0.34**
Jeans AF Wk 5	'AF'	0.37	0.26	0.24	0.13	'AF'	0.40	0.19	0.28	0.12	'AF'	0.47	0.18	0.25	0.10
Jeans DR Wk 5	'DR'	0.28	0.13	0.40	0.18	'DR'	0.23	0.14	0.46	0.17	'DR'	0.17	0.13	0.56	0.15
Jeans CF Wk 5	'CF'	0.07	0.81	0.09	0.03	'CF'	0.05	0.85	0.08	0.02	'CF'	0.09	0.80	0.08	0.03
Jeans TY Wk 5	**'AF'**	**0.37**	**0.17**	**0.26**	**0.20**	'TY'	0.27	0.15	0.27	0.31	**'DR'**	**0.28**	**0.16**	**0.30**	**0.26**
Shovel AF Wk 6	'AF'	0.46	0.22	0.20	0.13	'AF'	0.36	0.19	0.29	0.16	'AF'	0.43	0.18	0.25	0.13
Shovel DR Wk 6	'DR'	0.31	0.11	0.44	0.13	'DR'	0.23	0.14	0.50	0.14	'DR'	0.28	0.14	0.46	0.13
Shovel CF Wk 6	'CF'	0.08	0.81	0.07	0.04	'CF'	0.06	0.82	0.11	0.01	'CF'	0.09	0.80	0.08	0.04
Shovel TY Wk 6	**'AF'**	**0.40**	**0.09**	**0.26**	**0.25**	'TY'	0.28	0.10	0.27	0.35	'TY'	0.28	0.12	0.29	0.32
Sneakers AF Wk 6	'AF'	0.47	0.20	0.20	0.14	'AF'	0.48	0.15	0.21	0.16	'AF'	0.52	0.14	0.21	0.14
Sneakers DR Wk 6	'DR'	0.24	0.16	0.49	0.11	'DR'	0.19	0.18	0.51	0.13	'DR'	0.20	0.17	0.50	0.14
Sneakers CF Wk 6	'CF'	0.10	0.77	0.09	0.04	'CF'	0.06	0.75	0.11	0.08	'CF'	0.11	0.73	0.09	0.07
Sneakers TY Wk 6	'TY'	0.06	0.16	0.15	0.63	'TY'	0.15	0.08	0.24	0.53	**'AF'**	**0.33**	**0.15**	**0.27**	**0.25**
Jeans AF Wk 6	'AF'	0.38	0.21	0.28	0.13	**'DR'**	**0.33**	**0.18**	**0.35**	**0.14**	'AF'	0.42	0.18	0.29	0.11
Jeans DR Wk 6	'DR'	0.22	0.17	0.44	0.18	'DR'	0.19	0.15	0.50	0.16	'DR'	0.22	0.15	0.51	0.13
Jeans CF Wk 6	'CF'	0.13	0.70	0.12	0.05	'CF'	0.12	0.62	0.18	0.08	'CF'	0.16	0.59	0.16	0.08
Jeans TY Wk 6	'TY'	0.27	0.20	0.23	0.30	'TY'	0.24	0.13	0.26	0.38	**'AF'**	**0.33**	**0.12**	**0.27**	**0.28**

Table H9 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 7	'AF'	0.45	0.22	0.08	0.25	'AF'	0.54	0.14	0.22	0.10	'AF'	0.51	0.17	0.25	0.08
Shovel DR Wk 7	'DR'	0.25	0.16	0.45	0.14	'DR'	0.21	0.16	0.46	0.17	'DR'	0.21	0.15	0.51	0.13
Shovel CF Wk 7	'CF'	0.13	0.73	0.10	0.04	'CF'	0.11	0.69	0.16	0.05	'CF'	0.13	0.71	0.10	0.06
Shovel TY Wk 7	**'DR'**	**0.31**	**0.10**	**0.35**	**0.25**	**'AF'**	**0.36**	**0.08**	**0.26**	**0.29**	**'AF'**	**0.32**	**0.11**	**0.29**	**0.29**
Sneakers AF Wk 7	'AF'	0.47	0.13	0.20	0.20	'AF'	0.51	0.10	0.18	0.21	'AF'	0.53	0.13	0.20	0.14
Sneakers DR Wk 7	'DR'	0.25	0.09	0.48	0.17	'DR'	0.19	0.12	0.48	0.21	'DR'	0.21	0.11	0.53	0.15
Sneakers CF Wk 7	'CF'	0.07	0.81	0.08	0.04	'CF'	0.05	0.80	0.08	0.07	'CF'	0.10	0.76	0.09	0.05
Sneakers TY Wk 7	**'DR'**	**0.26**	**0.14**	**0.32**	**0.28**	'TY'	0.22	0.08	0.30	0.39	'TY'	0.28	0.10	0.27	0.35
Jeans AF Wk 7	'AF'	0.43	0.23	0.26	0.09	**'DR'**	**0.35**	**0.16**	**0.36**	**0.13**	'AF'	0.47	0.15	0.28	0.10
Jeans DR Wk 7	'DR'	0.22	0.13	0.46	0.19	'DR'	0.21	0.13	0.48	0.18	'DR'	0.24	0.13	0.50	0.13
Jeans CF Wk 7	'CF'	0.16	0.61	0.15	0.07	'CF'	0.15	0.51	0.26	0.08	'CF'	0.22	0.49	0.20	0.09
Jeans TY Wk 7	**'DR'**	**0.29**	**0.22**	**0.31**	**0.19**	'TY'	0.26	0.13	0.30	0.31	'TY'	0.26	0.13	0.29	0.33
Shovel AF Wk 8	'AF'	0.42	0.20	0.20	0.18	'AF'	0.55	0.12	0.19	0.14	'AF'	0.53	0.14	0.22	0.11
Shovel DR Wk 8	'DR'	0.28	0.07	0.43	0.22	'DR'	0.07	0.04	0.77	0.13	'DR'	0.25	0.09	0.38	0.29
Shovel CF Wk 8	'CF'	0.14	0.54	0.16	0.16	'CF'	0.19	0.52	0.13	0.16	'CF'	0.12	0.73	0.10	0.05
Shovel TY Wk 8	'TY'	0.09	0.03	0.08	0.80	'TY'	0.27	0.08	0.27	0.38	'TY'	0.34	0.12	0.17	0.38
Sneakers AF Wk 8	'AF'	0.39	0.17	0.20	0.14	'AF'	0.53	0.12	0.23	0.12	'AF'	0.56	0.13	0.21	0.10
Sneakers DR Wk 8	'DR'	0.27	0.19	0.28	0.26	'DR'	0.23	0.10	0.37	0.29	'DR'	0.23	0.14	0.34	0.28
Sneakers CF Wk 8	'CF'	0.23	0.53	0.07	0.18	'CF'	0.07	0.79	0.11	0.03	'CF'	0.19	0.55	0.10	0.16
Sneakers TY Wk 8	**'AF'**	**0.56**	**0.10**	**0.10**	**0.24**	'TY'	0.31	0.16	0.22	0.31	'TY'	0.10	0.05	0.07	0.79
Jeans AF Wk 8	'AF'	0.41	0.21	0.29	0.09	'AF'	0.45	0.14	0.33	0.08	'AF'	0.53	0.13	0.26	0.08
Jeans DR Wk 8	'DR'	0.23	0.10	0.47	0.19	'DR'	0.19	0.10	0.51	0.20	'DR'	0.22	0.09	0.55	0.14
Jeans CF Wk 8	'CF'	0.18	0.31	0.25	0.26	'CF'	0.26	0.34	0.26	0.14	'CF'	0.18	0.55	0.19	0.09
Jeans TY Wk 8	**'AF'**	**0.31**	**0.10**	**0.31**	**0.28**	'TY'	0.32	0.08	0.28	0.32	**'AF'**	**0.40**	**0.07**	**0.28**	**0.25**

Table H10. Bagged trees using random forests classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and the April training set (n = 13 per habitat, except dirt road n = 7). The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 12	**'DR'**	**0.27**	**0.30**	**0.31**	**0.13**	**'DR'**	**0.32**	**0.17**	**0.36**	**0.15**	'AF'	0.39	0.19	0.27	0.15
Shovel DR Wk 12	**'AF'**	**0.37**	**0.25**	**0.26**	**0.12**	'DR'	0.33	0.15	0.40	0.12	'DR'	0.29	0.17	0.41	0.13
Shovel CF Wk 12	'CF'	0.22	0.56	0.15	0.07	'CF'	0.15	0.59	0.17	0.09	'CF'	0.17	0.52	0.20	0.12
Shovel TY Wk 12	'TY'	0.21	0.17	0.28	0.34	'TY'	0.19	0.13	0.33	0.35	'TY'	0.20	0.12	0.28	0.40
Sneakers AF Wk 12	'AF'	0.42	0.28	0.18	0.11	'AF'	0.44	0.18	0.28	0.09	'AF'	0.45	0.18	0.24	0.14
Sneakers DR Wk 12	'DR'	0.28	0.20	0.37	0.15	'DR'	0.25	0.14	0.50	0.11	'DR'	0.25	0.16	0.47	0.12
Sneakers CF Wk 12	'CF'	0.23	0.53	0.19	0.05	'CF'	0.19	0.58	0.18	0.05	'CF'	0.16	0.56	0.21	0.07
Sneakers TY Wk 12	**'AF'**	**0.30**	**0.24**	**0.24**	**0.23**	'TY'	0.25	0.13	0.30	0.32	'TY'	0.26	0.14	0.25	0.35
Jeans AF Wk 12	**'DR'**	**0.30**	**0.30**	**0.31**	**0.10**	'AF'	0.36	0.24	0.31	0.10	'AF'	0.33	0.24	0.29	0.15
Jeans DR Wk 12	'DR'	0.26	0.12	0.47	0.15	'DR'	0.23	0.13	0.54	0.11	'DR'	0.26	0.10	0.54	0.10
Jeans CF Wk 12	'CF'	0.15	0.58	0.20	0.07	'CF'	0.19	0.51	0.20	0.10	'CF'	0.21	0.44	0.23	0.11
Jeans TY Wk 12	**'DR'**	**0.24**	**0.18**	**0.33**	**0.25**	**'DR'**	**0.24**	**0.12**	**0.33**	**0.31**	**'DR'**	**0.24**	**0.14**	**0.31**	**0.31**
Shovel AF Wk 16	**'TY'**	**0.28**	**0.11**	**0.31**	**0.31**	**'DR'**	**0.36**	**0.19**	**0.36**	**0.10**	'AF'	0.42	0.19	0.26	0.14
Shovel DR Wk 16	**'AF'**	**0.38**	**0.20**	**0.24**	**0.18**	'DR'	0.34	0.14	0.39	0.13	'DR'	0.32	0.15	0.37	0.18
Shovel CF Wk 16	'CF'	0.12	0.70	0.12	0.06	'CF'	0.14	0.65	0.15	0.06	'CF'	0.17	0.57	0.17	0.09
Shovel TY Wk 16	**'DR'**	**0.21**	**0.11**	**0.36**	**0.32**	'TY'	0.21	0.09	0.34	0.37	'TY'	0.25	0.09	0.27	0.40
Sneakers AF Wk 16	**'DR'**	**0.29**	**0.20**	**0.43**	**0.09**	'AF'	0.38	0.20	0.32	0.10	'AF'	0.39	0.21	0.26	0.14
Sneakers DR Wk 16	'DR'	0.29	0.15	0.39	0.17	'DR'	0.29	0.11	0.48	0.12	'DR'	0.23	0.12	0.48	0.17
Sneakers CF Wk 16	'CF'	0.11	0.72	0.12	0.05	'CF'	0.09	0.77	0.10	0.04	'CF'	0.12	0.69	0.13	0.07
Sneakers TY Wk 16	**'AF'**	**0.28**	**0.24**	**0.26**	**0.22**	**'DR'**	**0.25**	**0.15**	**0.34**	**0.26**	'TY'	0.28	0.15	0.25	0.33
Jeans AF Wk 16	'AF'	0.34	0.09	0.30	0.26	'AF'	0.36	0.22	0.34	0.08	'AF'	0.37	0.23	0.28	0.13
Jeans DR Wk 16	**'AF'**	**0.37**	**0.20**	**0.33**	**0.11**	'DR'	0.30	0.16	0.45	0.09	'DR'	0.28	0.19	0.42	0.11
Jeans CF Wk 16	'CF'	0.15	0.56	0.21	0.08	'CF'	0.18	0.54	0.19	0.09	'CF'	0.22	0.43	0.23	0.12
Jeans TY Wk 16	**'AF'**	**0.30**	**0.26**	**0.29**	**0.14**	**'DR'**	**0.27**	**0.18**	**0.36**	**0.19**	**'DR'**	**0.24**	**0.18**	**0.31**	**0.27**

Table H10 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 20	'AF'	0.44	0.18	0.24	0.14	'AF'	0.40	0.15	0.33	0.13	'AF'	0.47	0.17	0.22	0.14
Shovel DR Wk 20	'DR'	0.29	0.20	0.36	0.15	'DR'	0.25	0.14	0.49	0.12	'DR'	0.26	0.17	0.44	0.14
Shovel CF Wk 20	'CF'	0.09	0.76	0.10	0.05	'CF'	0.13	0.70	0.11	0.05	'CF'	0.13	0.66	0.14	0.08
Shovel TY Wk 20	**'DR'**	**0.26**	**0.16**	**0.36**	**0.21**	**'DR'**	**0.23**	**0.12**	**0.35**	**0.30**	'TY'	0.23	0.11	0.29	0.38
Sneakers AF Wk 20	'AF'	0.41	0.28	0.23	0.08	'AF'	0.43	0.19	0.32	0.06	'AF'	0.42	0.22	0.25	0.12
Sneakers DR Wk 20	'DR'	0.29	0.17	0.36	0.18	'DR'	0.27	0.11	0.50	0.12	'DR'	0.24	0.14	0.46	0.16
Sneakers CF Wk 20	'CF'	0.10	0.73	0.12	0.05	'CF'	0.07	0.80	0.08	0.04	'CF'	0.10	0.72	0.12	0.05
Sneakers TY Wk 20	**'AF'**	**0.36**	**0.16**	**0.29**	**0.19**	**'DR'**	**0.30**	**0.12**	**0.34**	**0.24**	'TY'	0.29	0.13	0.27	0.31
Jeans AF Wk 20	'AF'	0.36	0.08	0.30	0.25	**'DR'**	**0.31**	**0.25**	**0.34**	**0.10**	'AF'	0.33	0.26	0.29	0.13
Jeans DR Wk 20	'DR'	0.27	0.11	0.47	0.14	'DR'	0.26	0.09	0.55	0.09	'DR'	0.30	0.10	0.51	0.10
Jeans CF Wk 20	'CF'	0.15	0.58	0.19	0.08	'CF'	0.20	0.48	0.23	0.10	'CF'	0.23	0.40	0.25	0.12
Jeans TY Wk 20	**'DR'**	**0.30**	**0.26**	**0.31**	**0.13**	**'DR'**	**0.26**	**0.17**	**0.35**	**0.22**	'TY'	0.25	0.17	0.26	0.30
Shovel AF Wk 24	'AF'	0.29	0.13	0.29	0.29	'AF'	0.38	0.17	0.37	0.09	'AF'	0.40	0.20	0.30	0.11
Shovel DR Wk 24	**'AF'**	**0.34**	**0.20**	**0.31**	**0.14**	'DR'	0.30	0.16	0.41	0.12	'DR'	0.25	0.17	0.47	0.11
Shovel CF Wk 24	'CF'	0.17	0.58	0.18	0.07	'CF'	0.17	0.59	0.16	0.08	'CF'	0.18	0.52	0.19	0.11
Shovel TY Wk 24	**'DR'**	**0.24**	**0.17**	**0.35**	**0.24**	**'DR'**	**0.22**	**0.14**	**0.35**	**0.29**	'TY'	0.24	0.12	0.28	0.35
Sneakers AF Wk 24	'AF'	0.31	0.28	0.27	0.14	'AF'	0.38	0.18	0.36	0.08	'AF'	0.41	0.19	0.28	0.11
Sneakers DR Wk 24	**'AF'**	**0.39**	**0.17**	**0.27**	**0.18**	'DR'	0.34	0.13	0.40	0.14	'DR'	0.28	0.15	0.45	0.12
Sneakers CF Wk 24	'CF'	0.14	0.67	0.13	0.06	'CF'	0.13	0.69	0.12	0.06	'CF'	0.13	0.65	0.14	0.07
Sneakers TY Wk 24	**'DR'**	**0.28**	**0.24**	**0.29**	**0.19**	**'DR'**	**0.28**	**0.13**	**0.33**	**0.25**	'TY'	0.23	0.16	0.26	0.35
Jeans AF Wk 24	'AF'	0.40	0.09	0.28	0.23	'AF'	0.33	0.28	0.32	0.08	'AF'	0.33	0.28	0.27	0.13
Jeans DR Wk 24	**'AF'**	**0.40**	**0.23**	**0.25**	**0.12**	'DR'	0.34	0.15	0.41	0.10	'DR'	0.30	0.18	0.40	0.12
Jeans CF Wk 24	'CF'	0.18	0.52	0.21	0.08	'CF'	0.18	0.51	0.22	0.09	'CF'	0.21	0.44	0.24	0.11
Jeans TY Wk 24	'TY'	0.26	0.16	0.26	0.32	**'DR'**	**0.29**	**0.22**	**0.30**	**0.20**	**'DR'**	**0.24**	**0.23**	**0.27**	**0.26**

Storage Temperature Study

Room Temperature

Table H11. Support vector machines classification and scores for soils collected from t-shirts over one year (n = 12 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 9-5-14	**'TY'**	**-0.23**	**-0.79**	**-0.36**	**-0.10**	**'TY'**	**-0.11**	**-0.92**	**-0.36**	**-0.06**	**'TY'**	**-0.12**	**-0.71**	**-0.26**	**-0.12**
Shirt DR 9-5-14	**'TY'**	**-0.35**	**-0.68**	**-0.17**	**-0.02**	'DR'	-0.36	-0.72	-0.08	-0.09	**'TY'**	**-0.32**	**-0.66**	**-0.12**	**-0.08**
Shirt CF 9-5-14	'CF'	-0.24	0.00	-1.00	-0.79	'CF'	-0.24	0.00	-0.77	-0.59	'CF'	-0.23	0.00	-0.59	-0.51
Shirt TY 9-5-14	'TY'	-0.52	-0.91	-0.28	0.00	'TY'	-0.32	-0.94	-0.32	0.00	'TY'	-0.27	-0.71	-0.30	0.00
Shirt AF 10-3-14	**'TY'**	**-0.09**	**-0.89**	**-0.47**	**-0.08**	'AF'	-0.02	-1.07	-0.53	-0.15	'AF'	-0.02	-0.81	-0.43	-0.15
Shirt DR 10-3-14	**'TY'**	**-0.40**	**-1.98**	**-0.34**	**-0.02**	**'TY'**	**-0.30**	**-1.35**	**-0.15**	**-0.05**	**'TY'**	**-0.20**	**-1.05**	**-0.19**	**-0.11**
Shirt CF 10-3-14	'CF'	-0.23	0.00	-1.57	-0.75	'CF'	-0.23	0.00	-1.16	-0.54	'CF'	-0.23	0.00	-0.77	-0.46
Shirt TY 10-3-14	'TY'	-0.43	-0.79	-0.23	0.00	'TY'	-0.56	-1.15	-0.10	-0.07	'TY'	-0.43	-0.95	-0.17	0.00
Shirt AF 11-10-14	**'DR'**	**-0.37**	**-0.85**	**-0.02**	**-0.15**	**'DR'**	**-0.20**	**-0.75**	**-0.14**	**-0.16**	**'TY'**	**-0.17**	**-0.64**	**-0.21**	**-0.11**
Shirt DR 11-10-14	'DR'	-0.47	-3.18	-0.13	-0.16	'DR'	-0.41	-1.90	0.00	-0.22	'DR'	-0.17	-1.28	-0.10	-0.23
Shirt CF 11-10-14	'CF'	-0.21	0.00	-1.65	-0.58	'CF'	-0.20	0.00	-1.19	-0.43	'CF'	-0.19	0.00	-0.74	-0.39
Shirt TY 11-10-14	'TY'	-0.44	-0.90	-0.41	0.00	'TY'	-0.58	-1.24	-0.19	0.00	'TY'	-0.41	-0.96	-0.23	0.00
Shirt AF 1-7-15	'AF'	-0.06	-0.76	-0.25	-0.19	'AF'	0.00	-0.81	-0.25	-0.30	'AF'	0.00	-0.63	-0.29	-0.21
Shirt DR 1-7-15	**'TY'**	**-0.31**	**-0.92**	**-0.56**	**-0.10**	**'TY'**	**-0.32**	**-0.86**	**-0.24**	**-0.01**	**'TY'**	**-0.22**	**-0.77**	**-0.25**	**-0.04**
Shirt CF 1-7-15	'CF'	-0.28	-0.06	-1.43	-0.24	'CF'	-0.25	-0.03	-1.04	-0.26	'CF'	-0.22	0.00	-0.69	-0.31
Shirt TY 1-7-15	'TY'	-0.51	-0.93	-0.48	0.00	'TY'	-0.53	-1.15	-0.19	0.00	'TY'	-0.38	-0.93	-0.27	0.00
Shirt AF 2-10-15	'AF'	-0.07	-0.82	-0.32	-0.12	'AF'	0.00	-0.81	-0.42	-0.21	'AF'	-0.09	-0.70	-0.24	-0.17
Shirt DR 2-10-15	**'TY'**	**-0.38**	**-0.84**	**-0.13**	**-0.04**	'DR'	-0.33	-0.87	-0.06	-0.14	'DR'	-0.34	-0.79	-0.07	-0.11
Shirt CF 2-10-15	'CF'	-0.20	0.00	-1.85	-0.73	'CF'	-0.19	0.00	-1.30	-0.51	'CF'	-0.20	0.00	-0.81	-0.42
Shirt TY 2-10-15	'TY'	-0.34	-0.75	-0.37	0.00	'TY'	-0.25	-0.73	-0.34	0.00	'TY'	-0.28	-0.62	-0.29	0.00

Table H11 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 3-6-15	**'DR'**	**-1.82**	**-0.84**	**-0.46**	**-2.16**	**'DR'**	**-1.13**	**-0.64**	**-0.02**	**-1.30**	**'DR'**	**-0.38**	**-0.51**	**-0.09**	**-0.47**
Shirt DR 3-6-15	**'TY'**	**-0.47**	**-0.83**	**-0.19**	**-0.03**	**'TY'**	**-0.39**	**-0.82**	**-0.10**	**-0.07**	'DR'	-0.38	-0.77	-0.07	-0.10
Shirt CF 3-6-15	'CF'	-0.21	0.00	-1.81	-0.53	'CF'	-0.19	0.00	-1.28	-0.38	'CF'	-0.21	0.00	-0.83	-0.41
Shirt TY 3-6-15	'TY'	-0.35	-0.79	-0.36	0.00	'TY'	-0.21	-0.79	-0.36	0.00	'TY'	-0.25	-0.72	-0.35	0.00
Shirt AF 4-10-15	**'TY'**	**-0.12**	**-0.77**	**-0.89**	**-0.05**	**'TY'**	**-0.19**	**-1.05**	**-1.00**	**-0.01**	**'TY'**	**-0.14**	**-0.73**	**-0.60**	**-0.03**
Shirt DR 4-10-15	**'TY'**	**-0.34**	**-0.93**	**-0.31**	**-0.30**	**'TY'**	**-0.23**	**-0.77**	**-0.21**	**-0.06**	**'TY'**	**-0.21**	**-0.70**	**-0.19**	**-0.10**
Shirt CF 4-10-15	'CF'	-0.20	0.00	-1.63	-0.61	'CF'	-0.18	0.00	-1.15	-0.45	'CF'	-0.18	0.00	-0.74	-0.38
Shirt TY 4-10-15	'TY'	-0.50	-0.86	-0.32	0.00	'TY'	-0.31	-0.86	-0.34	0.00	'TY'	-0.37	-0.77	-0.31	0.00
Shirt AF 5-11-15	**'TY'**	**-0.10**	**-0.79**	**-0.33**	**-0.10**	'AF'	0.00	-0.94	-0.54	-0.32	'AF'	0.00	-0.70	-0.36	-0.21
Shirt DR 5-11-15	**'TY'**	**-0.35**	**-1.00**	**-0.10**	**-0.09**	'DR'	-0.36	-0.95	-0.06	-0.11	**'TY'**	**-0.32**	**-0.94**	**-0.23**	**-0.10**
Shirt CF 5-11-15	'CF'	-0.21	0.00	-1.75	-0.51	'CF'	-0.20	0.00	-1.27	-0.42	'CF'	-0.19	0.00	-0.76	-0.36
Shirt TY 5-11-15	'TY'	-0.45	-0.91	-0.45	0.00	'TY'	-0.36	-0.99	-0.30	0.00	'TY'	-0.32	-0.85	-0.29	0.00
Shirt AF 6-5-15	'AF'	-0.05	-0.86	-0.32	-0.18	'AF'	-0.04	-0.81	-0.29	-0.20	'AF'	-0.02	-0.74	-0.40	-0.15
Shirt DR 6-5-15	'DR'	-0.27	-0.59	-0.12	-0.13	'DR'	-0.24	-0.66	-0.02	-0.25	'DR'	-0.26	-0.58	-0.06	-0.19
Shirt CF 6-5-15	'CF'	-0.22	0.00	-1.50	-0.31	'CF'	-0.25	0.00	-1.10	-0.29	'CF'	-0.26	0.00	-0.73	-0.33
Shirt TY 6-5-15	'TY'	-0.42	-0.80	-0.31	0.00	'TY'	-0.60	-1.30	-0.12	-0.05	'TY'	-0.47	-1.08	-0.18	0.00
Shirt AF 7-6-15	'AF'	-0.04	-0.95	-0.24	-0.22	'AF'	-0.06	-0.89	-0.20	-0.24	'AF'	-0.03	-0.80	-0.32	-0.15
Shirt DR 7-6-15	**'TY'**	**-0.38**	**-0.63**	**-0.15**	**-0.02**	'DR'	-0.27	-0.79	-0.09	-0.13	**'TY'**	**-0.17**	**-0.89**	**-0.27**	**-0.07**
Shirt CF 7-6-15	'CF'	-0.21	0.00	-2.75	-0.84	'CF'	-0.18	0.00	-1.84	-0.54	'CF'	-0.20	0.00	-1.01	-0.44
Shirt TY 7-6-15	'TY'	-0.46	-0.83	-0.28	0.00	**'DR'**	**-0.63**	**-1.17**	**-0.06**	**-0.11**	'TY'	-0.43	-0.98	-0.16	-0.01
Shirt AF 8-4-15	'AF'	-0.05	-0.75	-0.28	-0.22	'AF'	0.00	-0.86	-0.37	-0.24	'AF'	-0.05	-0.76	-0.28	-0.19
Shirt DR 8-4-15	'DR'	-0.33	-0.74	-0.03	-0.24	'DR'	-0.29	-0.70	-0.03	-0.23	'DR'	-0.31	-0.66	-0.08	-0.11
Shirt CF 8-4-15	'CF'	-0.18	0.00	-1.89	-0.68	'CF'	-0.15	-0.02	-1.38	-0.51	'CF'	-0.19	0.00	-0.85	-0.43
Shirt TY 8-4-15	'TY'	-0.46	-0.81	-0.25	0.00	'TY'	-0.35	-0.91	-0.22	0.00	'TY'	-0.34	-0.78	-0.23	0.00
Shirt AF 9-4-15	'AF'	-0.07	-0.78	-0.28	-0.15	'AF'	0.00	-0.75	-0.37	-0.21	'AF'	-0.07	-0.65	-0.27	-0.16
Shirt DR 9-4-15	'TY'	-0.34	-0.74	-0.11	-0.10	'DR'	-0.31	-0.72	-0.06	-0.16	'DR'	-0.30	-0.69	-0.07	-0.13
Shirt CF 9-4-15	'CF'	-0.20	0.00	-2.11	-0.65	'CF'	-0.19	0.00	-1.48	-0.47	'CF'	-0.19	0.00	-0.87	-0.38
Shirt TY 9-4-15	'TY'	-0.36	-0.74	-0.35	0.00	'TY'	-0.24	-0.75	-0.32	0.00	'TY'	-0.28	-0.67	-0.29	0.00

Table H12. Support vector machines classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 0	'AF'	-0.01	-1.12	-0.32	-0.18	'AF'	-0.09	-0.92	-0.27	-0.14	'AF'	-0.05	-0.79	-0.25	-0.21
Shovel DR Day 0	'DR'	-0.14	-1.54	-0.02	-0.53	'DR'	-0.42	-1.26	0.00	-0.18	'DR'	-0.38	-0.96	0.00	-0.19
Shovel CF Day 0	'CF'	-0.31	0.00	-1.08	-0.63	'CF'	-0.34	0.00	-0.71	-0.50	'CF'	-0.26	0.00	-0.57	-0.48
Shovel TY Day 0	'TY'	-0.40	-0.92	-0.18	-0.01	'TY'	-0.34	-0.87	-0.24	0.00	'TY'	-0.37	-0.85	-0.16	-0.01
Sneakers AF Day 0	'AF'	-0.08	-1.15	-0.42	-0.09	**'TY'**	**-0.10**	**-0.91**	**-0.31**	**-0.10**	'AF'	-0.07	-0.79	-0.27	-0.17
Sneakers DR Day 0	**'AF'**	**-0.12**	**-1.70**	**-0.17**	**-0.21**	**'TY'**	**-0.30**	**-1.25**	**-0.18**	**-0.08**	'DR'	-0.31	-0.99	-0.04	-0.15
Sneakers CF Day 0	'CF'	-0.20	0.00	-1.26	-0.61	'CF'	-0.28	0.00	-0.78	-0.47	'CF'	-0.24	0.00	-0.64	-0.47
Sneakers TY Day 0	'TY'	-0.37	-0.77	-0.21	-0.01	'TY'	-0.32	-0.79	-0.26	0.00	'TY'	-0.35	-0.74	-0.18	-0.01
Jeans AF Day 0	'AF'	0.00	-2.12	-0.41	-1.34	'AF'	0.00	-1.38	-0.29	-0.71	'AF'	-0.02	-1.07	-0.15	-0.59
Jeans DR Day 0	**'AF'**	**-0.06**	**-2.44**	**-0.10**	**-2.27**	**'AF'**	**-0.06**	**-1.63**	**-0.11**	**-1.13**	'DR'	-0.20	-1.25	0.00	-0.75
Jeans CF Day 0	'CF'	-0.20	0.00	-0.89	-1.33	'CF'	-0.24	0.00	-0.53	-0.82	'CF'	-0.20	0.00	-0.46	-0.66
Jeans TY Day 0	**'AF'**	**-0.24**	**-1.62**	**-0.26**	**-1.69**	**'AF'**	**-0.19**	**-1.13**	**-0.23**	**-0.82**	**'DR'**	**-0.12**	**-1.00**	**-0.05**	**-0.49**
Shovel AF Day 1	'AF'	-0.05	-1.38	-0.65	-0.11	**'TY'**	**-0.09**	**-0.97**	**-0.48**	**-0.08**	'AF'	-0.06	-0.78	-0.30	-0.13
Shovel DR Day 1	**'AF'**	**-0.05**	**-1.40**	**-0.18**	**-0.27**	'DR'	-0.20	-1.07	-0.12	-0.18	'DR'	-0.30	-0.87	0.00	-0.22
Shovel CF Day 1	'CF'	-0.35	0.00	-1.13	-0.67	'CF'	-0.33	0.00	-0.74	-0.52	'CF'	-0.26	0.00	-0.59	-0.50
Shovel TY Day 1	'TY'	-0.31	-0.94	-0.29	0.00	'TY'	-0.27	-0.81	-0.29	0.00	'TY'	-0.33	-0.79	-0.20	0.00
Sneakers AF Day 1	**'TY'**	**-0.14**	**-1.82**	**-0.92**	**-0.03**	**'TY'**	**-0.15**	**-1.12**	**-0.56**	**-0.01**	'AF'	-0.04	-0.88	-0.37	-0.12
Sneakers DR Day 1	**'AF'**	**-0.03**	**-1.59**	**-0.21**	**-0.50**	**'AF'**	**-0.11**	**-1.18**	**-0.17**	**-0.22**	'DR'	-0.23	-1.00	-0.03	-0.25
Sneakers CF Day 1	'CF'	-2.60	0.00	-2.82	-0.56	'CF'	-0.91	-0.07	-1.45	-0.30	'AF'	0.00	-0.43	-1.01	-0.24
Sneakers TY Day 1	'TY'	-0.29	-0.87	-0.38	0.00	'TY'	-0.28	-0.84	-0.36	0.00	'TY'	-0.36	-0.81	-0.25	0.00
Jeans AF Day 1	'AF'	0.00	-2.97	-0.62	-3.62	'AF'	0.00	-1.80	-0.41	-1.97	'AF'	0.00	-1.31	-0.17	-1.25
Jeans DR Day 1	'AF'	-0.22	-2.41	-0.23	-2.24	'AF'	-0.01	-1.58	-0.15	-1.16	'DR'	-0.17	-1.24	0.00	-0.77
Jeans CF Day 1	'CF'	-0.10	-0.06	-1.02	-1.71	'CF'	-0.22	0.00	-0.54	-1.09	'CF'	-0.15	-0.02	-0.45	-0.80
Jeans TY Day 1	'AF'	-0.29	-1.77	-0.30	-1.80	'AF'	-0.21	-1.29	-0.23	-0.84	'DR'	-0.14	-1.06	-0.03	-0.51

Table H12 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 2	'AF'	-0.07	-2.02	-1.06	-0.10	'TY'	-0.11	-1.27	-0.64	-0.06	'AF'	-0.02	-0.95	-0.41	-0.15
Shovel DR Day 2	'DR'	-0.25	-1.27	-0.07	-0.28	'DR'	-0.25	-1.05	-0.07	-0.18	'DR'	-0.37	-0.93	0.00	-0.19
Shovel CF Day 2	'CF'	-0.33	0.00	-1.24	-0.74	'CF'	-0.33	0.00	-0.79	-0.55	'CF'	-0.25	0.00	-0.63	-0.50
Shovel TY Day 2	'TY'	-0.25	-1.10	-0.49	0.00	'TY'	-0.23	-0.96	-0.43	0.00	'TY'	-0.32	-0.90	-0.30	0.00
Sneakers AF Day 2	**'TY'**	**-0.10**	**-2.11**	**-1.10**	**-0.07**	**'TY'**	**-0.13**	**-1.33**	**-0.65**	**-0.03**	'AF'	-0.03	-0.98	-0.42	-0.13
Sneakers DR Day 2	'DR'	-0.14	-1.41	-0.13	-0.31	'DR'	-0.24	-1.16	-0.12	-0.14	'DR'	-0.35	-0.98	0.00	-0.22
Sneakers CF Day 2	'CF'	-0.37	0.00	-1.40	-0.88	'CF'	-0.33	0.00	-0.81	-0.59	'CF'	-0.27	0.00	-0.66	-0.55
Sneakers TY Day 2	'TY'	-0.22	-0.87	-0.36	0.00	'TY'	-0.28	-0.87	-0.30	0.00	'TY'	-0.36	-0.84	-0.23	0.00
Jeans AF Day 2	'AF'	0.00	-3.18	-0.66	-5.68	'AF'	0.00	-1.93	-0.46	-2.76	'AF'	-0.01	-1.40	-0.16	-1.79
Jeans DR Day 2	'DR'	-0.14	-1.79	-0.03	-1.40	'DR'	-0.13	-1.23	-0.04	-0.74	'DR'	-0.25	-1.05	0.00	-0.48
Jeans CF Day 2	'CF'	-2.26	0.00	-1.10	-5.41	'CF'	-1.17	0.00	-0.59	-2.77	'CF'	-0.76	0.00	-0.24	-1.85
Jeans TY Day 2	**'AF'**	**-0.39**	**-2.49**	**-0.51**	**-3.33**	**'AF'**	**-0.31**	**-1.59**	**-0.34**	**-1.66**	**'DR'**	**-0.08**	**-1.23**	**-0.08**	**-0.99**
Shovel AF Day 3	**'TY'**	**-0.12**	**-2.47**	**-1.27**	**-0.05**	**'TY'**	**-0.14**	**-1.43**	**-0.64**	**-0.03**	'AF'	-0.02	-1.02	-0.43	-0.15
Shovel DR Day 3	**'AF'**	**-0.09**	**-1.57**	**-0.30**	**-0.22**	**'TY'**	**-0.16**	**-1.12**	**-0.22**	**-0.12**	'DR'	-0.19	-0.94	-0.15	-0.16
Shovel CF Day 3	'CF'	-0.36	0.00	-1.13	-0.70	'CF'	-0.36	0.00	-0.75	-0.58	'CF'	-0.28	0.00	-0.61	-0.53
Shovel TY Day 3	'TY'	-0.31	-1.01	-0.44	0.00	'TY'	-0.29	-0.85	-0.35	0.00	'TY'	-0.37	-0.83	-0.25	0.00
Sneakers AF Day 3	'AF'	-0.04	-1.15	-0.67	-0.12	'AF'	-0.05	-0.85	-0.46	-0.12	'AF'	-0.03	-0.69	-0.35	-0.14
Sneakers DR Day 3	**'AF'**	**-0.08**	**-1.84**	**-0.27**	**-0.27**	**'TY'**	**-0.16**	**-1.29**	**-0.28**	**-0.06**	'DR'	-0.28	-1.02	-0.01	-0.21
Sneakers CF Day 3	'CF'	-0.37	0.00	-1.30	-0.88	'CF'	-0.35	0.00	-0.80	-0.63	'CF'	-0.28	0.00	-0.66	-0.56
Sneakers TY Day 3	'TY'	-0.23	-0.80	-0.42	0.00	'TY'	-0.31	-0.79	-0.30	0.00	'TY'	-0.37	-0.77	-0.25	0.00
Jeans AF Day 3	'AF'	0.00	-3.68	-0.79	-6.34	'AF'	0.00	-2.20	-0.54	-3.17	'AF'	0.00	-1.52	-0.17	-2.01
Jeans DR Day 3	**'AF'**	**-0.15**	**-1.92**	**-0.17**	**-1.92**	**'AF'**	**-0.01**	**-1.34**	**-0.16**	**-0.99**	'DR'	-0.13	-1.09	-0.03	-0.69
Jeans CF Day 3	'CF'	-2.50	0.00	-1.19	-4.97	'CF'	-1.28	0.00	-0.62	-2.57	'CF'	-0.79	0.00	-0.29	-1.67
Jeans TY Day 3	**'AF'**	**-0.18**	**-1.54**	**-0.27**	**-1.69**	**'AF'**	**-0.21**	**-1.14**	**-0.22**	**-0.75**	**'DR'**	**-0.15**	**-0.99**	**-0.04**	**-0.43**

Table H12 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 4	'AF'	-0.05	-1.61	-0.93	-0.12	'AF'	-0.07	-0.99	-0.50	-0.10	'AF'	-0.02	-0.76	-0.36	-0.14
Shovel DR Day 4	**'TY'**	**-0.15**	**-1.46**	**-0.27**	**-0.09**	**'TY'**	**-0.21**	**-1.07**	**-0.19**	**-0.10**	'DR'	-0.28	-0.92	-0.09	-0.13
Shovel CF Day 4	'CF'	-0.31	0.00	-1.23	-0.74	'CF'	-0.30	0.00	-0.77	-0.55	'CF'	-0.25	0.00	-0.63	-0.52
Shovel TY Day 4	'TY'	-0.19	-0.89	-0.66	0.00	'TY'	-0.19	-0.85	-0.48	0.00	'TY'	-0.24	-0.77	-0.34	0.00
Sneakers AF Day 4	'AF'	-0.06	-1.36	-0.82	-0.10	'AF'	-0.08	-0.96	-0.48	-0.09	'AF'	-0.04	-0.78	-0.36	-0.13
Sneakers DR Day 4	**'AF'**	**-0.07**	**-1.58**	**-0.23**	**-0.20**	**'TY'**	**-0.24**	**-1.10**	**-0.17**	**-0.09**	'DR'	-0.26	-0.91	-0.08	-0.16
Sneakers CF Day 4	'CF'	-0.35	0.00	-1.24	-0.78	'CF'	-0.35	0.00	-0.78	-0.59	'CF'	-0.27	0.00	-0.63	-0.53
Sneakers TY Day 4	'TY'	-0.20	-0.75	-0.41	0.00	'TY'	-0.37	-0.79	-0.20	0.00	'TY'	-0.41	-0.79	-0.18	0.00
Jeans AF Day 4	'AF'	0.00	-2.87	-0.64	-4.09	'AF'	0.00	-1.72	-0.43	-2.13	'AF'	-0.01	-1.24	-0.16	-1.37
Jeans DR Day 4	'AF'	0.00	-2.43	-0.21	-2.25	**'AF'**	**-0.01**	**-1.59**	**-0.16**	**-1.18**	'DR'	-0.15	-1.23	-0.02	-0.76
Jeans CF Day 4	'CF'	-0.53	0.00	-1.07	-2.52	'CF'	-0.22	-0.07	-0.55	-1.40	'CF'	-0.13	-0.06	-0.44	-0.98
Jeans TY Day 4	**'AF'**	**-0.41**	**-2.16**	**-0.46**	**-2.73**	**'AF'**	**-0.32**	**-1.43**	**-0.32**	**-1.35**	**'AF'**	**-0.08**	**-1.09**	**-0.09**	**-0.81**
Shovel AF Day 5	'AF'	-0.07	-1.21	-0.57	-0.10	'AF'	-0.07	-0.87	-0.38	-0.10	'AF'	-0.04	-0.70	-0.31	-0.15
Shovel DR Day 5	'DR'	-0.20	-1.00	-0.10	-0.23	'DR'	-0.19	-0.83	-0.12	-0.19	'DR'	-0.23	-0.82	-0.13	-0.14
Shovel CF Day 5	'CF'	-0.29	0.00	-1.35	-0.65	'CF'	-0.28	0.00	-0.82	-0.47	'CF'	-0.24	0.00	-0.66	-0.47
Shovel TY Day 5	'TY'	-0.19	-0.94	-0.77	0.00	'TY'	-0.17	-0.86	-0.59	0.00	'TY'	-0.19	-0.76	-0.40	0.00
Sneakers AF Day 5	'AF'	-0.05	-1.18	-0.57	-0.12	'AF'	-0.03	-0.86	-0.38	-0.13	'AF'	-0.04	-0.72	-0.29	-0.17
Sneakers DR Day 5	'DR'	-0.19	-1.41	-0.08	-0.37	'DR'	-0.34	-1.15	-0.04	-0.17	'DR'	-0.38	-0.95	0.00	-0.18
Sneakers CF Day 5	'CF'	-0.36	0.00	-1.29	-0.78	'CF'	-0.31	0.00	-0.79	-0.55	'CF'	-0.26	0.00	-0.66	-0.52
Sneakers TY Day 5	'TY'	-0.17	-0.80	-0.53	0.00	'TY'	-0.15	-0.73	-0.38	-0.01	'TY'	-0.26	-0.70	-0.30	0.00
Jeans AF Day 5	'AF'	0.00	-3.83	-0.87	-6.25	'AF'	0.00	-2.19	-0.57	-3.25	'AF'	0.00	-1.46	-0.18	-2.03
Jeans DR Day 5	**'AF'**	**-0.20**	**-2.42**	**-0.24**	**-2.76**	**'AF'**	**-0.20**	**-1.56**	**-0.21**	**-1.38**	'DR'	-0.15	-1.23	-0.02	-0.89
Jeans CF Day 5	'CF'	-2.34	0.00	-1.17	-4.86	'CF'	-1.13	0.00	-0.64	-2.54	'CF'	-0.69	0.00	-0.30	-1.67
Jeans TY Day 5	**'AF'**	**-0.59**	**-3.54**	**-0.72**	**-6.10**	**'AF'**	**-0.38**	**-2.11**	**-0.49**	**-2.96**	**'AF'**	**-0.05**	**-1.48**	**-0.12**	**-1.82**

Table H12 (cont'd).

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 6	'AF'	-0.06	-1.31	-0.65	-0.11	'AF'	-0.03	-0.96	-0.45	-0.14	'AF'	0.00	-0.78	-0.29	-0.22
Shovel DR Day 6	**'AF'**	**-0.11**	**-1.57**	**-0.40**	**-0.14**	**'AF'**	**-0.12**	**-1.08**	**-0.27**	**-0.13**	**'TY'**	**-0.16**	**-0.89**	**-0.21**	**-0.12**
Shovel CF Day 6	'CF'	-0.27	0.00	-1.37	-0.57	'CF'	-0.26	0.00	-0.82	-0.44	'CF'	-0.22	0.00	-0.63	-0.42
Shovel TY Day 6	**'AF'**	**-0.06**	**-1.48**	**-0.74**	**-0.10**	**'AF'**	**-0.07**	**-0.95**	**-0.45**	**-0.09**	**'AF'**	**-0.03**	**-0.77**	**-0.36**	**-0.14**
Sneakers AF Day 6	'AF'	-0.04	-1.21	-0.66	-0.12	'AF'	-0.05	-0.88	-0.39	-0.12	'AF'	-0.05	-0.81	-0.30	-0.15
Sneakers DR Day 6	'DR'	-0.27	-1.51	-0.02	-0.29	'DR'	-0.27	-1.14	-0.05	-0.18	'DR'	-0.31	-1.04	-0.04	-0.16
Sneakers CF Day 6	'CF'	-0.31	0.00	-1.31	-0.78	'CF'	-0.33	0.00	-0.82	-0.59	'CF'	-0.28	0.00	-0.67	-0.57
Sneakers TY Day 6	'TY'	-0.28	-0.77	-0.32	0.00	'TY'	-0.36	-0.79	-0.22	0.00	'TY'	-0.35	-0.74	-0.21	0.00
Jeans AF Day 6	'AF'	0.00	-2.67	-0.64	-3.83	'AF'	0.00	-1.65	-0.42	-2.04	'AF'	0.00	-1.20	-0.17	-1.31
Jeans DR Day 6	**'AF'**	**-0.20**	**-2.59**	**-0.28**	**-3.32**	**'AF'**	**-0.19**	**-1.69**	**-0.21**	-1.64	'DR'	-0.18	-1.37	0.00	-0.98
Jeans CF Day 6	'CF'	-1.94	0.00	-1.10	-4.02	'CF'	-0.96	0.00	-0.57	-2.17	'CF'	-0.60	0.00	-0.27	-1.46
Jeans TY Day 6	**'AF'**	**-0.36**	**-2.49**	**-0.47**	**-3.46**	**'AF'**	**-0.33**	**-1.67**	**-0.35**	**-1.64**	**'DR'**	**-0.10**	**-1.26**	**-0.07**	**-1.01**

Table H13. Support vector machines classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 pet habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 1	'AF'	0.00	-1.57	-1.06	-0.89	'AF'	0.00	-1.27	-0.91	-0.56	'AF'	0.00	-0.86	-0.42	-0.34
Shovel DR Wk 1	**'AF'**	**-0.12**	**-1.46**	**-0.13**	**-0.25**	'DR'	-0.13	-1.14	-0.11	-0.26	'DR'	-0.18	-0.89	-0.05	-0.27
Shovel CF Wk 1	'CF'	-0.34	-0.07	-0.78	-0.14	'CF'	-0.38	0.00	-0.68	-0.19	'CF'	-0.34	0.00	-0.56	-0.27
Shovel TY Wk 1	'TY'	-0.43	-0.87	-0.24	0.00	'TY'	-0.38	-0.88	-0.28	0.00	'TY'	-0.34	-0.75	-0.22	0.00
Sneakers AF Wk 1	'AF'	0.00	-1.03	-0.45	-0.31	'AF'	0.00	-0.85	-0.37	-0.25	'AF'	-0.04	-0.70	-0.20	-0.28
Sneakers DR Wk 1	**'TY'**	**-0.26**	**-1.44**	**-0.14**	**-0.10**	'DR'	-0.28	-1.02	-0.08	-0.15	'DR'	-0.28	-0.87	-0.01	-0.22
Sneakers CF Wk 1	'CF'	-0.21	-0.09	-0.65	-0.23	'CF'	-0.34	0.00	-0.66	-0.24	'CF'	-0.35	0.00	-0.55	-0.30
Sneakers TY Wk 1	'TY'	-0.46	-0.89	-0.26	0.00	'TY'	-0.48	-0.90	-0.24	0.00	'TY'	-0.40	-0.71	-0.18	0.00
Jeans AF Wk 1	'AF'	0.00	-1.66	-1.17	-1.37	'AF'	0.00	-1.19	-1.02	-1.37	'AF'	0.00	-0.88	-0.45	-0.58
Jeans DR Wk 1	**'AF'**	**-0.60**	**-1.69**	**-0.61**	**-0.66**	**'AF'**	**-0.60**	**-1.24**	**-0.62**	**-0.75**	**'AF'**	**-0.20**	**-0.99**	**-0.22**	**-0.35**
Jeans CF Wk 1	'CF'	-0.20	-0.12	-0.84	-0.77	'CF'	-0.20	0.00	-0.94	-0.74	'CF'	-0.21	0.00	-0.67	-0.42
Jeans TY Wk 1	**'AF'**	**-0.70**	**-1.22**	**-0.89**	**-0.74**	**'AF'**	**-0.81**	**-0.94**	**-0.82**	**-0.84**	**'AF'**	**-0.23**	**-0.72**	**-0.40**	**-0.28**
Shovel AF Wk 2	'AF'	0.00	-1.40	-0.91	-0.69	'AF'	0.00	-1.08	-0.66	-0.37	'AF'	-0.01	-0.78	-0.26	-0.31
Shovel DR Wk 2	'DR'	-0.25	-1.50	-0.01	-0.26	'DR'	-0.16	-1.15	-0.02	-0.34	'DR'	-0.22	-0.92	-0.03	-0.25
Shovel CF Wk 2	'CF'	-0.68	-0.04	-1.06	-0.15	'CF'	-0.58	0.00	-0.90	-0.20	'CF'	-0.41	0.00	-0.67	-0.20
Shovel TY Wk 2	'TY'	-0.43	-0.96	-0.28	0.00	'TY'	-0.41	-0.97	-0.30	0.00	'TY'	-0.38	-0.79	-0.25	0.00
Sneakers AF Wk 2	'AF'	0.00	-1.14	-0.57	-0.36	'AF'	0.00	-0.98	-0.53	-0.32	'AF'	0.00	-0.75	-0.33	-0.25
Sneakers DR Wk 2	'DR'	-0.21	-1.34	-0.08	-0.21	'DR'	-0.23	-1.00	-0.10	-0.17	'DR'	-0.27	-0.87	-0.01	-0.23
Sneakers CF Wk 2	'CF'	-0.32	-0.03	-0.88	-0.17	'CF'	-0.39	0.00	-0.77	-0.22	'CF'	-0.36	0.00	-0.65	-0.27
Sneakers TY Wk 2	'TY'	-0.39	-0.85	-0.23	0.00	'TY'	-0.41	-0.86	-0.26	0.00	'TY'	-0.35	-0.71	-0.27	0.00
Jeans AF Wk 2	'AF'	0.00	-1.51	-1.13	-1.32	'AF'	0.00	-1.04	-1.02	-1.38	'AF'	0.00	-0.79	-0.42	-0.60
Jeans DR Wk 2	**'AF'**	**-0.44**	**-1.72**	**-0.51**	**-0.67**	**'AF'**	**-0.62**	**-1.25**	**-0.63**	**-0.70**	**'AF'**	**-0.03**	**-1.03**	**-0.15**	**-0.37**
Jeans CF Wk 2	'CF'	-1.67	0.00	-1.69	-1.46	'CF'	-0.95	-0.07	-1.55	-1.51	'CF'	-0.47	-0.06	-0.68	-0.51
Jeans TY Wk 2	**'AF'**	**-0.24**	**-1.21**	**-0.52**	**-0.30**	**'AF'**	**-0.30**	**-1.10**	**-0.48**	**-0.32**	'TY'	-0.18	-0.88	-0.22	-0.10

Table H13 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 3	'AF'	0.00	-1.00	-0.31	-0.51	'AF'	0.00	-0.90	-0.35	-0.28	'AF'	0.00	-0.81	-0.29	-0.24
Shovel DR Wk 3	**'TY'**	**-0.19**	**-1.54**	**-0.25**	**-0.11**	**'TY'**	**-0.44**	**-1.29**	**-0.19**	**-0.18**	'DR'	-0.36	-1.07	-0.08	-0.10
Shovel CF Wk 3	'CF'	-0.84	0.00	-1.63	-0.17	'CF'	-0.66	0.00	-1.23	-0.19	'CF'	-0.43	0.00	-0.86	-0.21
Shovel TY Wk 3	'TY'	-0.46	-0.92	-0.20	0.00	'TY'	-0.53	-0.96	-0.21	0.00	'TY'	-0.51	-0.80	-0.16	0.00
Sneakers AF Wk 3	'AF'	0.00	-1.29	-0.62	-0.38	'AF'	0.00	-1.10	-0.49	-0.27	'AF'	0.00	-0.88	-0.32	-0.24
Sneakers DR Wk 3	**'TY'**	**-0.20**	**-2.08**	**-0.48**	**-0.06**	**'TY'**	**-0.49**	**-1.54**	**-0.23**	**-0.23**	**'TY'**	**-0.34**	**-1.17**	**-0.12**	**-0.05**
Sneakers CF Wk 3	'CF'	-0.59	-0.02	-1.35	-0.16	'CF'	-0.54	0.00	-0.99	-0.20	'CF'	-0.37	0.00	-0.73	-0.21
Sneakers TY Wk 3	'TY'	-0.59	-1.05	-0.21	0.00	'TY'	-0.66	-1.07	-0.26	0.00	'TY'	-0.46	-0.88	-0.19	0.00
Jeans AF Wk 3	'AF'	0.00	-1.98	-1.72	-1.98	'AF'	0.00	-1.30	-1.50	-2.12	'AF'	0.00	-0.88	-0.62	-0.77
Jeans DR Wk 3	**'AF'**	**-0.23**	**-1.81**	**-0.26**	**-0.42**	**'AF'**	**-0.28**	**-1.53**	**-0.30**	**-0.31**	'DR'	-0.20	-1.17	-0.05	-0.25
Jeans CF Wk 3	'CF'	-1.70	0.00	-1.59	-1.18	'CF'	-0.94	-0.07	-1.45	-1.28	'CF'	-0.47	-0.07	-0.64	-0.43
Jeans TY Wk 3	**'AF'**	**-0.80**	**-1.34**	**-0.89**	**-0.78**	**'AF'**	**-0.79**	**-1.08**	**-0.87**	**-0.83**	**'AF'**	**-0.21**	**-0.82**	**-0.38**	**-0.29**
Shovel AF Wk 4	'AF'	0.00	-0.97	-0.64	-0.45	'AF'	0.00	-0.77	-0.49	-0.34	'AF'	0.00	-0.66	-0.30	-0.26
Shovel DR Wk 4	**'AF'**	**-0.30**	**-1.74**	**-0.31**	**-1.81**	**'AF'**	**-0.12**	**-1.36**	**-0.18**	**-0.88**	'DR'	-0.10	-1.06	-0.06	-0.52
Shovel CF Wk 4	'CF'	-0.80	-0.02	-1.62	-0.16	'CF'	-0.67	0.00	-1.18	-0.19	'CF'	-0.45	0.00	-0.85	-0.20
Shovel TY Wk 4	'TY'	-0.50	-0.97	-0.27	0.00	'TY'	-0.49	-0.90	-0.25	0.00	'TY'	-0.41	-0.74	-0.20	0.00
Sneakers AF Wk 4	'AF'	0.00	-1.27	-0.63	-0.40	'AF'	0.00	-1.08	-0.51	-0.31	'AF'	0.00	-0.80	-0.32	-0.25
Sneakers DR Wk 4	**'AF'**	**-0.01**	**-1.76**	**-0.15**	**-0.98**	**'AF'**	**-0.23**	**-1.22**	**-0.25**	**-0.67**	'DR'	-0.09	-1.00	-0.07	-0.51
Sneakers CF Wk 4	'CF'	-0.63	0.00	-1.39	-0.17	'CF'	-0.62	0.00	-1.06	-0.21	'CF'	-0.42	0.00	-0.78	-0.21
Sneakers TY Wk 4	'TY'	-0.53	-0.95	-0.26	0.00	'TY'	-0.62	-0.93	-0.29	0.00	'TY'	-0.50	-0.77	-0.22	0.00
Jeans AF Wk 4	'AF'	0.00	-1.53	-1.10	-1.25	'AF'	0.00	-1.06	-0.99	-1.35	'AF'	0.00	-0.79	-0.45	-0.55
Jeans DR Wk 4	**'AF'**	**-0.44**	**-1.62**	**-0.46**	**-0.52**	**'AF'**	**-0.45**	**-1.29**	**-0.52**	**-0.48**	**'AF'**	**-0.12**	**-1.01**	**-0.16**	**-0.22**
Jeans CF Wk 4	'CF'	-1.50	0.00	-1.83	-1.52	'CF'	-0.91	-0.06	-1.67	-1.79	'CF'	-0.02	-0.53	-0.71	-0.59
Jeans TY Wk 4	**'AF'**	**-1.05**	**-1.78**	**-1.20**	**-1.31**	**'AF'**	**-1.01**	**-1.29**	**-1.12**	**-1.34**	**'AF'**	**-0.43**	**-0.86**	**-0.46**	**-0.48**

Table H14. Support vector machines classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 5	**'DR'**	**-0.10**	**-1.62**	**-0.07**	**-0.44**	**'DR'**	**-0.12**	**-1.00**	**-0.07**	**-0.33**	'AF'	-0.05	-0.78	-0.20	-0.29
Shovel CF Wk 5	'CF'	-1.87	0.00	-0.86	-3.82	'CF'	-1.08	0.00	-0.64	-2.01	'CF'	-0.55	-0.10	-0.47	-0.82
Jeans TY Wk 5	**'DR'**	**-0.09**	**-2.02**	**-0.08**	**-2.48**	**'AF'**	**-0.11**	**-1.29**	**-0.18**	**-1.26**	**'AF'**	**-0.23**	**-0.87**	**-0.23**	**-0.49**
Shovel TY Wk 5	'TY'	-0.75	-1.26	-0.26	0.00	'TY'	-0.55	-0.98	-0.23	0.00	'TY'	-0.40	-0.78	-0.19	0.00
Sneakers AF Wk 5	'AF'	-0.08	-1.25	-0.16	-0.32	'AF'	-0.12	-0.87	-0.15	-0.23	'AF'	-0.06	-0.72	-0.21	-0.23
Sneakers DR Wk 5	**'AF'**	**-0.21**	**-2.37**	**-0.22**	**-0.58**	'DR'	-0.22	-1.61	0.00	-0.52	'DR'	-0.20	-1.09	0.00	-0.35
Sneakers CF Wk 5	'CF'	-0.19	0.00	-1.63	-1.45	'CF'	-0.18	0.00	-0.93	-0.88	'CF'	-0.21	0.00	-0.75	-0.54
Sneakers TY Wk 5	'TY'	-0.90	-1.35	-0.26	0.00	'TY'	-0.50	-1.12	-0.25	0.00	'TY'	-0.40	-0.85	-0.19	0.00
Jeans AF Wk 5	'AF'	0.00	-2.60	-0.60	-4.33	'AF'	0.00	-1.56	-0.54	-2.30	'AF'	-0.01	-0.91	-0.47	-0.93
Jeans DR Wk 5	'DR'	-0.18	-1.64	0.00	-1.33	'DR'	-0.18	-1.18	0.00	-0.71	'DR'	-0.12	-0.89	-0.08	-0.36
Shovel DR Wk 5	**'AF'**	**-0.09**	**-1.65**	**-0.24**	**-0.26**	'DR'	-0.21	-1.26	-0.09	-0.22	'DR'	-0.30	-1.00	-0.08	-0.16
Jeans CF Wk 5	'CF'	-0.18	-0.01	-1.55	-1.40	'CF'	-0.19	0.00	-0.99	-0.80	'CF'	-0.20	0.00	-0.81	-0.50
Shovel AF Wk 6	'AF'	-0.07	-1.47	-0.22	-0.34	'AF'	-0.11	-0.94	-0.16	-0.24	'AF'	-0.05	-0.72	-0.21	-0.25
Shovel DR Wk 6	**'AF'**	**-0.15**	**-1.43**	**-0.16**	**-0.20**	'DR'	-0.26	-1.10	-0.08	-0.19	'DR'	-0.31	-0.89	-0.08	-0.13
Shovel CF Wk 6	'CF'	-0.16	-0.03	-1.15	-1.17	'CF'	-0.17	0.00	-0.83	-0.77	'CF'	-0.19	0.00	-0.72	-0.42
Shovel TY Wk 6	'TY'	-0.54	-1.10	-0.20	0.00	'TY'	-0.45	-0.96	-0.22	0.00	'TY'	-0.36	-0.78	-0.22	0.00
Sneakers AF Wk 6	'AF'	-0.09	-1.54	-0.12	-0.40	'AF'	-0.10	-1.01	-0.13	-0.28	'AF'	-0.05	-0.79	-0.20	-0.28
Sneakers DR Wk 6	'DR'	-0.12	-1.59	-0.05	-0.42	'DR'	-0.44	-1.24	0.00	-0.31	'DR'	-0.29	-0.94	0.00	-0.27
Sneakers CF Wk 6	'CF'	-0.17	-0.01	-1.42	-1.38	'CF'	-0.19	0.00	-0.90	-0.90	'CF'	-0.19	0.00	-0.74	-0.54
Sneakers TY Wk 6	'TY'	-0.63	-1.07	-0.27	0.00	'TY'	-0.43	-0.93	-0.26	0.00	'TY'	-0.33	-0.77	-0.23	0.00
Jeans AF Wk 6	'AF'	0.00	-2.50	-0.58	-4.24	'AF'	0.00	-1.49	-0.52	-2.22	'AF'	-0.01	-0.87	-0.46	-0.90
Jeans DR Wk 6	'DR'	-0.51	-1.53	-0.17	-0.58	'DR'	-0.31	-1.12	-0.08	-0.39	'DR'	-0.31	-0.92	-0.01	-0.19
Jeans CF Wk 6	'CF'	-0.89	-0.06	-1.02	-3.60	'CF'	-0.52	-0.11	-0.73	-1.94	'CF'	-0.26	-0.13	-0.63	-0.77
Jeans TY Wk 6	**'DR'**	**-0.43**	**-1.22**	**-0.03**	**-2.05**	**'AF'**	**-0.10**	**-0.91**	**-0.16**	**-1.06**	**'AF'**	**-0.23**	**-0.70**	**-0.30**	**-0.32**

Table H14 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 7	**'DR'**	**-0.40**	**-3.92**	**-0.33**	**-1.84**	**'DR'**	**-0.27**	**-2.09**	**-0.26**	**-1.00**	**'DR'**	**-0.10**	**-1.21**	**-0.07**	**-0.63**
Shovel DR Wk 7	**'AF'**	**-0.40**	**-2.09**	**-1.09**	**-0.47**	**'AF'**	**-0.09**	**-1.57**	**-0.46**	**-0.30**	**'AF'**	**-0.11**	**-1.17**	**-0.38**	**-0.16**
Shovel CF Wk 7	'CF'	-0.18	0.00	-1.49	-1.63	'CF'	-0.17	0.00	-0.98	-0.97	'CF'	-0.18	0.00	-0.74	-0.56
Shovel TY Wk 7	'TY'	-0.85	-1.32	-0.20	0.00	'TY'	-0.60	-1.10	-0.21	0.00	'TY'	-0.45	-0.86	-0.18	0.00
Sneakers AF Wk 7	'AF'	-0.06	-1.22	-0.19	-0.30	'AF'	-0.09	-0.98	-0.17	-0.24	'AF'	-0.06	-0.83	-0.17	-0.29
Sneakers DR Wk 7	**'TY'**	**-0.28**	**-1.47**	**-0.16**	**-0.10**	'DR'	-0.45	-1.22	0.00	-0.23	'DR'	-0.33	-0.93	-0.04	-0.18
Sneakers CF Wk 7	'CF'	-1.45	0.00	-1.18	-3.20	'CF'	-0.78	-0.10	-0.60	-1.86	'CF'	-0.31	-0.12	-0.38	-0.99
Sneakers TY Wk 7	'TY'	-0.76	-1.28	-0.23	0.00	'TY'	-0.47	-1.17	-0.23	0.00	'TY'	-0.41	-0.90	-0.19	0.00
Jeans AF Wk 7	'AF'	0.00	-2.42	-0.56	-4.44	'AF'	0.00	-1.47	-0.55	-2.44	'AF'	0.00	-0.89	-0.49	-0.97
Jeans DR Wk 7	'DR'	-0.32	-1.92	0.00	-1.48	'DR'	-0.24	-1.41	0.00	-0.82	'DR'	-0.14	-0.99	-0.06	-0.33
Jeans CF Wk 7	'CF'	-2.33	0.00	-0.81	-4.86	'CF'	-1.35	-0.01	-0.69	-2.63	'CF'	-0.70	-0.08	-0.56	-1.02
Jeans TY Wk 7	**'AF'**	**-0.04**	**-2.17**	**-0.13**	**-2.78**	**'AF'**	**-0.14**	**-1.46**	**-0.23**	**-1.44**	**'AF'**	**-0.21**	**-0.95**	**-0.25**	**-0.54**
Shovel AF Wk 8	'AF'	-0.07	-1.10	-0.15	-0.32	'AF'	-0.07	-0.82	-0.15	-0.30	'AF'	-0.02	-0.67	-0.22	-0.27
Shovel DR Wk 8	'DR'	-0.31	-2.49	0.00	-0.62	'DR'	-0.41	-1.67	0.00	-0.35	'DR'	-0.34	-1.20	0.00	-0.25
Shovel CF Wk 8	'CF'	-0.18	-0.01	-1.52	-1.44	'CF'	-0.18	0.00	-0.99	-0.93	'CF'	-0.20	0.00	-0.77	-0.52
Shovel TY Wk 8	'TY'	-0.87	-1.49	-0.24	0.00	'TY'	-0.57	-1.24	-0.25	0.00	'TY'	-0.45	-0.94	-0.19	0.00
Sneakers AF Wk 8	'AF'	-0.08	-1.38	-0.10	-0.37	**'DR'**	**-0.15**	**-0.99**	**-0.07**	**-0.28**	'AF'	-0.07	-0.83	-0.14	-0.31
Sneakers DR Wk 8	'DR'	-0.28	-1.68	-0.12	-0.13	'DR'	-0.49	-1.28	-0.02	-0.14	'DR'	-0.42	-1.02	-0.02	-0.14
Sneakers CF Wk 8	'CF'	-0.19	0.00	-1.60	-1.44	'CF'	-0.20	0.00	-0.97	-0.92	'CF'	-0.20	0.00	-0.77	-0.54
Sneakers TY Wk 8	'TY'	-0.69	-1.26	-0.22	0.00	'TY'	-0.48	-1.18	-0.23	0.00	'TY'	-0.44	-0.93	-0.18	0.00
Jeans AF Wk 8	'AF'	0.00	-2.13	-0.43	-3.43	'AF'	0.00	-1.32	-0.43	-1.90	'AF'	0.00	-0.85	-0.41	-0.80
Jeans DR Wk 8	'DR'	-0.45	-1.58	-0.09	-1.01	'DR'	-0.30	-1.25	0.00	-0.67	'DR'	-0.23	-0.94	-0.01	-0.26
Jeans CF Wk 8	'CF'	-2.20	0.00	-1.03	-4.59	'CF'	-1.26	-0.03	-0.75	-2.50	'CF'	-0.65	-0.09	-0.55	-1.01
Jeans TY Wk 8	**'DR'**	**-0.32**	**-1.66**	**-0.30**	**-1.92**	**'AF'**	**-0.08**	**-1.23**	**-0.10**	**-0.95**	**'AF'**	**-0.22**	**-0.86**	**-0.23**	**-0.30**

Table H15. Support vector machines classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 12	**'TY'**	**-0.83**	**-0.71**	**-0.61**	**-0.18**	**'TY'**	**-0.43**	**-0.95**	**-0.38**	**-0.37**	**'TY'**	**-0.31**	**-0.68**	**-0.19**	**0.00**
Shovel DR Wk 12	'DR'	-0.23	-1.17	-0.02	-0.30	'DR'	-0.20	-1.10	-0.08	-0.30	'DR'	-0.29	-0.82	0.00	-0.27
Shovel CF Wk 12	'CF'	-0.47	-0.09	-0.88	-0.14	'CF'	-0.32	-0.04	-0.69	-0.15	'CF'	-0.25	-0.07	-0.51	-0.23
Shovel TY Wk 12	'TY'	-0.39	-0.90	-0.28	0.00	'TY'	-0.31	-0.80	-0.31	0.00	'TY'	-0.32	-0.70	-0.28	0.00
Sneakers AF Wk 12	'AF'	0.00	-0.66	-0.36	-0.21	'AF'	-0.03	-0.61	-0.26	-0.21	'AF'	-0.01	-0.51	-0.29	-0.20
Sneakers DR Wk 12	'DR'	-0.32	-1.08	0.00	-0.46	'DR'	-0.08	-1.01	-0.08	-0.39	'DR'	-0.28	-0.80	0.00	-0.36
Sneakers CF Wk 12	'CF'	-0.39	-0.10	-0.52	-0.22	'CF'	-0.25	-0.11	-0.54	-0.24	'CF'	-0.25	-0.18	-0.39	-0.18
Sneakers TY Wk 12	'TY'	-0.35	-0.84	-0.27	0.00	'TY'	-0.34	-0.83	-0.29	0.00	'TY'	-0.30	-0.68	-0.28	0.00
Jeans AF Wk 12	'AF'	0.00	-2.16	-7.37	-2.30	'AF'	0.00	-1.85	-4.35	-2.20	'AF'	0.00	-0.85	-2.09	-1.00
Jeans DR Wk 12	**'AF'**	**-0.66**	**-1.53**	**-2.20**	**-0.69**	**'AF'**	**-0.63**	**-1.38**	**-1.37**	**-0.65**	**'AF'**	**-0.30**	**-0.87**	**-0.59**	**-0.33**
Jeans CF Wk 12	'CF'	-2.32	0.00	-7.37	-2.76	'CF'	-2.01	0.00	-4.68	-2.48	'CF'	-0.81	0.00	-2.19	-1.14
Jeans TY Wk 12	**'AF'**	**-0.52**	**-1.46**	**-1.73**	**-0.58**	**'AF'**	**-0.49**	**-1.21**	**-1.22**	**-0.52**	**'AF'**	**-0.20**	**-0.78**	**-0.64**	**-0.22**
Shovel AF Wk 16	'AF'	-0.15	-0.65	-0.17	-0.20	**'DR'**	**-0.11**	**-0.70**	**-0.10**	**-0.29**	'AF'	-0.09	-0.55	-0.17	-0.24
Shovel DR Wk 16	'DR'	-0.64	-1.62	0.00	-0.55	'DR'	-0.16	-1.39	-0.09	-0.27	'DR'	-0.27	-0.99	0.00	-0.33
Shovel CF Wk 16	'CF'	-0.51	-0.02	-1.03	-0.16	'CF'	-0.39	-0.01	-0.84	-0.17	'CF'	-0.30	0.00	-0.58	-0.23
Shovel TY Wk 16	'TY'	-0.52	-0.93	-0.20	0.00	'TY'	-0.47	-0.84	-0.18	0.00	'TY'	-0.39	-0.69	-0.21	0.00
Sneakers AF Wk 16	**'DR'**	**-0.42**	**-4.12**	**-0.40**	**-0.46**	'AF'	-0.07	-0.43	-0.15	-1.97	'AF'	-0.05	-0.38	-0.18	-0.96
Sneakers DR Wk 16	'DR'	-0.28	-1.37	0.00	-0.52	'DR'	-0.12	-1.12	-0.08	-0.29	'DR'	-0.23	-0.81	-0.01	-0.26
Sneakers CF Wk 16	'CF'	-0.64	0.00	-0.85	-0.19	'CF'	-0.41	-0.01	-0.77	-0.18	'CF'	-0.32	0.00	-0.55	-0.20
Sneakers TY Wk 16	'TY'	-0.34	-0.67	-0.17	-0.05	'TY'	-0.38	-0.70	-0.13	-0.07	'TY'	-0.32	-0.55	-0.19	-0.02
Jeans AF Wk 16	'AF'	0.00	-1.61	-4.63	-1.51	'AF'	0.00	-1.37	-2.73	-1.43	'AF'	0.00	-0.70	-1.40	-0.69
Jeans DR Wk 16	**'AF'**	**-0.99**	**-1.77**	**-4.63**	**-1.01**	**'AF'**	**-1.01**	**-1.51**	**-2.52**	**-1.10**	**'AF'**	**-0.45**	**-0.88**	**-1.19**	**-0.51**
Jeans CF Wk 16	'CF'	0.00	-2.27	-8.43	-2.63	'CF'	-1.94	0.00	-5.01	-2.48	'CF'	-0.80	0.00	-2.43	-1.14
Jeans TY Wk 16	**'AF'**	**-1.25**	**-2.52**	**-1.56**	**-1.33**	**'AF'**	**-1.00**	**-1.34**	**-1.92**	**-1.11**	**'AF'**	**-0.51**	**0.00**	**-0.66**	**-0.51**

Table H15 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 20	'AF'	-0.06	-0.77	-0.19	-0.16	'AF'	-0.11	-0.80	-0.26	-0.13	'AF'	-0.10	-0.75	-0.23	-0.17
Shovel DR Wk 20	'DR'	-0.55	-1.33	0.00	-0.54	'DR'	-0.25	-1.23	-0.01	-0.29	'DR'	-0.24	-0.86	0.00	-0.30
Shovel CF Wk 20	'CF'	-0.45	0.00	-1.02	-0.18	'CF'	-0.37	-0.02	-0.79	-0.17	'CF'	-0.28	0.00	-0.59	-0.24
Shovel TY Wk 20	'TY'	-0.51	-1.00	-0.22	0.00	'TY'	-0.46	-0.89	-0.19	-0.01	'TY'	-0.37	-0.70	-0.24	0.00
Sneakers AF Wk 20	'AF'	-0.05	-0.57	-0.19	-0.28	'AF'	-0.11	-0.51	-0.16	-0.24	'AF'	-0.09	-0.39	-0.26	-0.27
Sneakers DR Wk 20	'DR'	-0.45	-1.28	0.00	-0.33	'DR'	-0.30	-1.07	-0.09	-0.11	'DR'	-0.32	-0.79	-0.05	-0.16
Sneakers CF Wk 20	'CF'	-0.59	0.00	-0.91	-0.18	'CF'	-0.41	-0.01	-0.79	-0.17	'CF'	-0.31	0.00	-0.58	-0.21
Sneakers TY Wk 20	'AF'	-0.04	-0.92	-0.22	-0.24	'TY'	-0.15	-1.00	-0.32	-0.07	'TY'	-0.17	-0.70	-0.31	-0.02
Jeans AF Wk 20	'AF'	0.00	-2.35	-9.75	-2.51	'AF'	0.00	-2.03	-5.38	-2.54	'AF'	0.00	-0.93	-2.57	-1.15
Jeans DR Wk 20	**'AF'**	**-0.78**	**-1.74**	**-2.68**	**-0.85**	**'AF'**	**-0.45**	**-1.51**	**-1.66**	**-0.76**	**'AF'**	**-0.33**	**-0.91**	**-0.76**	**-0.35**
Jeans CF Wk 20	'CF'	-2.40	0.00	-7.65	-2.89	'CF'	0.00	-2.05	-4.89	-2.60	'CF'	0.00	-0.82	-2.34	-1.18
Jeans TY Wk 20	**'AF'**	**-1.54**	**-2.06**	**-6.57**	**-1.72**	**'AF'**	**-1.53**	**-1.83**	**-3.72**	**-1.66**	**'AF'**	**-0.71**	**-0.89**	**-1.83**	**-0.75**
Shovel AF Wk 24	**'DR'**	**-0.13**	**-0.69**	**-0.04**	**-0.92**	'AF'	-0.04	-0.62	-0.12	-0.54	'AF'	-0.04	-0.51	-0.13	-0.37
Shovel DR Wk 24	'DR'	-0.39	-1.11	0.00	-0.54	'DR'	-0.18	-1.03	0.00	-0.75	'DR'	-0.32	-0.82	0.00	-0.41
Shovel CF Wk 24	'CF'	-0.53	0.00	-0.96	-0.18	'CF'	-0.43	-0.01	-0.87	-0.17	'CF'	-0.29	0.00	-0.62	-0.22
Shovel TY Wk 24	'TY'	-0.46	-0.90	-0.23	0.00	'TY'	-0.35	-0.77	-0.26	0.00	'TY'	-0.38	-0.68	-0.25	0.00
Sneakers AF Wk 24	'AF'	-0.14	-0.69	-0.21	-0.21	'AF'	-0.10	-0.59	-0.21	-0.20	'AF'	-0.08	-0.48	-0.22	-0.21
Sneakers DR Wk 24	'DR'	-0.28	-1.21	0.00	-0.44	**'AF'**	**-0.10**	**-1.13**	**-0.13**	**-0.27**	'DR'	-0.24	-0.84	0.00	-0.28
Sneakers CF Wk 24	'CF'	-0.61	0.00	-1.02	-0.19	'CF'	-0.40	-0.01	-0.88	-0.18	'CF'	-0.30	0.00	-0.60	-0.20
Sneakers TY Wk 24	'TY'	-0.32	-0.94	-0.14	-0.07	'TY'	-0.29	-0.86	-0.21	-0.05	'TY'	-0.31	-0.69	-0.23	0.00
Jeans AF Wk 24	'AF'	0.00	-2.30	-7.88	-2.48	'AF'	0.00	-1.97	-4.64	-2.36	'AF'	0.00	-0.87	-2.24	-1.08
Jeans DR Wk 24	**'AF'**	**-1.03**	**-6.63**	**-1.68**	**-1.09**	**'AF'**	**-1.29**	**-1.46**	**-3.24**	**-1.34**	**'AF'**	**-0.59**	**-0.86**	**-1.51**	**-0.62**
Jeans CF Wk 24	'CF'	-1.79	0.00	-7.59	-2.02	'CF'	-1.54	0.00	-4.39	-2.03	'CF'	-0.66	0.00	-2.16	-0.95
Jeans TY Wk 24	**'AF'**	**-1.52**	**-5.08**	**-2.00**	**-1.74**	**'AF'**	**-1.42**	**-1.72**	**-3.21**	**-1.58**	**'AF'**	**-0.65**	**-0.84**	**-1.53**	**-0.68**

Table H16. Bagged trees using random forests classification and scores for soils collected from t-shirts over one year (n = 12 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shirt AF 9-5-14	**'TY'**	**0.30**	**0.02**	**0.33**	**0.36**	'AF'	0.41	0.03	0.27	0.29	'AF'	0.39	0.10	0.24	0.28
Shirt DR 9-5-14	'DR'	0.19	0.05	0.47	0.28	'DR'	0.24	0.07	0.38	0.31	'DR'	0.21	0.14	0.38	0.28
Shirt CF 9-5-14	'CF'	0.03	0.82	0.11	0.04	'CF'	0.07	0.81	0.08	0.04	'CF'	0.04	0.83	0.07	0.06
Shirt TY 9-5-14	'TY'	0.04	0.09	0.24	0.63	'TY'	0.09	0.11	0.22	0.58	'TY'	0.10	0.13	0.24	0.54
Shirt AF 10-3-14	'AF'	0.37	0.06	0.27	0.30	'AF'	0.48	0.06	0.24	0.22	'AF'	0.38	0.12	0.24	0.26
Shirt DR 10-3-14	'DR'	0.24	0.14	0.46	0.15	'DR'	0.26	0.13	0.39	0.22	'DR'	0.19	0.16	0.43	0.22
Shirt CF 10-3-14	'CF'	0.02	0.89	0.06	0.03	'CF'	0.04	0.86	0.07	0.02	'CF'	0.05	0.82	0.08	0.05
Shirt TY 10-3-14	'TY'	0.12	0.04	0.29	0.55	'TY'	0.09	0.06	0.23	0.62	'TY'	0.08	0.08	0.23	0.60
Shirt AF 11-10-14	'AF'	0.39	0.04	0.24	0.34	'AF'	0.46	0.05	0.19	0.30	'AF'	0.44	0.09	0.23	0.24
Shirt DR 11-10-14	'DR'	0.21	0.16	0.41	0.21	'DR'	0.31	0.16	0.34	0.19	'DR'	0.21	0.21	0.36	0.22
Shirt CF 11-10-14	'CF'	0.03	0.91	0.04	0.02	'CF'	0.08	0.82	0.06	0.03	'CF'	0.05	0.84	0.07	0.05
Shirt TY 11-10-14	'TY'	0.12	0.06	0.18	0.64	'TY'	0.18	0.07	0.22	0.53	'TY'	0.12	0.10	0.25	0.53
Shirt AF 1-7-15	'AF'	0.41	0.07	0.31	0.21	'AF'	0.51	0.09	0.26	0.14	'AF'	0.46	0.13	0.25	0.17
Shirt DR 1-7-15	'DR'	0.22	0.08	0.53	0.18	'DR'	0.23	0.10	0.41	0.26	'DR'	0.21	0.19	0.37	0.23
Shirt CF 1-7-15	'CF'	0.05	0.83	0.09	0.03	'CF'	0.11	0.77	0.09	0.03	'CF'	0.08	0.77	0.10	0.06
Shirt TY 1-7-15	'TY'	0.08	0.06	0.25	0.60	'TY'	0.07	0.05	0.22	0.65	'TY'	0.11	0.11	0.25	0.54
Shirt AF 2-10-15	**'DR'**	**0.33**	**0.04**	**0.33**	**0.30**	'AF'	0.41	0.06	0.30	0.23	'AF'	0.37	0.12	0.28	0.23
Shirt DR 2-10-15	'DR'	0.35	0.06	0.43	0.16	'DR'	0.35	0.09	0.36	0.20	'DR'	0.26	0.13	0.43	0.19
Shirt CF 2-10-15	'CF'	0.02	0.93	0.03	0.02	'CF'	0.06	0.88	0.04	0.02	'CF'	0.04	0.87	0.06	0.03
Shirt TY 2-10-15	'TY'	0.12	0.04	0.21	0.63	'TY'	0.14	0.07	0.16	0.63	'TY'	0.13	0.13	0.23	0.52

Table H16 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 3-6-15	**'DR'**	**0.27**	**0.09**	**0.41**	**0.23**	'AF'	0.39	0.12	0.30	0.19	'AF'	0.34	0.15	0.31	0.20
Shirt DR 3-6-15	'DR'	0.24	0.04	0.51	0.20	'DR'	0.37	0.06	0.39	0.19	'DR'	0.26	0.10	0.42	0.22
Shirt CF 3-6-15	'CF'	0.07	0.86	0.05	0.02	'CF'	0.10	0.80	0.08	0.02	'CF'	0.09	0.81	0.07	0.04
Shirt TY 3-6-15	'TY'	0.16	0.06	0.26	0.52	'TY'	0.16	0.09	0.21	0.55	'TY'	0.14	0.08	0.23	0.55
Shirt AF 4-10-15	**'TY'**	**0.33**	**0.08**	**0.23**	**0.35**	'AF'	0.42	0.11	0.23	0.24	'AF'	0.34	0.14	0.28	0.25
Shirt DR 4-10-15	'DR'	0.27	0.08	0.49	0.16	'DR'	0.29	0.08	0.44	0.19	'DR'	0.22	0.14	0.46	0.19
Shirt CF 4-10-15	'CF'	0.05	0.86	0.06	0.03	'CF'	0.08	0.80	0.08	0.04	'CF'	0.07	0.79	0.10	0.05
Shirt TY 4-10-15	'TY'	0.09	0.09	0.23	0.59	'TY'	0.17	0.11	0.21	0.52	'TY'	0.14	0.14	0.26	0.46
Shirt AF 5-11-15	'AF'	0.34	0.09	0.31	0.26	'AF'	0.42	0.08	0.26	0.24	'AF'	0.39	0.12	0.27	0.22
Shirt DR 5-11-15	'DR'	0.23	0.07	0.54	0.16	'DR'	0.29	0.06	0.47	0.19	'DR'	0.21	0.13	0.43	0.23
Shirt CF 5-11-15	'CF'	0.03	0.90	0.04	0.03	'CF'	0.09	0.81	0.07	0.03	'CF'	0.06	0.84	0.07	0.04
Shirt TY 5-11-15	'TY'	0.10	0.03	0.19	0.68	'TY'	0.20	0.04	0.18	0.58	'TY'	0.17	0.06	0.23	0.55
Shirt AF 6-5-15	'AF'	0.39	0.05	0.31	0.25	'AF'	0.48	0.08	0.22	0.23	'AF'	0.44	0.09	0.26	0.22
Shirt DR 6-5-15	'DR'	0.31	0.10	0.39	0.19	'DR'	0.28	0.10	0.39	0.22	'DR'	0.19	0.24	0.36	0.22
Shirt CF 6-5-15	'CF'	0.04	0.90	0.04	0.02	'CF'	0.09	0.80	0.07	0.03	'CF'	0.06	0.83	0.07	0.04
Shirt TY 6-5-15	'TY'	0.16	0.07	0.21	0.56	'TY'	0.19	0.03	0.23	0.55	'TY'	0.16	0.09	0.24	0.50
Shirt AF 7-6-15	'AF'	0.39	0.05	0.32	0.24	'AF'	0.54	0.08	0.22	0.16	'AF'	0.42	0.12	0.26	0.20
Shirt DR 7-6-15	'DR'	0.20	0.09	0.57	0.14	'DR'	0.25	0.11	0.43	0.21	'DR'	0.21	0.17	0.41	0.22
Shirt CF 7-6-15	'CF'	0.06	0.85	0.08	0.01	'CF'	0.08	0.77	0.12	0.03	'CF'	0.08	0.80	0.09	0.03
Shirt TY 7-6-15	'TY'	0.12	0.06	0.20	0.62	'TY'	0.16	0.06	0.18	0.60	'TY'	0.15	0.10	0.23	0.53
Shirt AF 8-4-15	'AF'	0.37	0.06	0.29	0.28	'AF'	0.52	0.05	0.24	0.19	'AF'	0.43	0.09	0.27	0.21
Shirt DR 8-4-15	'DR'	0.27	0.10	0.52	0.12	'DR'	0.30	0.13	0.43	0.14	'DR'	0.23	0.17	0.42	0.19
Shirt CF 8-4-15	'CF'	0.10	0.77	0.08	0.05	'CF'	0.10	0.80	0.06	0.05	'CF'	0.08	0.79	0.07	0.06
Shirt TY 8-4-15	'TY'	0.16	0.08	0.25	0.52	'TY'	0.18	0.06	0.25	0.52	'TY'	0.14	0.10	0.24	0.52
Shirt AF 9-4-15	'AF'	0.43	0.05	0.24	0.28	'AF'	0.53	0.06	0.19	0.21	'AF'	0.44	0.11	0.22	0.23
Shirt DR 9-4-15	'DR'	0.26	0.06	0.49	0.19	'DR'	0.29	0.11	0.40	0.20	'DR'	0.26	0.16	0.39	0.19
Shirt CF 9-4-15	'CF'	0.04	0.84	0.08	0.04	'CF'	0.08	0.78	0.09	0.05	'CF'	0.07	0.75	0.11	0.07
Shirt TY 9-4-15	'TY'	0.11	0.07	0.28	0.55	'TY'	0.14	0.09	0.24	0.53	'TY'	0.13	0.14	0.26	0.47

Table H17. Bagged trees using random forests classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 0	**'DR'**	**0.34**	**0.06**	**0.35**	**0.25**	'AF'	0.47	0.09	0.25	0.20	'AF'	0.42	0.10	0.31	0.19
Shovel DR Day 0	'DR'	0.22	0.05	0.48	0.25	'DR'	0.22	0.10	0.47	0.21	'DR'	0.17	0.11	0.53	0.20
Shovel CF Day 0	'CF'	0.10	0.65	0.17	0.08	'CF'	0.09	0.69	0.13	0.09	'CF'	0.06	0.71	0.16	0.07
Shovel TY Day 0	'TY'	0.12	0.01	0.34	0.54	'TY'	0.13	0.04	0.26	0.57	'TY'	0.08	0.05	0.24	0.64
Sneakers AF Day 0	'AF'	0.41	0.05	0.32	0.21	'AF'	0.43	0.09	0.29	0.19	'AF'	0.39	0.08	0.32	0.22
Sneakers DR Day 0	'DR'	0.25	0.04	0.44	0.27	'DR'	0.21	0.09	0.44	0.25	'DR'	0.17	0.13	0.51	0.20
Sneakers CF Day 0	'CF'	0.11	0.64	0.16	0.09	'CF'	0.10	0.66	0.14	0.10	'CF'	0.07	0.71	0.15	0.07
Sneakers TY Day 0	'TY'	0.10	0.04	0.37	0.49	'TY'	0.11	0.06	0.27	0.57	'TY'	0.08	0.07	0.25	0.60
Jeans AF Day 0	**'DR'**	**0.36**	**0.04**	**0.37**	**0.23**	'AF'	0.41	0.07	0.33	0.19	**'DR'**	**0.37**	**0.07**	**0.38**	**0.18**
Jeans DR Day 0	'DR'	0.27	0.07	0.34	0.31	'DR'	0.25	0.10	0.38	0.26	'DR'	0.18	0.14	0.44	0.24
Jeans CF Day 0	'CF'	0.08	0.73	0.12	0.07	'CF'	0.08	0.74	0.11	0.07	'CF'	0.06	0.74	0.14	0.07
Jeans TY Day 0	'TY'	0.25	0.01	0.21	0.52	'TY'	0.19	0.05	0.23	0.54	'TY'	0.11	0.06	0.26	0.57
Shovel AF Day 1	'AF'	0.50	0.04	0.25	0.21	'AF'	0.58	0.03	0.24	0.15	'AF'	0.46	0.04	0.30	0.20
Shovel DR Day 1	'DR'	0.28	0.05	0.41	0.26	'DR'	0.24	0.07	0.47	0.22	'DR'	0.19	0.12	0.50	0.20
Shovel CF Day 1	'CF'	0.08	0.74	0.11	0.07	'CF'	0.08	0.73	0.12	0.08	'CF'	0.06	0.78	0.11	0.04
Shovel TY Day 1	'TY'	0.13	0.02	0.29	0.56	'TY'	0.10	0.04	0.23	0.63	'TY'	0.10	0.04	0.21	0.66
Sneakers AF Day 1	'AF'	0.38	0.04	0.36	0.23	'AF'	0.38	0.10	0.33	0.19	'AF'	0.37	0.09	0.35	0.18
Sneakers DR Day 1	'DR'	0.19	0.08	0.44	0.29	'DR'	0.19	0.17	0.43	0.21	'DR'	0.16	0.15	0.46	0.23
Sneakers CF Day 1	'CF'	0.10	0.65	0.15	0.09	'CF'	0.09	0.68	0.14	0.10	'CF'	0.07	0.71	0.16	0.07
Sneakers TY Day 1	'TY'	0.13	0.02	0.13	0.71	'TY'	0.13	0.02	0.14	0.70	'TY'	0.07	0.05	0.17	0.71
Jeans AF Day 1	'AF'	0.39	0.07	0.28	0.27	'AF'	0.45	0.08	0.26	0.22	'AF'	0.42	0.09	0.29	0.21
Jeans DR Day 1	'DR'	0.24	0.10	0.33	0.33	'DR'	0.23	0.09	0.41	0.27	'DR'	0.18	0.11	0.49	0.22
Jeans CF Day 1	'CF'	0.07	0.78	0.09	0.05	'CF'	0.07	0.77	0.09	0.07	'CF'	0.04	0.80	0.10	0.06
Jeans TY Day 1	'TY'	0.22	0.01	0.26	0.51	'TY'	0.17	0.03	0.23	0.56	'TY'	0.13	0.05	0.25	0.58

Table H17 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 2	'AF'	0.64	0.01	0.21	0.14	'AF'	0.64	0.03	0.20	0.13	'AF'	0.61	0.03	0.25	0.11
Shovel DR Day 2	**'TY'**	**0.24**	**0.03**	**0.36**	**0.37**	'DR'	0.20	0.06	0.46	0.27	'DR'	0.14	0.10	0.51	0.25
Shovel CF Day 2	'CF'	0.07	0.78	0.10	0.05	'CF'	0.09	0.76	0.10	0.06	'CF'	0.05	0.83	0.09	0.03
Shovel TY Day 2	'TY'	0.16	0.00	0.13	0.71	'TY'	0.14	0.01	0.14	0.71	'TY'	0.09	0.02	0.18	0.71
Sneakers AF Day 2	'AF'	0.74	0.02	0.17	0.06	'AF'	0.70	0.03	0.20	0.07	'AF'	0.64	0.04	0.21	0.11
Sneakers DR Day 2	'DR'	0.25	0.05	0.37	0.32	'DR'	0.24	0.07	0.44	0.25	'DR'	0.19	0.12	0.47	0.23
Sneakers CF Day 2	'CF'	0.05	0.84	0.07	0.04	'CF'	0.07	0.76	0.10	0.07	'CF'	0.05	0.79	0.10	0.05
Sneakers TY Day 2	'TY'	0.17	0.01	0.19	0.63	'TY'	0.13	0.01	0.16	0.70	'TY'	0.11	0.02	0.19	0.68
Jeans AF Day 2	'AF'	0.55	0.03	0.20	0.23	'AF'	0.57	0.04	0.24	0.15	'AF'	0.54	0.04	0.25	0.18
Jeans DR Day 2	**'TY'**	**0.27**	**0.11**	**0.25**	**0.37**	'DR'	0.25	0.11	0.35	0.29	'DR'	0.17	0.16	0.40	0.26
Jeans CF Day 2	'CF'	0.08	0.74	0.11	0.06	'CF'	0.07	0.78	0.09	0.06	'CF'	0.04	0.82	0.09	0.06
Jeans TY Day 2	'TY'	0.24	0.02	0.19	0.56	'TY'	0.16	0.06	0.14	0.64	'TY'	0.13	0.06	0.19	0.62
Shovel AF Day 3	'AF'	0.54	0.02	0.28	0.16	'AF'	0.55	0.04	0.32	0.09	'AF'	0.59	0.04	0.28	0.10
Shovel DR Day 3	'DR'	0.24	0.08	0.42	0.25	'DR'	0.21	0.09	0.46	0.24	'DR'	0.18	0.10	0.51	0.20
Shovel CF Day 3	'CF'	0.06	0.77	0.11	0.06	'CF'	0.07	0.76	0.10	0.07	'CF'	0.03	0.82	0.10	0.05
Shovel TY Day 3	'TY'	0.15	0.00	0.17	0.68	'TY'	0.11	0.01	0.18	0.70	'TY'	0.09	0.03	0.20	0.69
Sneakers AF Day 3	'AF'	0.77	0.04	0.11	0.08	'AF'	0.76	0.06	0.09	0.08	'AF'	0.70	0.05	0.16	0.09
Sneakers DR Day 3	'DR'	0.22	0.12	0.37	0.29	'DR'	0.22	0.14	0.37	0.27	'DR'	0.16	0.17	0.45	0.23
Sneakers CF Day 3	'CF'	0.05	0.79	0.10	0.06	'CF'	0.06	0.77	0.10	0.07	'CF'	0.05	0.79	0.11	0.06
Sneakers TY Day 3	'TY'	0.10	0.01	0.19	0.70	'TY'	0.11	0.01	0.16	0.72	'TY'	0.10	0.04	0.19	0.68
Jeans AF Day 3	'AF'	0.37	0.05	0.31	0.26	'AF'	0.45	0.07	0.27	0.22	'AF'	0.49	0.06	0.29	0.17
Jeans DR Day 3	'DR'	0.29	0.04	0.41	0.26	'DR'	0.26	0.08	0.43	0.23	'DR'	0.20	0.10	0.49	0.21
Jeans CF Day 3	'CF'	0.10	0.72	0.12	0.06	'CF'	0.09	0.69	0.14	0.08	'CF'	0.07	0.71	0.15	0.08
Jeans TY Day 3	'TY'	0.18	0.02	0.21	0.59	'TY'	0.17	0.04	0.20	0.59	'TY'	0.11	0.05	0.23	0.61

Table H17 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 4	'AF'	0.65	0.02	0.18	0.15	'AF'	0.66	0.04	0.19	0.10	'AF'	0.62	0.04	0.22	0.12
Shovel DR Day 4	'DR'	0.27	0.07	0.41	0.25	'DR'	0.27	0.09	0.46	0.19	'DR'	0.17	0.10	0.51	0.22
Shovel CF Day 4	'CF'	0.08	0.79	0.09	0.04	'CF'	0.07	0.77	0.09	0.07	'CF'	0.07	0.78	0.11	0.04
Shovel TY Day 4	'TY'	0.14	0.01	0.15	0.71	'TY'	0.11	0.02	0.13	0.74	'TY'	0.10	0.06	0.16	0.68
Sneakers AF Day 4	'AF'	0.66	0.01	0.18	0.16	'AF'	0.68	0.02	0.18	0.12	'AF'	0.64	0.03	0.21	0.11
Sneakers DR Day 4	'DR'	0.23	0.11	0.41	0.24	'DR'	0.26	0.12	0.42	0.20	'DR'	0.17	0.18	0.46	0.19
Sneakers CF Day 4	'CF'	0.07	0.79	0.09	0.05	'CF'	0.05	0.78	0.10	0.07	'CF'	0.04	0.80	0.10	0.05
Sneakers TY Day 4	'TY'	0.15	0.00	0.18	0.67	'TY'	0.14	0.01	0.18	0.67	'TY'	0.09	0.04	0.22	0.65
Jeans AF Day 4	'AF'	0.52	0.04	0.21	0.23	'AF'	0.46	0.07	0.26	0.21	'AF'	0.48	0.06	0.26	0.20
Jeans DR Day 4	'DR'	0.32	0.08	0.33	0.27	'DR'	0.28	0.10	0.41	0.21	'DR'	0.23	0.12	0.46	0.20
Jeans CF Day 4	'CF'	0.06	0.80	0.09	0.06	'CF'	0.06	0.77	0.11	0.06	'CF'	0.04	0.77	0.12	0.08
Jeans TY Day 4	'TY'	0.20	0.02	0.19	0.59	'TY'	0.20	0.04	0.24	0.51	'TY'	0.18	0.08	0.26	0.49
Shovel AF Day 5	'AF'	0.73	0.02	0.15	0.10	'AF'	0.65	0.03	0.18	0.14	'AF'	0.61	0.06	0.19	0.13
Shovel DR Day 5	'DR'	0.31	0.05	0.40	0.25	'DR'	0.25	0.07	0.41	0.28	'DR'	0.19	0.10	0.47	0.24
Shovel CF Day 5	'CF'	0.04	0.83	0.09	0.04	'CF'	0.03	0.83	0.08	0.06	'CF'	0.03	0.84	0.09	0.04
Shovel TY Day 5	'TY'	0.10	0.03	0.16	0.71	'TY'	0.11	0.02	0.14	0.73	'TY'	0.11	0.05	0.14	0.70
Sneakers AF Day 5	'AF'	0.70	0.00	0.18	0.11	'AF'	0.61	0.03	0.24	0.12	'AF'	0.58	0.05	0.23	0.15
Sneakers DR Day 5	'DR'	0.23	0.09	0.39	0.30	'DR'	0.22	0.09	0.43	0.25	'DR'	0.20	0.14	0.43	0.23
Sneakers CF Day 5	'CF'	0.05	0.82	0.08	0.05	'CF'	0.04	0.84	0.07	0.05	'CF'	0.04	0.83	0.09	0.05
Sneakers TY Day 5	'TY'	0.19	0.05	0.13	0.63	'TY'	0.17	0.04	0.13	0.66	'TY'	0.14	0.07	0.16	0.64
Jeans AF Day 5	'AF'	0.37	0.08	0.30	0.25	'AF'	0.36	0.10	0.32	0.22	'AF'	0.44	0.10	0.28	0.19
Jeans DR Day 5	**'AF'**	**0.39**	**0.07**	**0.32**	**0.22**	'DR'	0.31	0.08	0.40	0.21	'DR'	0.21	0.14	0.45	0.21
Jeans CF Day 5	'CF'	0.11	0.70	0.12	0.07	'CF'	0.09	0.69	0.13	0.09	'CF'	0.05	0.73	0.14	0.07
Jeans TY Day 5	'TY'	0.19	0.07	0.30	0.43	'TY'	0.17	0.10	0.26	0.47	'TY'	0.14	0.13	0.33	0.41

Table H17 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 6	'AF'	0.69	0.01	0.17	0.12	'AF'	0.65	0.03	0.16	0.15	'AF'	0.64	0.03	0.21	0.12
Shovel DR Day 6	'DR'	0.21	0.05	0.41	0.33	'DR'	0.23	0.09	0.42	0.26	'DR'	0.16	0.13	0.47	0.24
Shovel CF Day 6	'CF'	0.05	0.89	0.04	0.01	'CF'	0.04	0.89	0.04	0.03	'CF'	0.03	0.89	0.06	0.03
Shovel TY Day 6	**'AF'**	**0.60**	**0.02**	**0.17**	**0.21**	**'AF'**	**0.65**	**0.04**	**0.17**	**0.14**	**'AF'**	**0.53**	**0.07**	**0.25**	**0.15**
Sneakers AF Day 6	'AF'	0.61	0.00	0.21	0.18	'AF'	0.61	0.01	0.21	0.17	'AF'	0.63	0.02	0.20	0.14
Sneakers DR Day 6	'DR'	0.30	0.08	0.37	0.25	'DR'	0.25	0.09	0.46	0.19	'DR'	0.18	0.12	0.50	0.20
Sneakers CF Day 6	'CF'	0.06	0.82	0.07	0.05	'CF'	0.06	0.79	0.08	0.07	'CF'	0.04	0.81	0.10	0.06
Sneakers TY Day 6	'TY'	0.18	0.04	0.22	0.56	'TY'	0.17	0.03	0.16	0.64	'TY'	0.10	0.05	0.24	0.62
Jeans AF Day 6	'AF'	0.59	0.03	0.21	0.17	'AF'	0.54	0.06	0.20	0.19	'AF'	0.52	0.06	0.24	0.19
Jeans DR Day 6	**'AF'**	**0.33**	**0.12**	**0.28**	**0.26**	'DR'	0.30	0.13	0.38	0.19	'DR'	0.21	0.18	0.44	0.18
Jeans CF Day 6	'CF'	0.08	0.77	0.10	0.05	'CF'	0.07	0.77	0.10	0.06	'CF'	0.04	0.80	0.09	0.07
Jeans TY Day 6	'TY'	0.23	0.02	0.18	0.57	'TY'	0.16	0.06	0.14	0.64	'TY'	0.16	0.07	0.19	0.57

Table H18. Bagged trees using random forests classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 pet habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 1	'AF'	0.77	0.03	0.10	0.10	'AF'	0.59	0.10	0.18	0.13	'AF'	0.61	0.08	0.20	0.12
Shovel DR Wk 1	'DR'	0.25	0.06	0.43	0.26	'DR'	0.22	0.12	0.44	0.22	'DR'	0.18	0.11	0.45	0.26
Shovel CF Wk 1	'CF'	0.09	0.74	0.12	0.05	'CF'	0.07	0.77	0.10	0.06	'CF'	0.08	0.81	0.07	0.04
Shovel TY Wk 1	'TY'	0.23	0.00	0.13	0.65	'TY'	0.11	0.05	0.11	0.73	'TY'	0.12	0.06	0.13	0.70
Sneakers AF Wk 1	'AF'	0.74	0.01	0.13	0.12	'AF'	0.61	0.08	0.20	0.12	'AF'	0.62	0.05	0.22	0.11
Sneakers DR Wk 1	'DR'	0.16	0.06	0.47	0.32	'DR'	0.20	0.12	0.45	0.23	'DR'	0.21	0.15	0.43	0.21
Sneakers CF Wk 1	'CF'	0.08	0.72	0.14	0.07	'CF'	0.06	0.77	0.12	0.06	'CF'	0.05	0.79	0.09	0.07
Sneakers TY Wk 1	'TY'	0.16	0.01	0.22	0.62	'TY'	0.15	0.07	0.18	0.60	'TY'	0.12	0.08	0.15	0.65
Jeans AF Wk 1	'AF'	0.50	0.07	0.23	0.21	'AF'	0.50	0.07	0.24	0.19	'AF'	0.53	0.06	0.24	0.18
Jeans DR Wk 1	'DR'	0.30	0.03	0.42	0.25	'DR'	0.27	0.11	0.42	0.20	'DR'	0.22	0.14	0.44	0.21
Jeans CF Wk 1	'CF'	0.03	0.74	0.13	0.10	'CF'	0.06	0.73	0.14	0.07	'CF'	0.05	0.77	0.11	0.07
Jeans TY Wk 1	'TY'	0.17	0.05	0.22	0.57	'TY'	0.13	0.10	0.21	0.56	'TY'	0.13	0.09	0.21	0.57
Shovel AF Wk 2	'AF'	0.81	0.03	0.04	0.12	'AF'	0.58	0.09	0.15	0.18	'AF'	0.63	0.07	0.18	0.12
Shovel DR Wk 2	'DR'	0.26	0.03	0.44	0.28	'DR'	0.23	0.10	0.46	0.22	'DR'	0.20	0.12	0.48	0.20
Shovel CF Wk 2	'CF'	0.05	0.89	0.04	0.02	'CF'	0.04	0.90	0.05	0.02	'CF'	0.04	0.90	0.04	0.03
Shovel TY Wk 2	'TY'	0.24	0.02	0.16	0.58	'TY'	0.13	0.05	0.13	0.69	'TY'	0.10	0.05	0.13	0.72
Sneakers AF Wk 2	'AF'	0.79	0.04	0.05	0.12	'AF'	0.65	0.08	0.12	0.16	'AF'	0.66	0.05	0.15	0.14
Sneakers DR Wk 2	'DR'	0.17	0.04	0.53	0.27	'DR'	0.22	0.09	0.46	0.23	'DR'	0.21	0.12	0.43	0.25
Sneakers CF Wk 2	'CF'	0.04	0.83	0.08	0.06	'CF'	0.07	0.79	0.11	0.04	'CF'	0.05	0.83	0.07	0.05
Sneakers TY Wk 2	'TY'	0.11	0.03	0.15	0.72	'TY'	0.09	0.05	0.13	0.73	'TY'	0.10	0.07	0.12	0.72
Jeans AF Wk 2	'AF'	0.52	0.02	0.24	0.23	'AF'	0.52	0.09	0.21	0.18	'AF'	0.53	0.07	0.23	0.17
Jeans DR Wk 2	**'AF'**	**0.33**	**0.11**	**0.26**	**0.31**	'DR'	0.27	0.12	0.36	0.25	'DR'	0.20	0.14	0.39	0.27
Jeans CF Wk 2	'CF'	0.04	0.68	0.14	0.13	'CF'	0.09	0.71	0.14	0.07	'CF'	0.07	0.75	0.10	0.08
Jeans TY Wk 2	'TY'	0.18	0.02	0.18	0.62	'TY'	0.13	0.11	0.15	0.61	'TY'	0.12	0.10	0.16	0.62

Table H18 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 3	'AF'	0.75	0.06	0.10	0.09	'AF'	0.58	0.11	0.19	0.12	'AF'	0.59	0.10	0.19	0.11
Shovel DR Wk 3	'DR'	0.33	0.02	0.42	0.24	'DR'	0.22	0.08	0.48	0.22	'DR'	0.20	0.10	0.42	0.28
Shovel CF Wk 3	'CF'	0.01	0.98	0.01	0.00	'CF'	0.03	0.94	0.01	0.02	'CF'	0.05	0.91	0.02	0.02
Shovel TY Wk 3	'TY'	0.25	0.03	0.22	0.50	'TY'	0.16	0.09	0.17	0.58	'TY'	0.12	0.10	0.18	0.61
Sneakers AF Wk 3	'AF'	0.64	0.04	0.15	0.17	'AF'	0.49	0.11	0.22	0.18	'AF'	0.61	0.08	0.17	0.14
Sneakers DR Wk 3	'DR'	0.33	0.07	0.35	0.26	'DR'	0.22	0.13	0.43	0.22	'DR'	0.21	0.15	0.42	0.22
Sneakers CF Wk 3	'CF'	0.03	0.83	0.08	0.06	'CF'	0.05	0.82	0.09	0.04	'CF'	0.03	0.85	0.07	0.05
Sneakers TY Wk 3	'TY'	0.28	0.03	0.19	0.51	'TY'	0.19	0.08	0.20	0.53	'TY'	0.15	0.07	0.21	0.58
Jeans AF Wk 3	'AF'	0.50	0.08	0.20	0.22	'AF'	0.40	0.18	0.23	0.19	'AF'	0.41	0.15	0.22	0.22
Jeans DR Wk 3	'DR'	0.30	0.07	0.33	0.30	'DR'	0.25	0.13	0.41	0.21	'DR'	0.23	0.13	0.44	0.20
Jeans CF Wk 3	'CF'	0.05	0.77	0.07	0.12	'CF'	0.07	0.77	0.10	0.06	'CF'	0.06	0.79	0.09	0.06
Jeans TY Wk 3	'TY'	0.27	0.04	0.16	0.53	'TY'	0.14	0.11	0.17	0.58	'TY'	0.13	0.10	0.16	0.61
Shovel AF Wk 4	'AF'	0.79	0.07	0.06	0.08	'AF'	0.63	0.09	0.14	0.14	'AF'	0.69	0.07	0.13	0.11
Shovel DR Wk 4	**'AF'**	**0.33**	**0.07**	**0.33**	**0.28**	'DR'	0.29	0.13	0.39	0.19	'DR'	0.23	0.13	0.43	0.22
Shovel CF Wk 4	'CF'	0.07	0.92	0.01	0.01	'CF'	0.06	0.86	0.03	0.05	'CF'	0.04	0.89	0.04	0.04
Shovel TY Wk 4	'TY'	0.21	0.03	0.14	0.63	'TY'	0.15	0.05	0.10	0.70	'TY'	0.13	0.07	0.12	0.68
Sneakers AF Wk 4	'AF'	0.67	0.08	0.15	0.11	'AF'	0.52	0.10	0.20	0.18	'AF'	0.55	0.07	0.23	0.15
Sneakers DR Wk 4	'DR'	0.26	0.08	0.40	0.26	'DR'	0.24	0.12	0.44	0.20	'DR'	0.24	0.15	0.41	0.21
Sneakers CF Wk 4	'CF'	0.09	0.90	0.00	0.01	'CF'	0.06	0.88	0.04	0.02	'CF'	0.07	0.85	0.05	0.04
Sneakers TY Wk 4	'TY'	0.25	0.03	0.13	0.59	'TY'	0.19	0.08	0.18	0.56	'TY'	0.11	0.09	0.16	0.65
Jeans AF Wk 4	'AF'	0.68	0.03	0.10	0.18	'AF'	0.50	0.12	0.21	0.18	'AF'	0.56	0.10	0.19	0.16
Jeans DR Wk 4	**'AF'**	**0.36**	**0.05**	**0.30**	**0.29**	'DR'	0.25	0.12	0.38	0.25	'DR'	0.21	0.14	0.41	0.24
Jeans CF Wk 4	'CF'	0.11	0.74	0.08	0.08	'CF'	0.08	0.76	0.10	0.06	'CF'	0.10	0.74	0.09	0.08
Jeans TY Wk 4	'TY'	0.23	0.04	0.13	0.59	'TY'	0.20	0.09	0.16	0.55	'TY'	0.17	0.12	0.19	0.52

Table H19. Bagged trees using random forests classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 5	'AF'	0.65	0.06	0.19	0.09	'AF'	0.74	0.06	0.15	0.06	'AF'	0.71	0.07	0.15	0.08
Shovel CF Wk 5	'CF'	0.08	0.78	0.07	0.06	'CF'	0.09	0.79	0.07	0.06	'CF'	0.09	0.78	0.07	0.07
Jeans TY Wk 5	'TY'	0.24	0.08	0.21	0.48	'TY'	0.14	0.12	0.25	0.50	'TY'	0.16	0.08	0.27	0.49
Shovel TY Wk 5	'TY'	0.12	0.04	0.12	0.72	'TY'	0.10	0.06	0.16	0.69	'TY'	0.11	0.07	0.15	0.67
Sneakers AF Wk 5	'AF'	0.68	0.05	0.17	0.11	'AF'	0.71	0.05	0.16	0.08	'AF'	0.67	0.04	0.18	0.11
Sneakers DR Wk 5	'DR'	0.26	0.13	0.42	0.20	'DR'	0.19	0.14	0.47	0.20	'DR'	0.21	0.11	0.47	0.20
Sneakers CF Wk 5	'CF'	0.05	0.88	0.04	0.03	'CF'	0.08	0.84	0.05	0.03	'CF'	0.06	0.86	0.04	0.04
Sneakers TY Wk 5	'TY'	0.12	0.04	0.10	0.74	'TY'	0.12	0.09	0.14	0.66	'TY'	0.11	0.08	0.14	0.67
Jeans AF Wk 5	'AF'	0.41	0.13	0.25	0.21	'AF'	0.47	0.18	0.18	0.18	'AF'	0.46	0.15	0.20	0.20
Jeans DR Wk 5	'DR'	0.27	0.17	0.35	0.21	'DR'	0.20	0.20	0.42	0.19	'DR'	0.20	0.16	0.42	0.22
Shovel DR Wk 5	'DR'	0.27	0.08	0.43	0.22	'DR'	0.22	0.13	0.45	0.20	'DR'	0.21	0.10	0.45	0.24
Jeans CF Wk 5	'CF'	0.05	0.90	0.03	0.01	'CF'	0.03	0.92	0.04	0.02	'CF'	0.04	0.92	0.03	0.02
Shovel AF Wk 6	'AF'	0.59	0.09	0.20	0.12	'AF'	0.67	0.08	0.18	0.08	'AF'	0.64	0.09	0.18	0.10
Shovel DR Wk 6	'DR'	0.31	0.11	0.38	0.19	'DR'	0.24	0.11	0.44	0.21	'DR'	0.20	0.10	0.45	0.24
Shovel CF Wk 6	'CF'	0.05	0.90	0.03	0.02	'CF'	0.05	0.88	0.04	0.03	'CF'	0.06	0.87	0.04	0.04
Shovel TY Wk 6	'TY'	0.10	0.05	0.10	0.75	'TY'	0.12	0.06	0.13	0.69	'TY'	0.11	0.08	0.13	0.68
Sneakers AF Wk 6	'AF'	0.68	0.05	0.17	0.10	'AF'	0.73	0.05	0.14	0.08	'AF'	0.67	0.05	0.17	0.11
Sneakers DR Wk 6	'DR'	0.25	0.15	0.41	0.19	'DR'	0.22	0.17	0.43	0.18	'DR'	0.22	0.15	0.43	0.21
Sneakers CF Wk 6	'CF'	0.06	0.89	0.03	0.02	'CF'	0.07	0.85	0.05	0.03	'CF'	0.07	0.84	0.05	0.05
Sneakers TY Wk 6	'TY'	0.19	0.03	0.08	0.69	'TY'	0.13	0.07	0.12	0.68	'TY'	0.13	0.06	0.14	0.68
Jeans AF Wk 6	'AF'	0.41	0.14	0.25	0.20	'AF'	0.53	0.16	0.17	0.14	'AF'	0.49	0.16	0.21	0.15
Jeans DR Wk 6	'DR'	0.32	0.18	0.33	0.18	'DR'	0.26	0.18	0.35	0.22	'DR'	0.23	0.15	0.39	0.23
Jeans CF Wk 6	'CF'	0.06	0.86	0.04	0.05	'CF'	0.07	0.83	0.06	0.04	'CF'	0.07	0.82	0.06	0.06
Jeans TY Wk 6	'TY'	0.20	0.07	0.21	0.52	'TY'	0.16	0.12	0.23	0.49	'TY'	0.14	0.09	0.27	0.50

Table H19 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 7	'AF'	0.65	0.06	0.19	0.09	'AF'	0.71	0.07	0.15	0.08	'AF'	0.63	0.08	0.17	0.12
Shovel DR Wk 7	'DR'	0.28	0.10	0.41	0.22	'DR'	0.19	0.14	0.47	0.21	'DR'	0.21	0.11	0.44	0.24
Shovel CF Wk 7	'CF'	0.07	0.87	0.03	0.03	'CF'	0.04	0.89	0.03	0.03	'CF'	0.06	0.87	0.03	0.04
Shovel TY Wk 7	'TY'	0.13	0.03	0.14	0.70	'TY'	0.10	0.07	0.15	0.68	'TY'	0.11	0.07	0.14	0.68
Sneakers AF Wk 7	'AF'	0.64	0.06	0.20	0.10	'AF'	0.71	0.06	0.15	0.09	'AF'	0.69	0.06	0.16	0.10
Sneakers DR Wk 7	'DR'	0.26	0.10	0.40	0.24	'DR'	0.22	0.13	0.45	0.20	'DR'	0.21	0.10	0.46	0.23
Sneakers CF Wk 7	'CF'	0.06	0.84	0.05	0.05	'CF'	0.08	0.82	0.06	0.05	'CF'	0.07	0.81	0.06	0.06
Sneakers TY Wk 7	'TY'	0.14	0.02	0.09	0.74	'TY'	0.13	0.07	0.14	0.66	'TY'	0.11	0.08	0.14	0.68
Jeans AF Wk 7	'AF'	0.44	0.13	0.28	0.16	'AF'	0.50	0.16	0.22	0.12	'AF'	0.47	0.13	0.25	0.15
Jeans DR Wk 7	'DR'	0.27	0.14	0.38	0.21	'DR'	0.21	0.17	0.40	0.21	'DR'	0.20	0.14	0.43	0.23
Jeans CF Wk 7	'CF'	0.14	0.66	0.12	0.07	'CF'	0.13	0.67	0.12	0.08	'CF'	0.13	0.67	0.10	0.11
Jeans TY Wk 7	'TY'	0.21	0.10	0.23	0.47	'TY'	0.16	0.14	0.23	0.47	'TY'	0.18	0.13	0.24	0.45
Shovel AF Wk 8	'AF'	0.62	0.06	0.22	0.11	'AF'	0.72	0.07	0.15	0.06	'AF'	0.67	0.07	0.16	0.10
Shovel DR Wk 8	'DR'	0.27	0.11	0.38	0.24	'DR'	0.23	0.12	0.45	0.21	'DR'	0.21	0.10	0.45	0.24
Shovel CF Wk 8	'CF'	0.07	0.85	0.06	0.02	'CF'	0.07	0.83	0.05	0.05	'CF'	0.09	0.80	0.06	0.05
Shovel TY Wk 8	'TY'	0.12	0.03	0.12	0.73	'TY'	0.11	0.05	0.14	0.70	'TY'	0.11	0.08	0.13	0.68
Sneakers AF Wk 8	'AF'	0.60	0.07	0.22	0.11	'AF'	0.72	0.05	0.15	0.08	'AF'	0.69	0.06	0.15	0.10
Sneakers DR Wk 8	'DR'	0.28	0.12	0.39	0.22	'DR'	0.20	0.12	0.45	0.24	'DR'	0.19	0.11	0.46	0.24
Sneakers CF Wk 8	'CF'	0.03	0.91	0.05	0.01	'CF'	0.07	0.87	0.04	0.03	'CF'	0.04	0.89	0.04	0.03
Sneakers TY Wk 8	'TY'	0.20	0.05	0.13	0.62	'TY'	0.15	0.09	0.19	0.58	'TY'	0.14	0.07	0.18	0.61
Jeans AF Wk 8	'AF'	0.47	0.09	0.25	0.19	'AF'	0.59	0.09	0.18	0.13	'AF'	0.57	0.09	0.20	0.14
Jeans DR Wk 8	'DR'	0.25	0.11	0.42	0.21	'DR'	0.22	0.17	0.40	0.22	'DR'	0.20	0.13	0.43	0.24
Jeans CF Wk 8	'CF'	0.08	0.75	0.11	0.07	'CF'	0.11	0.73	0.09	0.07	'CF'	0.09	0.69	0.13	0.09
Jeans TY Wk 8	'TY'	0.17	0.07	0.18	0.57	'TY'	0.15	0.10	0.20	0.55	'TY'	0.15	0.12	0.22	0.51

Table H20. Bagged trees using random forests classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 per habitat) stored at room temperature. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 12	'AF'	0.83	0.06	0.06	0.05	'AF'	0.65	0.07	0.17	0.10	'AF'	0.66	0.10	0.13	0.11
Shovel DR Wk 12	'DR'	0.36	0.05	0.39	0.21	'DR'	0.28	0.09	0.45	0.18	'DR'	0.19	0.10	0.46	0.25
Shovel CF Wk 12	'CF'	0.13	0.68	0.11	0.08	'CF'	0.08	0.73	0.12	0.08	'CF'	0.10	0.73	0.11	0.06
Shovel TY Wk 12	'TY'	0.21	0.03	0.11	0.66	'TY'	0.16	0.05	0.19	0.60	'TY'	0.13	0.07	0.15	0.66
Sneakers AF Wk 12	'AF'	0.81	0.04	0.10	0.04	'AF'	0.60	0.07	0.21	0.11	'AF'	0.69	0.08	0.14	0.09
Sneakers DR Wk 12	'DR'	0.32	0.12	0.38	0.18	'DR'	0.27	0.16	0.40	0.18	'DR'	0.16	0.20	0.43	0.21
Sneakers CF Wk 12	'CF'	0.18	0.61	0.13	0.08	'CF'	0.19	0.61	0.13	0.07	'CF'	0.12	0.64	0.16	0.07
Sneakers TY Wk 12	'TY'	0.19	0.03	0.12	0.66	'TY'	0.12	0.06	0.19	0.63	'TY'	0.14	0.09	0.15	0.63
Jeans AF Wk 12	'AF'	0.62	0.10	0.11	0.16	'AF'	0.42	0.15	0.27	0.16	'AF'	0.46	0.19	0.20	0.15
Jeans DR Wk 12	**'AF'**	**0.36**	**0.09**	**0.35**	**0.20**	'DR'	0.28	0.16	0.41	0.15	'DR'	0.18	0.18	0.44	0.21
Jeans CF Wk 12	'CF'	0.19	0.56	0.12	0.13	'CF'	0.15	0.57	0.17	0.11	'CF'	0.11	0.63	0.15	0.12
Jeans TY Wk 12	'TY'	0.24	0.03	0.17	0.56	'TY'	0.15	0.08	0.31	0.46	'TY'	0.12	0.11	0.25	0.52
Shovel AF Wk 16	'AF'	0.82	0.07	0.06	0.05	'AF'	0.61	0.08	0.18	0.13	'AF'	0.63	0.10	0.14	0.13
Shovel DR Wk 16	**'AF'**	**0.42**	**0.07**	**0.33**	**0.18**	'DR'	0.30	0.16	0.40	0.14	'DR'	0.18	0.21	0.42	0.19
Shovel CF Wk 16	'CF'	0.07	0.84	0.06	0.03	'CF'	0.05	0.86	0.05	0.04	'CF'	0.06	0.82	0.06	0.06
Shovel TY Wk 16	'TY'	0.22	0.03	0.17	0.58	'TY'	0.20	0.04	0.27	0.49	'TY'	0.15	0.10	0.22	0.53
Sneakers AF Wk 16	'AF'	0.83	0.05	0.06	0.06	'AF'	0.58	0.11	0.19	0.12	'AF'	0.60	0.13	0.16	0.12
Sneakers DR Wk 16	'DR'	0.37	0.06	0.38	0.20	'DR'	0.32	0.13	0.43	0.13	'DR'	0.14	0.18	0.49	0.19
Sneakers CF Wk 16	'CF'	0.08	0.84	0.05	0.02	'CF'	0.06	0.83	0.07	0.04	'CF'	0.05	0.81	0.08	0.06
Sneakers TY Wk 16	'TY'	0.28	0.08	0.19	0.46	'TY'	0.19	0.08	0.26	0.46	'TY'	0.16	0.13	0.19	0.52
Jeans AF Wk 16	'AF'	0.63	0.08	0.15	0.13	'AF'	0.37	0.16	0.32	0.15	'AF'	0.51	0.15	0.20	0.14
Jeans DR Wk 16	**'AF'**	**0.37**	**0.12**	**0.31**	**0.19**	'DR'	0.28	0.16	0.41	0.16	'DR'	0.17	0.20	0.44	0.20
Jeans CF Wk 16	'CF'	0.22	0.53	0.13	0.12	'CF'	0.16	0.56	0.18	0.10	'CF'	0.13	0.57	0.18	0.12
Jeans TY Wk 16	'TY'	0.24	0.10	0.24	0.42	'TY'	0.17	0.14	0.33	0.36	'TY'	0.15	0.22	0.26	0.38

Table H20 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 20	'AF'	0.70	0.05	0.13	0.12	'AF'	0.55	0.05	0.23	0.17	'AF'	0.62	0.08	0.16	0.15
Shovel DR Wk 20	**'AF'**	**0.38**	**0.08**	**0.33**	**0.21**	'DR'	0.34	0.12	0.40	0.13	'DR'	0.17	0.18	0.45	0.20
Shovel CF Wk 20	'CF'	0.16	0.77	0.05	0.02	'CF'	0.07	0.84	0.06	0.03	'CF'	0.07	0.82	0.07	0.05
Shovel TY Wk 20	'TY'	0.31	0.03	0.16	0.50	'TY'	0.21	0.05	0.25	0.50	'TY'	0.14	0.10	0.19	0.57
Sneakers AF Wk 20	'AF'	0.83	0.04	0.07	0.06	'AF'	0.62	0.06	0.21	0.11	'AF'	0.63	0.12	0.14	0.11
Sneakers DR Wk 20	'DR'	0.29	0.09	0.40	0.22	'DR'	0.29	0.14	0.41	0.16	'DR'	0.21	0.19	0.42	0.19
Sneakers CF Wk 20	'CF'	0.07	0.87	0.04	0.01	'CF'	0.05	0.85	0.07	0.03	'CF'	0.04	0.85	0.07	0.05
Sneakers TY Wk 20	'TY'	0.27	0.04	0.17	0.52	'TY'	0.15	0.08	0.25	0.52	'TY'	0.13	0.10	0.21	0.57
Jeans AF Wk 20	'AF'	0.33	0.19	0.28	0.20	**'DR'**	**0.26**	**0.22**	**0.38**	**0.14**	**'DR'**	**0.21**	**0.29**	**0.30**	**0.21**
Jeans DR Wk 20	'DR'	0.33	0.06	0.41	0.20	'DR'	0.21	0.13	0.48	0.18	'DR'	0.15	0.17	0.48	0.20
Jeans CF Wk 20	'CF'	0.16	0.64	0.11	0.10	'CF'	0.13	0.64	0.14	0.09	'CF'	0.09	0.65	0.15	0.11
Jeans TY Wk 20	'TY'	0.19	0.09	0.25	0.47	'TY'	0.15	0.13	0.32	0.40	'TY'	0.14	0.20	0.25	0.42
Shovel AF Wk 24	'AF'	0.87	0.02	0.07	0.05	'AF'	0.62	0.06	0.21	0.12	'AF'	0.61	0.09	0.18	0.13
Shovel DR Wk 24	**'AF'**	**0.37**	**0.07**	**0.36**	**0.20**	'DR'	0.31	0.13	0.41	0.15	'DR'	0.18	0.19	0.42	0.22
Shovel CF Wk 24	'CF'	0.14	0.78	0.05	0.03	'CF'	0.06	0.81	0.09	0.04	'CF'	0.10	0.78	0.08	0.05
Shovel TY Wk 24	'TY'	0.20	0.04	0.16	0.60	'TY'	0.17	0.06	0.22	0.56	'TY'	0.12	0.11	0.19	0.58
Sneakers AF Wk 24	'AF'	0.86	0.04	0.06	0.04	'AF'	0.67	0.05	0.17	0.11	'AF'	0.66	0.11	0.14	0.09
Sneakers DR Wk 24	'DR'	0.30	0.14	0.40	0.16	'DR'	0.31	0.17	0.38	0.14	'DR'	0.16	0.21	0.43	0.20
Sneakers CF Wk 24	'CF'	0.08	0.84	0.04	0.04	'CF'	0.06	0.84	0.07	0.04	'CF'	0.07	0.80	0.08	0.05
Sneakers TY Wk 24	'TY'	0.28	0.03	0.19	0.50	'TY'	0.14	0.09	0.22	0.55	'TY'	0.15	0.11	0.18	0.56
Jeans AF Wk 24	'AF'	0.44	0.12	0.27	0.17	**'DR'**	**0.29**	**0.18**	**0.40**	**0.13**	'AF'	0.37	0.22	0.26	0.16
Jeans DR Wk 24	'DR'	0.29	0.15	0.38	0.18	'DR'	0.22	0.21	0.42	0.15	'DR'	0.15	0.22	0.44	0.19
Jeans CF Wk 24	'CF'	0.16	0.67	0.09	0.08	'CF'	0.15	0.65	0.13	0.07	'CF'	0.08	0.72	0.12	0.09
Jeans TY Wk 24	'TY'	0.21	0.13	0.14	0.52	'TY'	0.16	0.13	0.27	0.44	'TY'	0.14	0.18	0.24	0.44

-80°C

Table H21. Support vector machines classification and scores for soils collected from t-shirts over one year (n = 12 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 9-5-14	'AF'	0.00	-1.30	-0.39	-0.17	'AF'	-0.04	-1.00	-0.33	-0.16	'AF'	-0.07	-0.86	-0.24	-0.20
Shirt DR 9-5-14	'DR'	-0.39	-1.17	0.00	-0.24	'DR'	-0.44	-1.03	-0.01	-0.16	'DR'	-0.38	-0.78	-0.05	-0.12
Shirt CF 9-5-14	'CF'	-0.48	0.00	-1.09	-0.70	'CF'	-0.36	0.00	-0.88	-0.47	'CF'	-0.35	0.00	-0.67	-0.44
Shirt TY 9-5-14	'TY'	-0.44	-0.86	-0.13	-0.04	'TY'	-0.43	-0.78	-0.09	-0.08	'TY'	-0.37	-0.72	-0.11	-0.06
Shirt AF 10-3-14	'AF'	0.00	-2.20	-0.52	-0.24	'AF'	0.00	-1.64	-0.44	-0.29	'AF'	0.00	-1.15	-0.33	-0.27
Shirt DR 10-3-14	**'TY'**	**-0.44**	**-2.56**	**-0.71**	**-0.01**	**'TY'**	**-0.27**	**-1.80**	**-0.47**	**-0.10**	**'TY'**	**-0.35**	**-1.13**	**-0.24**	**-0.22**
Shirt CF 10-3-14	'CF'	-1.10	0.00	-1.03	-0.93	'CF'	-0.80	0.00	-0.78	-0.61	'CF'	-0.54	0.00	-0.70	-0.55
Shirt TY 10-3-14	**'DR'**	**-1.63**	**-2.38**	**-0.20**	**-0.24**	**'DR'**	**-1.26**	**-1.87**	**-0.02**	**-0.15**	'TY'	-0.70	-1.34	-0.16	-0.01
Shirt AF 11-10-14	'AF'	-0.06	-1.58	-0.18	-0.28	'AF'	-0.05	-1.15	-0.12	-0.45	**'DR'**	**-0.15**	**-0.96**	**-0.08**	**-0.31**
Shirt DR 11-10-14	**'TY'**	**-0.71**	**-3.37**	**-1.22**	**-0.08**	**'TY'**	**-0.27**	**-2.06**	**-0.70**	**-0.19**	**'TY'**	**-0.30**	**-1.18**	**-0.32**	**-0.01**
Shirt CF 11-10-14	'CF'	-0.72	0.00	-1.12	-0.96	'CF'	-0.51	0.00	-0.87	-0.62	'CF'	-0.42	0.00	-0.63	-0.52
Shirt TY 11-10-14	**'DR'**	**-1.74**	**-2.40**	**-0.10**	**-0.19**	**'DR'**	**-1.25**	**-1.79**	**-0.13**	**-0.18**	'TY'	-0.66	-1.30	-0.09	-0.07
Shirt AF 1-7-15	**'DR'**	**-0.23**	**-2.45**	**-0.19**	**-0.40**	'AF'	-0.07	-1.82	-0.17	-0.26	'AF'	-0.06	-1.28	-0.23	-0.21
Shirt DR 1-7-15	**'TY'**	**-0.84**	**-2.10**	**-0.24**	**-0.23**	**'TY'**	**-0.59**	**-1.68**	**-0.22**	**-0.19**	**'TY'**	**-0.39**	**-1.11**	**-0.15**	**-0.02**
Shirt CF 1-7-15	'CF'	-0.28	0.00	-1.03	-1.99	'CF'	-0.24	0.00	-0.70	-1.12	'CF'	-0.24	0.00	-0.61	-0.80
Shirt TY 1-7-15	**'DR'**	**-1.78**	**-2.50**	**-0.01**	**-0.16**	**'DR'**	**-1.29**	**-1.86**	**-0.04**	**-0.12**	'TY'	-0.73	-1.28	-0.17	0.00
Shirt AF 2-10-15	'AF'	0.00	-2.00	-0.48	-0.29	'AF'	0.00	-1.53	-0.49	-0.19	'AF'	-0.08	-1.07	-0.33	-0.11
Shirt DR 2-10-15	'DR'	-0.59	-2.44	0.00	-0.42	'DR'	-0.58	-1.67	0.00	-0.33	'DR'	-0.44	-1.19	0.00	-0.24
Shirt CF 2-10-15	'CF'	-0.72	0.00	-1.22	-0.93	'CF'	-0.49	0.00	-0.88	-0.59	'CF'	-0.39	0.00	-0.66	-0.52
Shirt TY 2-10-15	'TY'	-0.49	-1.43	-0.39	0.00	'TY'	-0.43	-1.15	-0.35	0.00	'TY'	-0.37	-0.89	-0.30	0.00
Shirt AF 3-6-15	**'DR'**	**-2.34**	**-0.30**	**-0.04**	**-3.01**	**'DR'**	**-1.75**	**-0.44**	**-0.01**	**-2.29**	**'DR'**	**-0.93**	**-0.31**	**-0.09**	**-1.22**
Shirt DR 3-6-15	'DR'	-0.73	-2.22	0.00	-0.23	'DR'	-0.68	-1.67	0.00	-0.23	'DR'	-0.50	-1.22	0.00	-0.19
Shirt CF 3-6-15	'CF'	-0.56	0.00	-0.87	-1.16	'CF'	-0.42	0.00	-0.68	-0.71	'CF'	-0.35	0.00	-0.54	-0.57
Shirt TY 3-6-15	'TY'	-0.65	-1.55	-0.31	0.00	'TY'	-0.56	-1.29	-0.30	0.00	'TY'	-0.43	-0.97	-0.26	0.00
Shirt AF 4-10-15	'AF'	0.00	-1.97	-1.12	-0.22	'AF'	-0.01	-1.62	-0.80	-0.18	'AF'	-0.05	-1.13	-0.51	-0.12
Shirt DR 4-10-15	**'TY'**	**-0.34**	**-1.92**	**-0.16**	**-0.06**	'DR'	-0.29	-1.50	-0.04	-0.21	'DR'	-0.32	-1.10	-0.07	-0.13
Shirt CF 4-10-15	'CF'	-0.66	0.00	-0.94	-0.99	'CF'	-0.51	0.00	-0.74	-0.65	'CF'	-0.44	0.00	-0.59	-0.51
Shirt TY 4-10-15	'TY'	-0.51	-1.50	-0.48	0.00	'TY'	-0.44	-1.17	-0.47	0.00	'TY'	-0.41	-0.92	-0.39	0.00

Table 21 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shirt AF 5-11-15	'AF'	0.00	-1.91	-0.59	-0.16	'AF'	-0.01	-1.54	-0.39	-0.25	'AF'	-0.04	-1.14	-0.36	-0.17
Shirt DR 5-11-15	'DR'	-0.60	-2.09	0.00	-0.22	'DR'	-0.64	-1.76	-0.01	-0.15	'DR'	-0.47	-1.27	0.00	-0.18
Shirt CF 5-11-15	'CF'	-0.72	0.00	-1.50	-1.09	'CF'	-0.50	0.00	-1.12	-0.68	'CF'	-0.35	0.00	-0.78	-0.56
Shirt TY 5-11-15	'TY'	-1.28	-2.33	-0.22	0.00	'TY'	-0.97	-1.75	-0.24	0.00	'TY'	-0.63	-1.27	-0.22	0.00
Shirt AF 6-5-15	'AF'	-0.07	-2.46	-0.10	-0.42	'AF'	-0.03	-2.08	-0.33	-0.20	'AF'	0.00	-1.45	-0.46	-0.25
Shirt DR 6-5-15	'DR'	-0.72	-2.26	0.00	-0.33	'DR'	-0.68	-1.61	0.00	-0.28	'DR'	-0.48	-1.13	0.00	-0.19
Shirt CF 6-5-15	'CF'	-0.68	0.00	-1.10	-0.98	'CF'	-0.49	0.00	-0.81	-0.68	'CF'	-0.41	0.00	-0.63	-0.54
Shirt TY 6-5-15	**'DR'**	**-2.51**	**-2.86**	**-0.01**	**-0.50**	**'DR'**	**-1.76**	**-2.14**	**-0.25**	**-0.32**	**'DR'**	**-0.91**	**-1.50**	**-0.06**	**-0.10**
Shirt AF 7-6-15	**'DR'**	**-0.20**	**-2.63**	**-0.10**	**-0.57**	'AF'	0.00	-2.11	-0.20	-0.42	'AF'	0.00	-1.41	-0.34	-0.36
Shirt DR 7-6-15	'DR'	-0.91	-2.24	0.00	-0.46	'DR'	-0.65	-1.83	0.00	-0.29	'DR'	-0.34	-1.35	-0.01	-0.18
Shirt CF 7-6-15	'CF'	-0.85	0.00	-1.27	-1.29	'CF'	-0.56	0.00	-0.84	-0.83	'CF'	-0.43	0.00	-0.68	-0.62
Shirt TY 7-6-15	**'DR'**	**-2.45**	**-3.04**	**-0.07**	**-0.17**	'TY'	-1.68	-2.22	-0.10	-0.06	'TY'	-0.86	-1.55	-0.20	0.00
Shirt AF 8-4-15	'AF'	0.00	-2.30	-0.36	-0.48	'AF'	0.00	-1.94	-0.32	-0.49	'AF'	0.00	-1.31	-0.25	-0.32
Shirt DR 8-4-15	'DR'	-0.35	-2.21	0.00	-0.72	'DR'	-0.39	-1.60	0.00	-0.39	'DR'	-0.35	-1.12	0.00	-0.25
Shirt CF 8-4-15	'CF'	-0.61	0.00	-1.21	-1.03	'CF'	-0.40	0.00	-0.81	-0.71	'CF'	-0.32	0.00	-0.58	-0.55
Shirt TY 8-4-15	'TY'	-0.77	-1.99	-0.21	0.00	'TY'	-0.70	-1.56	-0.20	0.00	'TY'	-0.46	-1.12	-0.22	0.00
Shirt AF 9-4-15	'AF'	-0.10	-2.08	-0.14	-0.44	'AF'	0.00	-1.71	-0.30	-0.23	'AF'	-0.05	-1.26	-0.25	-0.21
Shirt DR 9-4-15	'DR'	-0.40	-2.21	0.00	-0.50	'DR'	-0.50	-1.58	0.00	-0.29	'DR'	-0.42	-1.11	0.00	-0.26
Shirt CF 9-4-15	'CF'	-0.80	0.00	-1.25	-1.17	'CF'	-0.59	0.00	-0.89	-0.75	'CF'	-0.46	0.00	-0.67	-0.58
Shirt TY 9-4-15	'TY'	-0.71	-1.68	-0.29	0.00	**'AF'**	**0.00**	**0.00**	**0.00**	**0.00**	'TY'	-0.45	-0.97	-0.25	0.00

Table H22. Support vector machines classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 0	'AF'	0.00	-0.69	-0.16	-1.07	'AF'	0.00	-0.71	-0.20	-0.67	'AF'	0.00	-0.71	-0.17	-0.43
Shovel DR Day 0	'DR'	-0.24	-1.33	-0.14	-0.16	'DR'	-0.40	-1.20	0.00	-0.33	'DR'	-0.39	-0.90	0.00	-0.25
Shovel CF Day 0	'CF'	-0.30	0.00	-0.35	-0.59	'CF'	-0.41	0.00	-0.40	-0.35	'CF'	-0.40	0.00	-0.40	-0.37
Shovel TY Day 0	'TY'	-0.32	-0.84	-0.26	-0.03	'TY'	-0.25	-0.89	-0.25	-0.04	'TY'	-0.25	-0.87	-0.25	-0.02
Sneakers AF Day 0	'AF'	-0.02	-0.71	-0.15	-0.99	'AF'	-0.03	-0.71	-0.14	-0.54	'AF'	-0.04	-0.71	-0.13	-0.36
Sneakers DR Day 0	**'AF'**	**-0.11**	**-1.33**	**-0.11**	**-0.45**	'DR'	-0.30	-1.26	0.00	-0.44	'DR'	-0.37	-0.93	0.00	-0.28
Sneakers CF Day 0	'CF'	-0.22	0.00	-0.38	-0.90	'CF'	-0.29	0.00	-0.32	-0.56	'CF'	-0.33	0.00	-0.35	-0.47
Sneakers TY Day 0	'TY'	-0.30	-0.84	-0.23	-0.03	'TY'	-0.21	-0.88	-0.32	0.00	'TY'	-0.27	-0.78	-0.25	-0.01
Jeans AF Day 0	'AF'	0.00	-1.05	-1.51	-2.27	'AF'	0.00	-0.98	-0.70	-1.19	'AF'	0.00	-0.81	-0.35	-0.60
Jeans DR Day 0	**'AF'**	**-0.10**	**-1.86**	**-1.79**	**-2.01**	**'AF'**	**-0.01**	**-1.52**	**-0.70**	**-1.07**	**'AF'**	**-0.16**	**-1.02**	**-0.18**	**-0.52**
Jeans CF Day 0	'CF'	-0.16	-0.01	-0.78	-1.16	'CF'	-0.16	-0.01	-0.48	-0.63	'CF'	-0.20	0.00	-0.43	-0.49
Jeans TY Day 0	**'AF'**	**-1.01**	**-1.38**	**-1.82**	**-1.08**	**'AF'**	**-0.52**	**-1.22**	**-0.92**	**-0.56**	**'AF'**	**-0.19**	**-0.96**	**-0.45**	**-0.21**
Shovel AF Day 1	'AF'	0.00	-0.65	-0.16	-1.56	'AF'	-0.02	-0.70	-0.14	-0.90	'AF'	-0.01	-0.68	-0.15	-0.52
Shovel DR Day 1	**'AF'**	**-0.07**	**-1.21**	**-0.10**	**-0.71**	'DR'	-0.10	-1.17	-0.06	-0.64	'DR'	-0.26	-0.90	0.00	-0.34
Shovel CF Day 1	'CF'	-0.29	0.00	-0.42	-0.83	'CF'	-0.40	0.00	-0.36	-0.49	'CF'	-0.38	0.00	-0.42	-0.44
Shovel TY Day 1	'TY'	-0.28	-0.99	-0.31	0.00	'TY'	-0.23	-0.92	-0.30	0.00	'TY'	-0.30	-0.87	-0.25	0.00
Sneakers AF Day 1	'AF'	0.00	-0.77	-0.22	-2.03	'AF'	0.00	-0.76	-0.17	-1.07	'AF'	-0.02	-0.72	-0.14	-0.51
Sneakers DR Day 1	**'AF'**	**-0.24**	**-1.58**	**-0.25**	**-1.32**	'DR'	-0.08	-1.39	-0.08	-0.83	'DR'	-0.29	-0.97	0.00	-0.36
Sneakers CF Day 1	'CF'	-0.18	-0.02	-0.37	-5.40	'CF'	-0.18	0.00	-0.35	-2.73	'CF'	-0.21	0.00	-0.38	-1.29
Sneakers TY Day 1	'TY'	-0.27	-1.00	-0.61	0.00	'TY'	-0.20	-0.99	-0.50	0.00	'TY'	-0.26	-0.90	-0.34	0.00

Table H22 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 1	'AF'	0.00	-1.86	-3.09	-2.80	'AF'	0.00	-1.50	-1.38	-1.40	'AF'	0.00	-1.03	-0.61	-0.70
Jeans DR Day 1	**'AF'**	**-1.60**	**-1.83**	**-1.82**	**-1.67**	**'AF'**	**-0.68**	**-1.53**	**-0.69**	**-0.94**	**'AF'**	**-0.01**	**-1.03**	**-0.21**	**-0.48**
Jeans CF Day 1	'CF'	-0.18	-0.07	-1.44	-1.08	'CF'	-0.12	-0.08	-0.88	-0.57	'CF'	-0.19	0.00	-0.59	-0.47
Jeans TY Day 1	**'AF'**	**-1.21**	**-1.56**	**-2.13**	**-1.40**	**'AF'**	**-0.07**	**-1.39**	**-1.08**	**-0.69**	**'AF'**	**0.00**	**-1.03**	**-0.52**	**-0.23**
Shovel AF Day 2	'AF'	0.00	-0.92	-0.33	-1.91	'AF'	0.00	-0.92	-0.24	-1.09	'AF'	0.00	-0.83	-0.20	-0.60
Shovel DR Day 2	'DR'	-0.13	-1.28	-0.03	-0.75	'DR'	-0.16	-1.16	-0.02	-0.53	'DR'	-0.34	-0.92	0.00	-0.37
Shovel CF Day 2	'CF'	-0.27	0.00	-0.48	-1.04	'CF'	-0.39	0.00	-0.40	-0.61	'CF'	-0.39	0.00	-0.41	-0.50
Shovel TY Day 2	'TY'	-0.34	-1.26	-0.71	0.00	'TY'	-0.25	-1.14	-0.48	0.00	'TY'	-0.29	-0.95	-0.34	0.00
Sneakers AF Day 2	'AF'	0.00	-0.82	-0.26	-2.87	'AF'	0.00	-0.85	-0.21	-1.51	'AF'	0.00	-0.80	-0.21	-0.76
Sneakers DR Day 2	**'AF'**	**-0.03**	**-1.44**	**-0.14**	**-1.22**	'DR'	-0.23	-1.41	0.00	-0.75	'DR'	-0.35	-1.02	0.00	-0.39
Sneakers CF Day 2	'CF'	-0.25	0.00	-0.46	-0.88	'CF'	-0.37	0.00	-0.38	-0.50	'CF'	-0.40	0.00	-0.41	-0.47
Sneakers TY Day 2	'TY'	-0.27	-1.04	-0.58	0.00	'TY'	-0.27	-1.06	-0.43	0.00	'TY'	-0.32	-0.95	-0.34	0.00
Jeans AF Day 2	'AF'	0.00	-1.81	-4.67	-4.42	'AF'	0.00	-1.56	-1.99	-2.18	'AF'	0.00	-1.07	-0.82	-1.04
Jeans DR Day 2	**'AF'**	**-0.60**	**-1.92**	**-0.79**	**-1.64**	**'AF'**	**-0.01**	**-1.55**	**-0.26**	**-0.81**	'DR'	-0.19	-1.04	0.00	-0.41
Jeans CF Day 2	'CF'	-1.21	0.00	-5.37	-4.72	'CF'	-0.79	0.00	-2.42	-2.26	'CF'	-0.28	0.00	-1.06	-1.12
Jeans TY Day 2	**'AF'**	**-0.06**	**-1.98**	**-3.64**	**-2.29**	**'AF'**	**-1.01**	**-1.64**	**-1.65**	**-1.11**	**'AF'**	**-0.42**	**-1.11**	**-0.73**	**-0.43**
Shovel AF Day 3	'AF'	-0.01	-0.79	-0.16	-2.86	'AF'	-0.02	-0.80	-0.15	-1.54	'AF'	0.00	-0.76	-0.18	-0.73
Shovel DR Day 3	**'AF'**	**-0.05**	**-1.21**	**-0.11**	**-0.93**	'DR'	-0.14	-1.21	-0.03	-0.68	'DR'	-0.30	-0.95	0.00	-0.38
Shovel CF Day 3	'CF'	-0.26	0.00	-0.46	-0.81	'CF'	-0.36	0.00	-0.38	-0.51	'CF'	-0.39	0.00	-0.40	-0.47
Shovel TY Day 3	'TY'	-0.25	-1.06	-0.56	0.00	'TY'	-0.21	-1.05	-0.47	0.00	'TY'	-0.29	-0.93	-0.36	0.00
Sneakers AF Day 3	'AF'	0.00	-0.83	-0.24	-1.32	'AF'	0.00	-0.81	-0.16	-0.78	'AF'	-0.01	-0.78	-0.16	-0.44
Sneakers DR Day 3	**'AF'**	**-0.01**	**-1.31**	**-0.18**	**-1.24**	'DR'	-0.11	-1.19	-0.06	-0.92	'DR'	-0.21	-0.88	0.00	-0.46
Sneakers CF Day 3	'CF'	-0.29	0.00	-0.48	-0.73	'CF'	-0.40	0.00	-0.42	-0.47	'CF'	-0.38	0.00	-0.44	-0.45
Sneakers TY Day 3	'TY'	-0.33	-1.05	-0.60	0.00	'TY'	-0.32	-0.99	-0.38	0.00	'TY'	-0.35	-0.90	-0.32	0.00

Table H22 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 3	'AF'	0.00	-2.04	-5.36	-4.91	'AF'	0.00	-1.62	-2.33	-2.37	'AF'	0.00	-0.99	-0.93	-1.08
Jeans DR Day 3	**'AF'**	**-1.62**	**-1.69**	**-1.66**	**-1.66**	**'AF'**	**0.00**	**-1.38**	**-0.74**	**-0.94**	**'AF'**	**-0.21**	**-0.96**	**-0.24**	**-0.47**
Jeans CF Day 3	'CF'	-1.46	0.00	-4.46	-3.53	'CF'	-1.01	0.00	-2.01	-1.70	'CF'	0.00	-0.43	-0.90	-0.74
Jeans TY Day 3	**'AF'**	**-1.01**	**-1.37**	**-1.47**	**-1.07**	**'AF'**	**-0.42**	**-1.21**	**-0.76**	**-0.49**	**'AF'**	**0.00**	**-0.94**	**-0.42**	**-0.16**
Shovel AF Day 4	'AF'	0.00	-0.77	-0.25	-1.94	'AF'	0.00	-0.75	-0.17	-1.08	'AF'	0.00	-0.72	-0.17	-0.56
Shovel DR Day 4	'DR'	-0.18	-1.39	-0.07	-0.35	'DR'	-0.26	-1.24	0.00	-0.41	'DR'	-0.37	-0.97	0.00	-0.29
Shovel CF Day 4	'CF'	-0.28	0.00	-0.51	-1.04	'CF'	-0.35	0.00	-0.40	-0.62	'CF'	-0.38	0.00	-0.40	-0.51
Shovel TY Day 4	'TY'	-0.37	-1.27	-1.31	0.00	'TY'	-0.26	-1.07	-0.75	0.00	'TY'	-0.25	-0.91	-0.47	0.00
Sneakers AF Day 4	'AF'	0.00	-0.87	-0.38	-1.39	'AF'	0.00	-0.89	-0.23	-0.82	'AF'	0.00	-0.82	-0.18	-0.49
Sneakers DR Day 4	**'AF'**	**-0.07**	**-1.21**	**-0.10**	**-0.74**	**'AF'**	**-0.19**	**-1.12**	**-0.20**	**-0.73**	'DR'	-0.15	-0.82	-0.05	-0.34
Sneakers CF Day 4	'CF'	-0.26	0.00	-0.51	-1.15	'CF'	-0.30	0.00	-0.40	-0.68	'CF'	-0.35	0.00	-0.36	-0.53
Sneakers TY Day 4	'TY'	-0.30	-0.97	-0.46	0.00	'TY'	-0.37	-0.98	-0.34	0.00	'TY'	-0.40	-0.88	-0.27	0.00
Jeans AF Day 4	'AF'	0.00	-1.72	-3.75	-3.48	'AF'	0.00	-1.43	-1.69	-1.69	'AF'	0.00	-0.97	-0.70	-0.82
Jeans DR Day 4	**'AF'**	**-1.61**	**-2.03**	**-1.89**	**-1.69**	**'AF'**	**-0.66**	**-1.68**	**-0.71**	**-0.89**	**'AF'**	**-0.20**	**-1.08**	**-0.21**	**-0.45**
Jeans CF Day 4	'CF'	-0.16	-0.03	-1.82	-2.06	'CF'	-0.09	-0.07	-0.94	-1.14	'CF'	-0.20	0.00	-0.60	-0.74
Jeans TY Day 4	**'AF'**	**-0.05**	**-1.65**	**-2.72**	**-1.91**	**'AF'**	**-0.90**	**-1.43**	**-1.25**	**-0.90**	**'AF'**	**-0.33**	**-1.01**	**-0.56**	**-0.34**
Shovel AF Day 5	'AF'	0.00	-0.80	-0.27	-1.05	'AF'	0.00	-0.80	-0.18	-0.65	'AF'	0.00	-0.75	-0.18	-0.39
Shovel DR Day 5	'DR'	-0.18	-1.24	0.00	-0.74	'DR'	-0.20	-1.18	0.00	-0.50	'DR'	-0.36	-0.93	0.00	-0.25
Shovel CF Day 5	'CF'	-0.27	0.00	-0.49	-1.10	'CF'	-0.32	0.00	-0.39	-0.67	'CF'	-0.36	0.00	-0.37	-0.53
Shovel TY Day 5	'TY'	-0.40	-1.31	-1.47	0.00	'TY'	-0.26	-1.17	-0.77	0.00	'TY'	-0.26	-0.95	-0.44	0.00
Sneakers AF Day 5	'AF'	0.00	-0.93	-0.21	-1.04	'AF'	0.00	-0.92	-0.17	-0.61	'AF'	-0.02	-0.81	-0.17	-0.35
Sneakers DR Day 5	**'AF'**	**-0.06**	**-1.41**	**-0.11**	**-0.75**	'DR'	-0.17	-1.25	0.00	-0.52	'DR'	-0.37	-0.93	0.00	-0.32
Sneakers CF Day 5	'CF'	-0.30	0.00	-0.57	-1.16	'CF'	-0.31	0.00	-0.43	-0.70	'CF'	-0.37	0.00	-0.39	-0.56
Sneakers TY Day 5	'TY'	-0.23	-1.13	-0.67	0.00	'TY'	-0.20	-1.02	-0.37	0.00	'TY'	-0.27	-0.86	-0.29	0.00
Jeans AF Day 5	'AF'	0.00	-2.36	-5.95	-5.04	'AF'	0.00	-1.82	-2.57	-2.45	'AF'	0.00	-1.05	-1.00	-1.08
Jeans DR Day 5	**'AF'**	**-0.01**	**-1.96**	**-2.41**	**-2.45**	**'AF'**	**-0.89**	**-1.64**	**-0.94**	**-1.29**	**'AF'**	**-0.26**	**-1.07**	**-0.29**	**-0.60**
Jeans CF Day 5	'CF'	-1.28	0.00	-4.23	-3.69	'CF'	-0.89	0.00	-1.91	-1.76	'CF'	-0.31	0.00	-0.92	-0.86
Jeans TY Day 5	**'AF'**	**-0.07**	**-2.16**	**-5.11**	**-4.09**	**'AF'**	**-1.46**	**-1.66**	**-2.27**	**-1.95**	**'AF'**	**-0.80**	**-1.00**	**-0.90**	**-0.81**

Table H22 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Day 6	'AF'	0.00	-0.94	-0.50	-0.96	'AF'	0.00	-0.90	-0.23	-0.58	'AF'	0.00	-0.81	-0.20	-0.38
Shovel DR Day 6	**'AF'**	**-0.05**	**-1.30**	**-0.12**	**-1.44**	'DR'	-0.13	-1.23	-0.04	-0.87	'DR'	-0.20	-0.91	0.00	-0.42
Shovel CF Day 6	'CF'	-0.30	0.00	-0.67	-1.56	'CF'	-0.25	0.00	-0.48	-0.90	'CF'	-0.30	0.00	-0.39	-0.61
Shovel TY Day 6	**'AF'**	**-0.01**	**-0.80**	**-0.30**	**-1.54**	**'AF'**	**-0.80**	**-0.80**	**-0.22**	**-0.87**	'AF'	0.00	-0.77	-0.18	-0.46
Sneakers AF Day 6	'AF'	0.00	-0.90	-0.30	-1.15	'AF'	0.00	-0.91	-0.17	-0.67	'AF'	0.00	-0.86	-0.17	-0.37
Sneakers DR Day 6	'DR'	-0.16	-1.41	-0.01	-0.65	'DR'	-0.24	-1.30	0.00	-0.50	'DR'	-0.38	-0.98	0.00	-0.29
Sneakers CF Day 6	'CF'	-0.28	0.00	-0.51	-0.99	'CF'	-0.36	0.00	-0.41	-0.57	'CF'	-0.37	0.00	-0.45	-0.51
Sneakers TY Day 6	'TY'	-0.35	-0.98	-0.21	-0.01	'TY'	-0.26	-0.88	-0.28	0.00	'TY'	-0.36	-0.83	-0.24	0.00
Jeans AF Day 6	'AF'	0.00	-1.78	-3.84	-3.17	'AF'	0.00	-1.49	-1.71	-1.57	'AF'	0.00	-0.96	-0.72	-0.72
Jeans DR Day 6	**'AF'**	**-2.00**	**-2.22**	**-2.73**	**-2.12**	**'AF'**	**-0.93**	**-1.75**	**-1.10**	**-0.97**	**'AF'**	**-0.33**	**-1.14**	**-0.34**	**-0.44**
Jeans CF Day 6	'CF'	-0.95	0.00	-3.55	-2.80	'CF'	-0.63	0.00	-1.68	-1.34	'CF'	-0.22	-0.05	-0.82	-0.69
Jeans TY Day 6	**'AF'**	**-0.01**	**-1.75**	**-3.57**	**-2.65**	**'AF'**	**-1.26**	**-1.45**	**-1.65**	**-1.27**	**'AF'**	**-0.01**	**-0.98**	**-0.71**	**-0.50**

Table H23. Support vector machines classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 pet habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 1	'AF'	0.00	-0.74	-0.42	-2.03	'AF'	0.00	-0.73	-0.25	-1.35	'AF'	-0.04	-0.74	-0.12	-0.68
Shovel DR Wk 1	**'TY'**	**-0.61**	**-1.81**	**-0.24**	**-0.21**	'DR'	-0.43	-1.37	0.00	-0.17	'DR'	-0.41	-1.02	-0.05	-0.11
Shovel CF Wk 1	'CF'	-0.35	0.00	-0.86	-0.55	'CF'	-0.29	0.00	-0.58	-0.52	'CF'	-0.38	0.00	-0.50	-0.43
Shovel TY Wk 1	'TY'	-0.45	-1.36	-0.19	0.00	'TY'	-0.43	-1.35	-0.18	-0.01	'TY'	-0.32	-1.02	-0.27	0.00
Sneakers AF Wk 1	'AF'	0.00	-1.11	-0.16	-0.56	'AF'	-0.02	-0.96	-0.14	-0.51	'AF'	-0.01	-0.87	-0.17	-0.35
Sneakers DR Wk 1	**'TY'**	**-0.49**	**-1.60**	**-0.44**	**-0.42**	**'TY'**	**-0.39**	**-1.28**	**-0.12**	**-0.10**	'DR'	-0.38	-0.95	-0.05	-0.11
Sneakers CF Wk 1	'CF'	-0.34	0.00	-0.88	-0.50	'CF'	-0.28	0.00	-0.58	-0.48	'CF'	-0.36	0.00	-0.54	-0.42
Sneakers TY Wk 1	'TY'	-0.52	-1.38	-0.23	0.00	'TY'	-0.44	-1.18	-0.21	0.00	'TY'	-0.35	-0.90	-0.26	0.00
Jeans AF Wk 1	'AF'	0.00	-1.89	-1.98	-1.37	'AF'	0.00	-1.29	-1.21	-0.68	'AF'	0.00	-0.97	-0.60	-0.41
Jeans DR Wk 1	**'AF'**	**-0.01**	**-2.10**	**-1.21**	**-0.64**	**'AF'**	**-0.08**	**-1.55**	**-0.65**	**-0.33**	**'AF'**	**-0.06**	**-1.18**	**-0.26**	**-0.18**
Jeans CF Wk 1	'CF'	-0.22	0.00	-1.36	-1.15	'CF'	-0.26	0.00	-0.93	-0.82	'CF'	-0.23	0.00	-0.70	-0.60
Jeans TY Wk 1	**'AF'**	**-0.07**	**-1.71**	**-1.53**	**-0.95**	**'AF'**	**-0.40**	**-1.36**	**-0.99**	**-0.42**	**'AF'**	**-0.20**	**-1.06**	**-0.55**	**-0.21**
Shovel AF Wk 2	'AF'	0.00	-0.93	-0.39	-1.34	'AF'	0.00	-0.94	-0.28	-0.91	'AF'	0.00	-0.83	-0.18	-0.49
Shovel DR Wk 2	**'TY'**	**-0.55**	**-1.92**	**-0.38**	**-0.31**	**'TY'**	**-0.46**	**-1.40**	**-0.15**	**-0.02**	'DR'	-0.44	-1.04	-0.08	-0.09
Shovel CF Wk 2	'CF'	-0.40	0.00	-0.93	-0.61	'CF'	-0.33	0.00	-0.64	-0.60	'CF'	-0.35	0.00	-0.54	-0.48
Shovel TY Wk 2	'TY'	-0.53	-1.61	-0.17	0.00	'TY'	-0.46	-1.47	-0.11	-0.05	'TY'	-0.38	-1.12	-0.21	0.00
Sneakers AF Wk 2	'AF'	0.00	-1.30	-0.27	-0.81	'AF'	0.00	-1.21	-0.18	-0.75	'AF'	0.00	-0.97	-0.17	-0.46
Sneakers DR Wk 2	**'TY'**	**-0.42**	**-1.46**	**-0.18**	**-0.04**	'DR'	-0.43	-1.24	0.00	-0.19	'DR'	-0.43	-0.96	0.00	-0.17
Sneakers CF Wk 2	'CF'	-0.40	0.00	-0.94	-0.71	'CF'	-0.37	0.00	-0.66	-0.68	'CF'	-0.36	0.00	-0.57	-0.54
Sneakers TY Wk 2	'TY'	-0.55	-1.48	-0.24	0.00	'TY'	-0.49	-1.25	-0.16	0.00	'TY'	-0.41	-0.98	-0.19	0.00
Jeans AF Wk 2	'AF'	0.00	-1.70	-2.04	-1.54	'AF'	0.00	-1.18	-1.28	-0.74	'AF'	0.00	-0.95	-0.63	-0.43
Jeans DR Wk 2	**'AF'**	**-0.03**	**-2.26**	**-0.98**	**-0.62**	**'AF'**	**-0.06**	**-1.53**	**-0.50**	**-0.31**	**'AF'**	**-0.12**	**-1.12**	**-0.19**	**-0.19**
Jeans CF Wk 2	'CF'	-1.13	0.00	-3.09	-1.95	'CF'	-0.40	-0.06	-1.80	-1.03	'CF'	-0.26	-0.03	-0.91	-0.63
Jeans TY Wk 2	**'AF'**	**-0.06**	**-1.89**	**-0.53**	**-0.61**	**'AF'**	**-0.01**	**-1.48**	**-0.28**	**-0.32**	**'AF'**	**-0.04**	**-1.21**	**-0.23**	**-0.24**

Table H23 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 3	'AF'	-0.04	-1.33	-0.12	-0.75	'AF'	-0.04	-1.21	-0.13	-0.63	'AF'	0.00	-1.13	-0.20	-0.52
Shovel DR Wk 3	'DR'	-0.88	-1.96	0.00	-0.27	'DR'	-0.77	-1.48	0.00	-0.39	'DR'	-0.54	-1.13	0.00	-0.27
Shovel CF Wk 3	'CF'	-0.48	0.00	-1.04	-0.80	'CF'	-0.42	0.00	-0.70	-0.83	'CF'	-0.38	0.00	-0.58	-0.59
Shovel TY Wk 3	**'DR'**	**-0.72**	**-1.60**	**0.01**	**-0.23**	**'DR'**	**-0.62**	**-1.51**	**-0.21**	**-0.27**	**'DR'**	**-0.35**	**-1.11**	**-0.12**	**-0.14**
Sneakers AF Wk 3	'AF'	0.00	-1.53	-0.17	-1.05	'AF'	-0.03	-1.41	-0.13	-0.86	'AF'	0.00	-1.20	-0.20	-0.60
Sneakers DR Wk 3	'DR'	-1.27	-2.13	0.00	-0.41	'DR'	-1.05	-1.64	0.00	-0.49	'DR'	-0.63	-1.16	0.00	-0.28
Sneakers CF Wk 3	'CF'	-0.49	0.00	-1.05	-0.75	'CF'	-0.46	0.00	-0.75	-0.72	'CF'	-0.43	0.00	-0.62	-0.55
Sneakers TY Wk 3	**'DR'**	**-0.96**	**-1.77**	**-0.20**	**-0.24**	**'DR'**	**-0.79**	**-1.49**	**-0.22**	**-0.24**	**'DR'**	**-0.44**	**-1.14**	**-0.06**	**-0.11**
Jeans AF Wk 3	'AF'	0.00	-2.42	-3.43	-2.13	'AF'	0.00	-1.57	-2.12	-1.00	'AF'	0.00	-1.13	-0.99	-0.55
Jeans DR Wk 3	**'TY'**	**-0.23**	**-2.52**	**-0.41**	**0.01**	**'TY'**	**-0.45**	**-1.77**	**-0.12**	**-0.05**	'DR'	-0.36	-1.23	-0.06	-0.11
Jeans CF Wk 3	'CF'	-1.48	0.00	-3.28	-1.28	'AF'	-0.08	-0.47	-1.94	-0.66	'CF'	-0.26	-0.06	-0.99	-0.46
Jeans TY Wk 3	**'AF'**	**-1.00**	**-1.95**	**-1.65**	**-1.03**	**'AF'**	**-0.42**	**-1.49**	**-1.00**	**-0.43**	**'AF'**	**-0.21**	**-1.11**	**-0.56**	**-0.22**
Shovel AF Wk 4	'AF'	0.00	-1.72	-0.64	-0.67	'AF'	0.00	-1.22	-0.31	-0.73	'AF'	0.00	-0.95	-0.26	-0.45
Shovel DR Wk 4	'DR'	-0.74	-1.71	0.00	-0.25	'DR'	-0.57	-1.35	0.00	-0.31	'DR'	-0.47	-1.09	0.00	-0.19
Shovel CF Wk 4	'CF'	-0.50	0.00	-0.93	-0.82	'CF'	-0.39	0.00	-0.65	-0.77	'CF'	-0.37	0.00	-0.54	-0.58
Shovel TY Wk 4	'TY'	-0.75	-1.71	-0.13	-0.04	**'DR'**	**-0.58**	**-1.40**	**-0.04**	**-0.12**	'TY'	-0.41	-1.04	-0.13	-0.04
Sneakers AF Wk 4	'AF'	-0.03	-1.55	-0.14	-0.98	'AF'	-0.04	-1.37	-0.13	-0.86	'AF'	-0.01	-1.13	-0.16	-0.55
Sneakers DR Wk 4	'DR'	-0.96	-1.75	0.00	-0.17	'DR'	-0.56	-1.57	0.00	-0.44	'DR'	-0.48	-1.10	0.00	-0.25
Sneakers CF Wk 4	'CF'	-0.71	0.00	-1.24	-0.56	'CF'	-0.48	0.00	-0.82	-0.57	'CF'	-0.44	0.00	-0.65	-0.49
Sneakers TY Wk 4	'TY'	-0.72	-1.63	-0.10	-0.07	'TY'	-0.59	-1.44	-0.09	-0.07	'TY'	-0.37	-1.05	-0.22	0.00
Jeans AF Wk 4	'AF'	0.00	-2.04	-1.97	-1.59	'AF'	0.00	-1.39	-1.22	-0.75	'AF'	0.00	-1.07	-0.60	-0.49
Jeans DR Wk 4	**'AF'**	**-0.55**	**-2.22**	**-0.58**	**-0.71**	**'AF'**	**0.01**	**-1.49**	**-0.24**	**-0.42**	'DR'	-0.14	-1.08	-0.10	-0.26
Jeans CF Wk 4	'CF'	-1.03	0.00	-3.35	-2.48	'CF'	-0.49	0.00	-1.98	-1.25	'CF'	-0.40	0.00	-0.96	-0.70
Jeans TY Wk 4	**'AF'**	**-1.24**	**-2.21**	**-2.28**	**-1.54**	**'AF'**	**-0.61**	**-1.54**	**-1.38**	**-0.68**	**'AF'**	**-0.31**	**-1.10**	**-0.67**	**-0.33**

Table H24. Support vector machines classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 5	'AF'	-0.04	-1.12	-0.13	-0.61	'AF'	-0.04	-1.09	-0.12	-0.53	'AF'	-0.02	-0.89	-0.16	-0.35
Shovel CF Wk 5	'CF'	-0.95	0.00	-1.97	-3.82	'CF'	-0.37	0.00	-1.43	-1.71	'CF'	-0.15	-0.01	-0.89	-1.14
Jeans TY Wk 5	**'DR'**	**-1.16**	**-2.97**	**-0.05**	**-2.60**	**'DR'**	**-0.68**	**-2.31**	**-0.09**	**-0.98**	**'DR'**	**-0.29**	**-1.56**	**-0.04**	**-0.62**
Shovel TY Wk 5	'TY'	-1.23	-1.94	-0.31	0.00	'TY'	-0.91	-1.58	-0.20	0.00	'TY'	-0.58	-1.12	-0.17	0.00
Sneakers AF Wk 5	**'DR'**	**-0.18**	**-1.29**	**-0.03**	**-0.60**	**'DR'**	**-0.11**	**-1.18**	**-0.05**	**-0.48**	'AF'	-0.06	-0.92	-0.11	-0.34
Sneakers DR Wk 5	'DR'	-1.16	-1.76	0.00	-0.33	'DR'	-1.04	-1.49	0.00	-0.39	'DR'	-0.59	-1.11	0.00	-0.26
Sneakers CF Wk 5	'CF'	-0.53	0.00	-1.50	-0.80	'CF'	-0.41	0.00	-1.07	-0.70	'CF'	-0.32	0.00	-0.73	-0.60
Sneakers TY Wk 5	'TY'	-1.05	-1.91	-0.37	0.00	'TY'	-0.91	-1.63	-0.29	0.00	'TY'	-0.59	-1.15	-0.22	0.00
Jeans AF Wk 5	**'DR'**	**-1.50**	**-3.69**	**-0.01**	**-6.03**	**'DR'**	**-0.74**	**-2.72**	**-0.69**	**-2.64**	**'DR'**	**-0.28**	**-1.79**	**-0.26**	**-1.57**
Jeans DR Wk 5	'DR'	-1.02	-2.52	0.00	-2.14	'DR'	-0.68	-1.90	0.00	-1.00	'DR'	-0.37	-1.32	0.00	-0.67
Shovel DR Wk 5	'DR'	-1.09	-2.40	0.00	-0.57	'DR'	-0.95	-1.77	0.00	-0.48	'DR'	-0.58	-1.22	0.00	-0.31
Jeans CF Wk 5	'CF'	-0.50	0.00	-1.44	-0.81	'CF'	-0.39	0.00	-0.94	-0.64	'CF'	-0.33	0.00	-0.73	-0.62
Shovel AF Wk 6	'AF'	-0.06	-1.15	-0.11	-0.59	'AF'	-0.06	-1.03	-0.11	-0.48	'AF'	-0.04	-0.82	-0.14	-0.34
Shovel DR Wk 6	'DR'	-0.61	-1.97	0.00	-0.29	'DR'	-0.54	-1.46	0.00	-0.27	'DR'	-0.45	-1.02	0.00	-0.22
Shovel CF Wk 6	'CF'	-0.44	0.00	-1.32	-0.69	'CF'	-0.33	0.00	-0.86	-0.54	'CF'	-0.31	0.00	-0.63	-0.53
Shovel TY Wk 6	'TY'	-0.84	-1.71	-0.26	0.00	'TY'	-0.68	-1.47	-0.19	0.00	'TY'	-0.47	-1.05	-0.19	0.00
Sneakers AF Wk 6	'AF'	0.00	-1.16	-0.19	-0.48	'AF'	-0.01	-1.06	-0.15	-0.38	'AF'	-0.03	-0.86	-0.17	-0.30
Sneakers DR Wk 6	'DR'	-0.64	-1.71	0.00	-0.34	'DR'	-0.60	-1.35	0.00	-0.30	'DR'	-0.45	-0.97	0.00	-0.22
Sneakers CF Wk 6	'CF'	-0.50	0.00	-1.49	-0.73	'CF'	-0.38	0.00	-1.09	-0.66	'CF'	-0.30	0.00	-0.72	-0.55
Sneakers TY Wk 6	'TY'	-0.71	-1.85	-0.37	0.00	'TY'	-0.58	-1.51	-0.29	0.00	'TY'	-0.42	-1.09	-0.33	0.00
Jeans AF Wk 6	**'DR'**	**-1.40**	**-3.40**	**-1.19**	**-6.08**	**'DR'**	**-0.69**	**-2.57**	**-0.65**	**-2.75**	**'DR'**	**-0.26**	**-1.71**	**-0.22**	**-1.62**
Jeans DR Wk 6	'DR'	-1.34	-2.75	0.00	-1.75	'DR'	-0.99	-2.01	0.00	-0.86	'DR'	-0.58	-1.45	0.00	-0.65
Jeans CF Wk 6	'CF'	-1.47	0.00	-1.44	-5.34	'CF'	-0.57	0.00	-1.01	-2.57	'CF'	-0.21	0.00	-0.71	-1.63
Jeans TY Wk 6	**'DR'**	**-1.69**	**-2.82**	**-0.05**	**-4.95**	**'DR'**	**-0.96**	**-2.32**	**-0.03**	**-2.25**	**'DR'**	**-0.39**	**-1.61**	**-0.06**	**-1.29**

Table H24 (cont'd).

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 7	**'DR'**	**-0.13**	**-0.58**	**-0.04**	**-1.09**	'AF'	-0.08	-0.85	-0.09	-0.63	'AF'	-0.03	-0.77	-0.14	-0.37
Shovel DR Wk 7	'DR'	-0.34	-3.16	-0.06	-0.76	'DR'	-0.45	-2.28	0.00	-0.54	'DR'	-0.32	-1.45	0.00	-0.36
Shovel CF Wk 7	'CF'	-0.63	0.00	-1.99	-0.69	'CF'	-0.44	0.00	-1.25	-0.57	'CF'	-0.32	0.00	-0.85	-0.51
Shovel TY Wk 7	'TY'	-1.53	-2.16	-0.20	0.00	'TY'	-1.13	-1.76	-0.12	-0.04	'TY'	-0.66	-1.19	-0.13	-0.04
Sneakers AF Wk 7	**'DR'**	**-0.24**	**-1.54**	**-0.21**	**-0.48**	**'DR'**	**-0.19**	**-1.40**	**-0.03**	**-0.33**	**'DR'**	**-0.11**	**-1.10**	**-0.09**	**-0.32**
Sneakers DR Wk 7	'DR'	-1.17	-2.13	0.00	-0.39	'DR'	-1.03	-1.59	0.00	-0.39	'DR'	-0.63	-1.10	0.00	-0.29
Sneakers CF Wk 7	'CF'	-0.90	0.00	-1.12	-0.53	'CF'	-0.47	0.00	-0.95	-0.48	'CF'	-0.36	0.00	-0.65	-0.46
Sneakers TY Wk 7	'TY'	-1.26	-2.03	-0.26	0.00	'TY'	-0.99	-1.78	-0.16	0.00	'TY'	-0.62	-1.23	-0.19	0.00
Jeans AF Wk 7	**'DR'**	**-1.54**	**-3.51**	**-1.53**	**-6.51**	**'DR'**	**-0.77**	**-2.66**	**-0.74**	**-2.94**	**'DR'**	**-0.29**	**-1.80**	**-0.26**	**-1.74**
Jeans DR Wk 7	'DR'	-1.57	-3.28	0.00	-2.79	'DR'	-1.04	-2.45	0.00	-1.27	'DR'	-0.52	-1.62	0.00	-0.89
Jeans CF Wk 7	'CF'	-1.65	0.00	-3.06	-6.34	'CF'	-0.75	0.00	-2.27	-2.78	'CF'	-0.28	0.00	-1.46	-1.66
Jeans TY Wk 7	**'DR'**	**-1.43**	**-3.39**	**-0.01**	**-3.07**	**'DR'**	**-0.84**	**-2.60**	**-0.05**	**-1.24**	**'DR'**	**-0.36**	**-1.73**	**0.02**	**-0.73**
Shovel AF Wk 8	**'DR'**	**-0.09**	**-1.60**	**-0.08**	**-0.79**	'AF'	-0.08	-1.36	-0.09	-0.59	'AF'	-0.01	-1.06	-0.15	-0.37
Shovel DR Wk 8	'DR'	-0.94	-2.17	0.00	-0.57	'DR'	-0.91	-1.76	0.00	-0.49	'DR'	-0.60	-1.27	0.00	-0.28
Shovel CF Wk 8	'CF'	-0.65	0.00	-1.99	-0.71	'CF'	-0.48	0.00	-1.27	-0.59	'CF'	-0.35	0.00	-0.88	-0.53
Shovel TY Wk 8	'TY'	-1.67	-2.39	-0.21	0.00	'TY'	-1.30	-1.90	-0.13	-0.04	'TY'	-0.74	-1.27	-0.15	-0.01
Sneakers AF Wk 8	**'DR'**	**-0.22**	**-1.69**	**-0.22**	**-0.66**	**'DR'**	**-0.18**	**-1.45**	**-0.17**	**-0.51**	'AF'	-0.05	-1.16	-0.11	-0.38
Sneakers DR Wk 8	'DR'	-1.09	-2.06	0.00	-0.31	'DR'	-1.05	-1.62	0.00	-0.36	'DR'	-0.65	-1.14	0.00	-0.29
Sneakers CF Wk 8	'CF'	-0.70	0.00	-1.61	-0.65	'CF'	-0.43	0.00	-1.13	-0.63	'CF'	-0.33	0.00	-0.78	-0.56
Sneakers TY Wk 8	'TY'	-1.50	-2.12	-0.11	-0.06	**'DR'**	**-1.22**	**-1.89**	**-0.06**	**-0.11**	'TY'	-0.71	-1.25	-0.13	-0.04
Jeans AF Wk 8	**'DR'**	**-1.19**	**-3.16**	**-1.00**	**-4.86**	**'DR'**	**-0.59**	**-2.46**	**-0.51**	**-2.23**	**'DR'**	**-0.22**	**-1.68**	**-0.22**	**-1.31**
Jeans DR Wk 8	'DR'	-1.48	-2.95	0.00	-2.89	'DR'	-0.97	-2.23	0.00	-1.35	'DR'	-0.46	-1.53	0.00	-0.93
Jeans CF Wk 8	'CF'	-1.26	0.00	-2.42	-5.20	'CF'	-0.53	0.00	-1.77	-2.31	'CF'	-0.21	0.00	-1.11	-1.44
Jeans TY Wk 8	**'DR'**	**-1.86**	**-3.44**	**-0.10**	**-3.43**	**'DR'**	**-1.19**	**-2.77**	**-0.07**	**-1.51**	**'DR'**	**-0.49**	**-1.84**	**-0.07**	**-0.90**

Table H25. Support vector machines classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 12	'AF'	0.00	-0.59	-1.09	-1.00	'AF'	0.00	-0.77	-0.47	-0.57	'AF'	0.00	-0.68	-0.28	-0.37
Shovel DR Wk 12	'DR'	-0.47	-2.00	0.00	-0.18	'DR'	-0.31	-1.54	0.00	-0.27	'DR'	-0.35	-1.08	0.00	-0.24
Shovel CF Wk 12	'CF'	-0.61	0.00	-0.84	-0.85	'CF'	-0.39	0.00	-0.59	-0.70	'CF'	-0.37	0.00	-0.51	-0.54
Shovel TY Wk 12	'TY'	-0.99	-1.20	-0.71	0.00	'TY'	-0.65	-1.06	-0.37	0.00	'TY'	-0.50	-0.93	-0.30	0.00
Sneakers AF Wk 12	'AF'	0.00	-1.29	-0.35	-0.68	'AF'	0.00	-1.01	-0.28	-0.41	'AF'	0.00	-0.87	-0.29	-0.29
Sneakers DR Wk 12	**'TY'**	**-0.55**	**-1.72**	**-0.38**	**-0.35**	**'TY'**	**-0.44**	**-1.42**	**-0.11**	**-0.09**	'DR'	-0.32	-0.97	-0.02	-0.15
Sneakers CF Wk 12	'CF'	-0.37	0.00	-0.67	-0.64	'CF'	-0.27	0.00	-0.56	-0.58	'CF'	-0.30	0.00	-0.44	-0.45
Sneakers TY Wk 12	'TY'	-0.74	-1.21	-0.56	0.00	'TY'	-0.55	-1.13	-0.31	0.00	'TY'	-0.46	-0.93	-0.27	0.00
Jeans AF Wk 12	**'TY'**	**-0.39**	**-2.23**	**-1.02**	**-0.01**	**'TY'**	**-0.15**	**-1.37**	**-0.76**	**-0.02**	**'TY'**	**-0.15**	**-0.82**	**-0.47**	**-0.02**
Jeans DR Wk 12	**'TY'**	**-0.80**	**-1.99**	**-0.60**	**0.00**	**'TY'**	**-0.57**	**-1.43**	**-0.25**	**-0.21**	'DR'	-0.46	-0.98	-0.08	-0.08
Jeans CF Wk 12	'CF'	-0.45	0.00	-1.13	-1.57	'CF'	-0.16	-0.01	-0.79	-0.88	'CF'	-0.22	0.00	-0.47	-0.46
Jeans TY Wk 12	'TY'	-0.85	-1.54	-0.63	0.00	'TY'	-0.59	-1.20	-0.40	0.00	'TY'	-0.50	-0.93	-0.32	0.00
Shovel AF Wk 16	'AF'	0.00	-1.33	-0.19	-0.68	**'DR'**	**-0.11**	**-1.11**	**-0.06**	**-0.38**	'AF'	-0.02	-0.85	-0.20	-0.29
Shovel DR Wk 16	**'TY'**	**-0.87**	**-2.23**	**-0.59**	**-0.05**	**'TY'**	**-0.51**	**-1.72**	**-0.17**	**-0.04**	'DR'	-0.40	-1.09	-0.05	-0.12
Shovel CF Wk 16	'CF'	-0.52	0.00	-0.84	-0.96	'CF'	-0.41	0.00	-0.61	-0.72	'CF'	-0.38	0.00	-0.52	-0.55
Shovel TY Wk 16	'TY'	-1.06	-1.15	-0.61	0.00	'TY'	-0.71	-1.04	-0.23	0.00	'TY'	-0.54	-0.90	-0.19	0.00
Sneakers AF Wk 16	'AF'	0.00	-3.06	-0.23	-0.42	'AF'	-0.02	-2.01	-0.25	-0.26	'AF'	-0.06	-1.12	-0.21	-0.24
Sneakers DR Wk 16	**'TY'**	**-0.64**	**-2.52**	**-0.14**	**-0.03**	'DR'	-0.57	-1.71	-0.03	-0.14	'DR'	-0.42	-1.11	0.00	-0.16
Sneakers CF Wk 16	'CF'	-0.69	0.00	-0.77	-0.84	'CF'	-0.44	0.00	-0.66	-0.73	'CF'	-0.40	0.00	-0.55	-0.55
Sneakers TY Wk 16	'TY'	-0.75	-0.89	-0.40	0.00	'TY'	-0.60	-0.90	-0.14	-0.03	'TY'	-0.43	-0.75	-0.17	0.00
Jeans AF Wk 16	**'TY'**	**-0.10**	**-1.74**	**-0.61**	**-0.07**	'AF'	-0.08	-1.17	-0.46	-0.09	**'TY'**	**-0.11**	**-0.72**	**-0.33**	**-0.07**
Jeans DR Wk 16	**'TY'**	**-0.73**	**-2.22**	**-0.52**	**-0.08**	**'TY'**	**-0.46**	**-1.55**	**-0.29**	**-0.27**	**'TY'**	**-0.40**	**-0.97**	**-0.14**	**-0.06**
Jeans CF Wk 16	'CF'	-0.45	0.00	-1.24	-1.81	'CF'	-0.16	0.00	-1.00	-0.01	'CF'	-0.22	0.00	-0.51	-0.51
Jeans TY Wk 16	'TY'	-0.57	-1.04	-0.60	0.00	'TY'	-0.38	-0.79	-0.32	0.00	'TY'	-0.37	-0.59	-0.24	0.00

Table H25 (cont'd).

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 20	'AF'	-0.01	-1.70	-0.15	-0.52	'AF'	-0.03	-1.26	-0.15	-0.34	'AF'	-0.01	-1.09	-0.20	-0.30
Shovel DR Wk 20	'DR'	-0.89	-2.00	0.00	-0.23	'DR'	-0.82	-1.59	0.00	-0.30	'DR'	-0.52	-1.08	0.00	-0.23
Shovel CF Wk 20	'CF'	-0.49	0.00	-0.92	-1.11	'CF'	-0.34	0.00	-0.59	-0.71	'CF'	-0.32	0.00	-0.53	-0.53
Shovel TY Wk 20	'TY'	-1.23	-1.26	-0.67	0.00	'TY'	-0.85	-1.15	-0.26	0.00	'TY'	-0.54	-0.97	-0.22	0.00
Sneakers AF Wk 20	'AF'	0.00	-1.34	-0.21	-0.71	'AF'	-0.02	-1.04	-0.14	-0.41	'AF'	-0.03	-0.74	-0.15	-0.34
Sneakers DR Wk 20	**'TY'**	**-0.88**	**-1.85**	**-0.23**	**-0.22**	'DR'	-0.65	-1.42	-0.05	-0.12	'DR'	-0.46	-0.96	0.00	-0.16
Sneakers CF Wk 20	'CF'	-0.53	0.00	-0.78	-0.86	'CF'	-0.41	0.00	-0.68	-0.77	'CF'	-0.37	0.00	-0.54	-0.56
Sneakers TY Wk 20	'TY'	-0.70	-1.23	-0.34	0.00	**'DR'**	**-0.63**	**-1.31**	**-0.04**	**-0.13**	'TY'	-0.48	-0.99	-0.16	-0.01
Jeans AF Wk 20	**'TY'**	**-0.43**	**-2.47**	**-1.29**	**-0.08**	**'TY'**	**-0.13**	**-1.43**	**-0.90**	**-0.03**	**'TY'**	**-0.16**	**-0.79**	**-0.51**	**-0.01**
Jeans DR Wk 20	**'TY'**	**-1.10**	**-2.30**	**-0.28**	**-0.25**	'DR'	-0.73	-1.62	-0.06	-0.10	'DR'	-0.53	-1.05	-0.04	-0.13
Jeans CF Wk 20	'CF'	-0.34	0.00	-1.12	-1.52	'CF'	-0.13	-0.04	-0.79	-0.83	'CF'	-0.20	-0.04	-0.47	-0.43
Jeans TY Wk 20	'TY'	-0.74	-2.07	-0.92	0.00	'TY'	-0.39	-1.42	-0.55	0.00	'TY'	-0.35	-0.90	-0.38	0.00
Shovel AF Wk 24	'AF'	0.00	-1.76	-0.29	-0.70	'AF'	0.00	-1.36	-0.27	-0.40	'AF'	0.00	-0.97	-0.27	-0.31
Shovel DR Wk 24	**'TY'**	**-0.72**	**-2.09**	**-0.13**	**-0.08**	'DR'	-0.78	-1.67	0.00	-0.24	'DR'	-0.48	-1.10	0.00	-0.19
Shovel CF Wk 24	'CF'	-0.51	0.00	-0.96	-0.94	'CF'	-0.37	0.00	-0.67	-0.67	'CF'	-0.32	0.00	-0.55	-0.51
Shovel TY Wk 24	'TY'	-1.01	-1.28	-0.58	0.00	'TY'	-0.63	-1.07	-0.29	0.00	'TY'	-0.50	-0.89	-0.25	0.00
Sneakers AF Wk 24	'AF'	0.00	-1.49	-0.26	-0.99	'AF'	0.00	-1.16	-0.20	-0.55	'AF'	0.00	-0.86	-0.22	-0.35
Sneakers DR Wk 24	**'TY'**	**-0.49**	**-2.11**	**-0.62**	**-0.01**	**'TY'**	**-0.35**	**-1.52**	**-0.27**	**-0.01**	**'TY'**	**-0.38**	**-1.01**	**-0.09**	**-0.08**
Sneakers CF Wk 24	'CF'	-0.54	0.00	-0.90	-0.95	'CF'	-0.40	0.00	-0.70	-0.75	'CF'	-0.34	0.00	-0.56	-0.55
Sneakers TY Wk 24	'TY'	-0.87	-1.49	-0.38	0.00	'TY'	-0.59	-1.22	-0.20	0.00	'TY'	-0.44	-0.98	-0.24	0.00
Jeans AF Wk 24	**'TY'**	**-0.41**	**-2.24**	**-1.11**	**-0.40**	**'TY'**	**-0.17**	**-1.35**	**-0.83**	**0.00**	**'TY'**	**-0.16**	**-0.78**	**-0.50**	**-0.01**
Jeans DR Wk 24	**'TY'**	**-0.78**	**-2.68**	**-0.95**	**-0.01**	**'TY'**	**-0.38**	**-1.68**	**-0.64**	**-0.08**	**'TY'**	**-0.32**	**-0.99**	**-0.33**	**-0.05**
Jeans CF Wk 24	'CF'	-0.42	0.00	-1.21	-1.41	'CF'	-0.17	-0.02	-0.86	-0.76	'CF'	-0.24	-0.02	-0.51	-0.39
Jeans TY Wk 24	'TY'	-0.66	-2.02	-0.92	0.00	'TY'	-0.34	-1.28	-0.68	0.00	'TY'	-0.30	-0.82	-0.43	0.00

Table H26. Bagged trees using random forests classification and scores for soils collected from t-shirts over one year (n = 12 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the t-shirts classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shirt AF 9-5-14	**'TY'**	**0.28**	**0.06**	**0.23**	**0.43**	'AF'	0.40	0.04	0.31	0.26	'AF'	0.43	0.06	0.27	0.24
Shirt DR 9-5-14	'DR'	0.15	0.07	0.58	0.21	'DR'	0.15	0.08	0.56	0.20	'DR'	0.09	0.08	0.61	0.22
Shirt CF 9-5-14	'CF'	0.04	0.93	0.01	0.02	'CF'	0.04	0.92	0.04	0.01	'CF'	0.04	0.86	0.06	0.04
Shirt TY 9-5-14	'TY'	0.03	0.01	0.27	0.69	'TY'	0.06	0.03	0.29	0.62	'TY'	0.06	0.04	0.26	0.65
Shirt AF 10-3-14	'AF'	0.35	0.11	0.20	0.35	**'DR'**	**0.32**	**0.09**	**0.33**	**0.26**	**'DR'**	**0.27**	**0.13**	**0.32**	**0.28**
Shirt DR 10-3-14	'DR'	0.12	0.11	0.53	0.25	'DR'	0.19	0.09	0.53	0.19	'DR'	0.17	0.12	0.47	0.24
Shirt CF 10-3-14	'CF'	0.08	0.84	0.05	0.03	'CF'	0.09	0.77	0.10	0.03	'CF'	0.09	0.74	0.12	0.06
Shirt TY 10-3-14	'TY'	0.05	0.03	0.26	0.65	'TY'	0.09	0.07	0.28	0.56	'TY'	0.10	0.08	0.26	0.57
Shirt AF 11-10-14	'AF'	0.37	0.06	0.26	0.31	**'DR'**	**0.29**	**0.09**	**0.39**	**0.23**	**'TY'**	**0.27**	**0.10**	**0.30**	**0.33**
Shirt DR 11-10-14	'DR'	0.16	0.14	0.43	0.27	'DR'	0.20	0.19	0.38	0.24	'DR'	0.17	0.19	0.38	0.27
Shirt CF 11-10-14	'CF'	0.11	0.79	0.04	0.06	'CF'	0.11	0.78	0.09	0.02	'CF'	0.11	0.70	0.12	0.07
Shirt TY 11-10-14	'TY'	0.08	0.03	0.32	0.57	'TY'	0.08	0.04	0.31	0.57	'TY'	0.14	0.07	0.27	0.53
Shirt AF 1-7-15	'AF'	0.36	0.13	0.15	0.35	'AF'	0.37	0.11	0.29	0.22	**'DR'**	**0.28**	**0.17**	**0.30**	**0.25**
Shirt DR 1-7-15	'DR'	0.12	0.07	0.57	0.24	'DR'	0.21	0.11	0.52	0.16	'DR'	0.21	0.13	0.45	0.21
Shirt CF 1-7-15	'CF'	0.13	0.70	0.07	0.10	'CF'	0.16	0.71	0.09	0.04	'CF'	0.13	0.63	0.14	0.10
Shirt TY 1-7-15	'TY'	0.06	0.04	0.23	0.67	'TY'	0.07	0.06	0.24	0.63	'TY'	0.06	0.07	0.23	0.65
Shirt AF 2-10-15	**'TY'**	**0.36**	**0.07**	**0.21**	**0.37**	**'DR'**	**0.30**	**0.11**	**0.35**	**0.24**	**'DR'**	**0.26**	**0.11**	**0.37**	**0.26**
Shirt DR 2-10-15	'DR'	0.27	0.10	0.44	0.19	'DR'	0.28	0.13	0.45	0.13	'DR'	0.17	0.13	0.54	0.16
Shirt CF 2-10-15	'CF'	0.13	0.78	0.03	0.06	'CF'	0.11	0.75	0.10	0.04	'CF'	0.12	0.68	0.12	0.08
Shirt TY 2-10-15	'TY'	0.10	0.03	0.25	0.62	'TY'	0.11	0.04	0.30	0.55	'TY'	0.11	0.05	0.28	0.56
Shirt AF 3-6-15	'AF'	0.35	0.07	0.23	0.35	**'DR'**	**0.28**	**0.11**	**0.36**	**0.25**	**'DR'**	**0.23**	**0.13**	**0.35**	**0.29**
Shirt DR 3-6-15	'DR'	0.23	0.09	0.45	0.24	'DR'	0.23	0.09	0.48	0.21	'DR'	0.17	0.10	0.54	0.19
Shirt CF 3-6-15	'CF'	0.13	0.83	0.02	0.03	'CF'	0.11	0.79	0.07	0.04	'CF'	0.13	0.67	0.12	0.09
Shirt TY 3-6-15	'TY'	0.09	0.03	0.24	0.65	'TY'	0.11	0.05	0.27	0.57	'TY'	0.11	0.05	0.26	0.58
Shirt AF 4-10-15	'AF'	0.37	0.14	0.21	0.28	'AF'	0.33	0.13	0.32	0.22	**'DR'**	**0.28**	**0.16**	**0.31**	**0.26**
Shirt DR 4-10-15	'DR'	0.31	0.07	0.39	0.23	'DR'	0.26	0.11	0.44	0.20	'DR'	0.20	0.12	0.47	0.22
Shirt CF 4-10-15	'CF'	0.14	0.74	0.05	0.07	'CF'	0.14	0.71	0.09	0.05	'CF'	0.11	0.69	0.12	0.08
Shirt TY 4-10-15	'TY'	0.05	0.03	0.27	0.65	'TY'	0.08	0.07	0.24	0.62	'TY'	0.07	0.06	0.21	0.66

Table H26 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shirt AF 5-11-15	**'TY'**	**0.33**	**0.07**	**0.24**	**0.35**	**'DR'**	**0.28**	**0.10**	**0.39**	**0.23**	**'DR'**	**0.24**	**0.15**	**0.34**	**0.27**
Shirt DR 5-11-15	'DR'	0.25	0.09	0.46	0.20	'DR'	0.23	0.10	0.50	0.16	'DR'	0.19	0.15	0.45	0.22
Shirt CF 5-11-15	'CF'	0.15	0.75	0.04	0.05	'CF'	0.15	0.70	0.09	0.06	'CF'	0.15	0.63	0.13	0.10
Shirt TY 5-11-15	'TY'	0.09	0.01	0.24	0.66	'TY'	0.08	0.03	0.26	0.64	'TY'	0.11	0.06	0.25	0.58
Shirt AF 6-5-15	'AF'	0.31	0.15	0.27	0.27	'AF'	0.36	0.10	0.31	0.23	**'DR'**	**0.29**	**0.14**	**0.35**	**0.23**
Shirt DR 6-5-15	'DR'	0.27	0.08	0.44	0.21	'DR'	0.26	0.10	0.46	0.18	'DR'	0.18	0.11	0.51	0.20
Shirt CF 6-5-15	'CF'	0.15	0.77	0.03	0.05	'CF'	0.13	0.74	0.10	0.04	'CF'	0.14	0.64	0.13	0.10
Shirt TY 6-5-15	'TY'	0.09	0.01	0.33	0.57	'TY'	0.13	0.04	0.29	0.55	'TY'	0.11	0.07	0.29	0.54
Shirt AF 7-6-15	'AF'	0.41	0.05	0.32	0.22	**'DR'**	**0.34**	**0.08**	**0.37**	**0.21**	**'DR'**	**0.33**	**0.10**	**0.35**	**0.21**
Shirt DR 7-6-15	'DR'	0.15	0.13	0.58	0.14	'DR'	0.22	0.11	0.53	0.14	'DR'	0.15	0.17	0.51	0.18
Shirt CF 7-6-15	'CF'	0.09	0.79	0.07	0.05	'CF'	0.12	0.71	0.13	0.04	'CF'	0.11	0.60	0.19	0.10
Shirt TY 7-6-15	'TY'	0.05	0.05	0.23	0.67	'TY'	0.10	0.04	0.25	0.61	'TY'	0.12	0.07	0.25	0.56
Shirt AF 8-4-15	'AF'	0.44	0.10	0.18	0.28	'AF'	0.37	0.12	0.31	0.21	**'DR'**	**0.28**	**0.13**	**0.34**	**0.25**
Shirt DR 8-4-15	'DR'	0.23	0.11	0.48	0.17	'DR'	0.22	0.12	0.50	0.16	'DR'	0.16	0.13	0.51	0.20
Shirt CF 8-4-15	'CF'	0.16	0.73	0.05	0.05	'CF'	0.15	0.73	0.06	0.05	'CF'	0.14	0.65	0.12	0.09
Shirt TY 8-4-15	'TY'	0.10	0.05	0.27	0.58	'TY'	0.09	0.08	0.27	0.56	'TY'	0.10	0.08	0.25	0.57
Shirt AF 9-4-15	'AF'	0.43	0.08	0.19	0.31	'AF'	0.40	0.09	0.32	0.18	'AF'	0.32	0.11	0.32	0.26
Shirt DR 9-4-15	'DR'	0.31	0.11	0.35	0.23	'DR'	0.24	0.10	0.46	0.20	'DR'	0.17	0.14	0.47	0.22
Shirt CF 9-4-15	'CF'	0.12	0.76	0.05	0.07	'CF'	0.13	0.72	0.10	0.06	'CF'	0.13	0.64	0.14	0.10
Shirt TY 9-4-15	'TY'	0.07	0.05	0.21	0.67	'TY'	0.17	0.30	0.22	0.31	'TY'	0.08	0.08	0.25	0.59

Table H27. Bagged trees using random forests classification and scores for the soils collected daily for one week from shovels, sneakers, and jeans (n = 21 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 0	'AF'	0.55	0.05	0.26	0.14	'AF'	0.55	0.02	0.27	0.16	'AF'	0.57	0.05	0.27	0.11
Shovel DR Day 0	'DR'	0.10	0.05	0.47	0.38	'DR'	0.12	0.05	0.65	0.18	'DR'	0.10	0.06	0.66	0.18
Shovel CF Day 0	'CF'	0.01	0.97	0.02	0.00	'CF'	0.02	0.94	0.02	0.03	'CF'	0.02	0.94	0.02	0.02
Shovel TY Day 0	'TY'	0.14	0.00	0.37	0.49	'TY'	0.28	0.01	0.34	0.37	'TY'	0.22	0.03	0.27	0.49
Sneakers AF Day 0	'AF'	0.51	0.00	0.25	0.24	'AF'	0.63	0.01	0.16	0.20	'AF'	0.66	0.02	0.19	0.14
Sneakers DR Day 0	**'TY'**	**0.09**	**0.03**	**0.40**	**0.47**	'DR'	0.10	0.04	0.61	0.24	'DR'	0.08	0.06	0.69	0.18
Sneakers CF Day 0	'CF'	0.01	0.92	0.03	0.03	'CF'	0.02	0.88	0.03	0.06	'CF'	0.02	0.88	0.06	0.04
Sneakers TY Day 0	'TY'	0.05	0.01	0.42	0.52	'TY'	0.24	0.03	0.26	0.48	'TY'	0.18	0.04	0.30	0.48
Jeans AF Day 0	'AF'	0.46	0.01	0.33	0.19	'AF'	0.57	0.03	0.20	0.21	'AF'	0.55	0.03	0.25	0.17
Jeans DR Day 0	**'TY'**	**0.14**	**0.01**	**0.38**	**0.47**	'DR'	0.20	0.04	0.48	0.27	'DR'	0.14	0.07	0.57	0.23
Jeans CF Day 0	'CF'	0.03	0.95	0.01	0.01	'CF'	0.04	0.89	0.03	0.04	'CF'	0.01	0.91	0.05	0.03
Jeans TY Day 0	'TY'	0.13	0.01	0.36	0.49	'TY'	0.25	0.03	0.27	0.45	'TY'	0.18	0.04	0.33	0.45
Shovel AF Day 1	'AF'	0.63	0.03	0.27	0.06	'AF'	0.66	0.03	0.25	0.07	'AF'	0.64	0.03	0.24	0.09
Shovel DR Day 1	**'TY'**	**0.11**	**0.03**	**0.42**	**0.44**	'DR'	0.13	0.05	0.63	0.19	'DR'	0.13	0.06	0.58	0.23
Shovel CF Day 1	'CF'	0.03	0.95	0.01	0.01	'CF'	0.03	0.93	0.02	0.02	'CF'	0.01	0.94	0.03	0.02
Shovel TY Day 1	'TY'	0.15	0.00	0.42	0.43	'TY'	0.20	0.01	0.30	0.49	'TY'	0.21	0.02	0.27	0.51
Sneakers AF Day 1	'AF'	0.41	0.01	0.36	0.22	'AF'	0.51	0.01	0.23	0.25	'AF'	0.48	0.03	0.32	0.17
Sneakers DR Day 1	'DR'	0.09	0.03	0.46	0.41	'DR'	0.15	0.05	0.58	0.22	'DR'	0.11	0.08	0.59	0.22
Sneakers CF Day 1	'CF'	0.02	0.93	0.02	0.03	'CF'	0.03	0.89	0.03	0.05	'CF'	0.02	0.89	0.06	0.04
Sneakers TY Day 1	'TY'	0.16	0.00	0.34	0.50	'TY'	0.28	0.02	0.25	0.45	'TY'	0.25	0.03	0.26	0.46

Table H27 (cont'd.)

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 1	'AF'	0.47	0.01	0.37	0.15	'AF'	0.51	0.02	0.29	0.18	'AF'	0.51	0.04	0.32	0.14
Jeans DR Day 1	'DR'	0.11	0.01	0.46	0.41	'DR'	0.14	0.03	0.63	0.20	'DR'	0.09	0.05	0.70	0.17
Jeans CF Day 1	'CF'	0.01	0.97	0.02	0.00	'CF'	0.03	0.93	0.02	0.02	'CF'	0.03	0.89	0.05	0.04
Jeans TY Day 1	'TY'	0.17	0.01	0.33	0.50	'TY'	0.27	0.03	0.23	0.47	'TY'	0.20	0.04	0.26	0.50
Shovel AF Day 2	'AF'	0.49	0.01	0.33	0.16	'AF'	0.46	0.02	0.29	0.22	'AF'	0.50	0.03	0.32	0.15
Shovel DR Day 2	'DR'	0.19	0.01	0.47	0.33	'DR'	0.16	0.02	0.66	0.16	'DR'	0.15	0.05	0.62	0.18
Shovel CF Day 2	'CF'	0.05	0.91	0.00	0.04	'CF'	0.03	0.93	0.02	0.02	'CF'	0.03	0.93	0.03	0.01
Shovel TY Day 2	'TY'	0.19	0.00	0.33	0.48	'TY'	0.26	0.02	0.22	0.50	'TY'	0.23	0.03	0.23	0.51
Sneakers AF Day 2	'AF'	0.59	0.01	0.27	0.13	'AF'	0.59	0.01	0.23	0.17	'AF'	0.58	0.03	0.26	0.13
Sneakers DR Day 2	'DR'	0.17	0.01	0.46	0.36	'DR'	0.14	0.04	0.55	0.28	'DR'	0.12	0.06	0.59	0.24
Sneakers CF Day 2	'CF'	0.03	0.95	0.00	0.02	'CF'	0.03	0.93	0.01	0.03	'CF'	0.02	0.93	0.03	0.02
Sneakers TY Day 2	'TY'	0.19	0.00	0.36	0.45	'TY'	0.16	0.02	0.32	0.50	'TY'	0.14	0.03	0.32	0.51
Jeans AF Day 2	'AF'	0.48	0.04	0.31	0.17	'AF'	0.55	0.07	0.13	0.25	'AF'	0.49	0.07	0.26	0.18
Jeans DR Day 2	'DR'	0.19	0.02	0.41	0.37	'DR'	0.17	0.06	0.52	0.25	'DR'	0.14	0.10	0.57	0.19
Jeans CF Day 2	'CF'	0.07	0.86	0.05	0.02	'CF'	0.07	0.84	0.05	0.04	'CF'	0.04	0.81	0.09	0.07
Jeans TY Day 2	'TY'	0.19	0.01	0.28	0.52	'TY'	0.28	0.03	0.26	0.44	'TY'	0.18	0.03	0.26	0.52
Shovel AF Day 3	'AF'	0.59	0.01	0.30	0.10	'AF'	0.53	0.01	0.34	0.12	'AF'	0.52	0.04	0.32	0.13
Shovel DR Day 3	'DR'	0.13	0.05	0.43	0.38	'DR'	0.13	0.05	0.61	0.21	'DR'	0.11	0.08	0.63	0.18
Shovel CF Day 3	'CF'	0.04	0.92	0.01	0.03	'CF'	0.02	0.97	0.00	0.01	'CF'	0.02	0.95	0.02	0.01
Shovel TY Day 3	'TY'	0.19	0.00	0.34	0.47	'TY'	0.21	0.02	0.29	0.48	'TY'	0.18	0.03	0.30	0.50
Sneakers AF Day 3	'AF'	0.56	0.01	0.29	0.14	'AF'	0.60	0.02	0.24	0.14	'AF'	0.48	0.04	0.33	0.15
Sneakers DR Day 3	'DR'	0.11	0.05	0.49	0.35	'DR'	0.17	0.06	0.58	0.19	'DR'	0.12	0.10	0.60	0.19
Sneakers CF Day 3	'CF'	0.03	0.95	0.00	0.02	'CF'	0.03	0.91	0.02	0.04	'CF'	0.02	0.90	0.05	0.04
Sneakers TY Day 3	'TY'	0.08	0.01	0.31	0.61	'TY'	0.17	0.04	0.32	0.47	'TY'	0.16	0.03	0.26	0.56

Table H27 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Jeans AF Day 3	'AF'	0.49	0.05	0.30	0.17	'AF'	0.53	0.06	0.22	0.19	'AF'	0.37	0.08	0.36	0.19
Jeans DR Day 3	'DR'	0.19	0.03	0.45	0.33	'DR'	0.17	0.07	0.55	0.22	'DR'	0.12	0.08	0.58	0.21
Jeans CF Day 3	'CF'	0.07	0.85	0.05	0.03	'CF'	0.06	0.82	0.07	0.06	'CF'	0.05	0.75	0.10	0.10
Jeans TY Day 3	'TY'	0.16	0.01	0.27	0.56	'TY'	0.26	0.03	0.30	0.41	'TY'	0.16	0.04	0.26	0.54
Shovel AF Day 4	'AF'	0.53	0.01	0.35	0.11	'AF'	0.54	0.01	0.32	0.13	'AF'	0.45	0.05	0.37	0.13
Shovel DR Day 4	'DR'	0.13	0.04	0.43	0.40	'DR'	0.17	0.05	0.53	0.25	'DR'	0.12	0.06	0.56	0.25
Shovel CF Day 4	'CF'	0.05	0.93	0.01	0.02	'CF'	0.03	0.94	0.01	0.02	'CF'	0.04	0.93	0.03	0.01
Shovel TY Day 4	'TY'	0.21	0.02	0.32	0.45	'TY'	0.26	0.04	0.20	0.50	'TY'	0.16	0.05	0.23	0.56
Sneakers AF Day 4	'AF'	0.47	0.01	0.28	0.24	'AF'	0.59	0.02	0.19	0.20	'AF'	0.47	0.05	0.33	0.16
Sneakers DR Day 4	'DR'	0.11	0.03	0.47	0.39	'DR'	0.14	0.05	0.58	0.23	'DR'	0.11	0.09	0.58	0.22
Sneakers CF Day 4	'CF'	0.03	0.94	0.00	0.03	'CF'	0.04	0.92	0.02	0.02	'CF'	0.01	0.93	0.04	0.02
Sneakers TY Day 4	'TY'	0.21	0.01	0.26	0.53	'TY'	0.24	0.04	0.22	0.51	'TY'	0.17	0.04	0.25	0.54
Jeans AF Day 4	'AF'	0.53	0.04	0.22	0.21	'AF'	0.57	0.04	0.23	0.15	'AF'	0.45	0.06	0.34	0.16
Jeans DR Day 4	'DR'	0.24	0.02	0.41	0.33	'DR'	0.22	0.03	0.52	0.24	'DR'	0.16	0.09	0.56	0.19
Jeans CF Day 4	'CF'	0.03	0.89	0.05	0.03	'CF'	0.04	0.88	0.04	0.05	'CF'	0.03	0.85	0.07	0.05
Jeans TY Day 4	'TY'	0.17	0.03	0.27	0.53	'TY'	0.29	0.05	0.25	0.41	'TY'	0.18	0.07	0.27	0.49
Shovel AF Day 5	'AF'	0.50	0.01	0.28	0.21	'AF'	0.54	0.02	0.25	0.19	'AF'	0.50	0.04	0.30	0.17
Shovel DR Day 5	'DR'	0.20	0.01	0.47	0.32	'DR'	0.21	0.04	0.53	0.21	'DR'	0.17	0.08	0.54	0.21
Shovel CF Day 5	'CF'	0.02	0.98	0.00	0.00	'CF'	0.04	0.90	0.04	0.02	'CF'	0.03	0.87	0.06	0.04
Shovel TY Day 5	'TY'	0.25	0.01	0.26	0.48	'TY'	0.20	0.02	0.21	0.57	'TY'	0.13	0.04	0.26	0.57
Sneakers AF Day 5	'AF'	0.47	0.03	0.27	0.23	'AF'	0.47	0.04	0.24	0.25	'AF'	0.38	0.06	0.36	0.21
Sneakers DR Day 5	**'TY'**	**0.09**	**0.02**	**0.41**	**0.48**	'DR'	0.16	0.04	0.52	0.28	'DR'	0.13	0.07	0.57	0.23
Sneakers CF Day 5	'CF'	0.05	0.95	0.01	0.00	'CF'	0.04	0.92	0.02	0.03	'CF'	0.02	0.91	0.04	0.03
Sneakers TY Day 5	'TY'	0.27	0.05	0.19	0.49	'TY'	0.29	0.07	0.23	0.41	'TY'	0.17	0.05	0.23	0.55
Jeans AF Day 5	'AF'	0.53	0.06	0.22	0.19	'AF'	0.48	0.10	0.22	0.20	'AF'	0.38	0.11	0.35	0.17
Jeans DR Day 5	'DR'	0.22	0.02	0.49	0.27	'DR'	0.21	0.04	0.58	0.16	'DR'	0.16	0.07	0.64	0.13
Jeans CF Day 5	'CF'	0.04	0.91	0.03	0.02	'CF'	0.05	0.84	0.06	0.06	'CF'	0.04	0.78	0.10	0.08
Jeans TY Day 5	'TY'	0.15	0.03	0.29	0.52	'TY'	0.25	0.07	0.26	0.41	'TY'	0.18	0.09	0.34	0.40

Table H27 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Day 6	'AF'	0.49	0.02	0.31	0.18	'AF'	0.58	0.02	0.24	0.15	'AF'	0.46	0.06	0.32	0.16
Shovel DR Day 6	'DR'	0.11	0.05	0.42	0.41	'DR'	0.16	0.05	0.59	0.20	'DR'	0.13	0.09	0.58	0.20
Shovel CF Day 6	'CF'	0.05	0.90	0.02	0.03	'CF'	0.05	0.89	0.03	0.02	'CF'	0.05	0.88	0.04	0.03
Shovel TY Day 6	**'AF'**	**0.45**	**0.02**	**0.24**	**0.29**	**'AF'**	**0.50**	**0.05**	**0.28**	**0.16**	**'DR'**	**0.38**	**0.08**	**0.38**	**0.17**
Sneakers AF Day 6	'AF'	0.36	0.07	0.29	0.28	'AF'	0.39	0.04	0.29	0.28	'AF'	0.35	0.03	0.32	0.30
Sneakers DR Day 6	'DR'	0.11	0.03	0.47	0.38	'DR'	0.16	0.04	0.59	0.21	'DR'	0.13	0.09	0.61	0.18
Sneakers CF Day 6	'CF'	0.02	0.97	0.01	0.01	'CF'	0.03	0.91	0.03	0.03	'CF'	0.03	0.87	0.07	0.04
Sneakers TY Day 6	'TY'	0.21	0.01	0.30	0.48	'TY'	0.29	0.01	0.22	0.48	'TY'	0.21	0.03	0.28	0.48
Jeans AF Day 6	'AF'	0.56	0.05	0.25	0.13	'AF'	0.58	0.07	0.19	0.15	'AF'	0.41	0.09	0.32	0.19
Jeans DR Day 6	**'TY'**	**0.23**	**0.07**	**0.34**	**0.37**	'DR'	0.22	0.05	0.44	0.28	'DR'	0.16	0.13	0.49	0.22
Jeans CF Day 6	'CF'	0.07	0.89	0.04	0.01	'CF'	0.07	0.83	0.06	0.04	'CF'	0.06	0.79	0.09	0.07
Jeans TY Day 6	'TY'	0.14	0.01	0.25	0.59	'TY'	0.23	0.06	0.22	0.49	'TY'	0.22	0.04	0.21	0.53

Table H28. Bagged trees using random forests classification and scores for the soils collected each week (Wk) for one month from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 pet habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples bolded indicate the evidence failed to classify. Samples bolded and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 1	'AF'	0.50	0.01	0.34	0.15	'AF'	0.44	0.05	0.39	0.13	**'DR'**	**0.34**	**0.07**	**0.42**	**0.17**
Shovel DR Wk 1	'DR'	0.11	0.04	0.55	0.30	'DR'	0.16	0.07	0.46	0.30	'DR'	0.09	0.06	0.55	0.30
Shovel CF Wk 1	'CF'	0.08	0.91	0.01	0.01	'CF'	0.05	0.90	0.02	0.03	'CF'	0.03	0.91	0.03	0.03
Shovel TY Wk 1	'TY'	0.23	0.00	0.37	0.40	'TY'	0.20	0.01	0.32	0.46	'TY'	0.19	0.03	0.28	0.50
Sneakers AF Wk 1	'AF'	0.44	0.01	0.33	0.21	'AF'	0.49	0.02	0.35	0.14	**'DR'**	**0.39**	**0.04**	**0.40**	**0.18**
Sneakers DR Wk 1	'DR'	0.09	0.07	0.45	0.39	'DR'	0.15	0.05	0.52	0.29	'DR'	0.08	0.07	0.59	0.26
Sneakers CF Wk 1	'CF'	0.05	0.92	0.01	0.02	'CF'	0.03	0.93	0.01	0.03	'CF'	0.04	0.89	0.03	0.04
Sneakers TY Wk 1	'TY'	0.21	0.01	0.34	0.44	'TY'	0.14	0.03	0.34	0.49	'TY'	0.11	0.05	0.29	0.55
Jeans AF Wk 1	'AF'	0.53	0.05	0.29	0.14	'AF'	0.48	0.03	0.39	0.10	'AF'	0.40	0.07	0.38	0.15
Jeans DR Wk 1	'DR'	0.09	0.04	0.56	0.31	'DR'	0.16	0.05	0.46	0.33	'DR'	0.12	0.09	0.57	0.22
Jeans CF Wk 1	'CF'	0.05	0.84	0.03	0.08	'CF'	0.03	0.87	0.05	0.05	'CF'	0.03	0.84	0.06	0.07
Jeans TY Wk 1	**'DR'**	**0.24**	**0.05**	**0.41**	**0.31**	'TY'	0.16	0.01	0.37	0.45	'TY'	0.16	0.09	0.32	0.44
Shovel AF Wk 2	'AF'	0.50	0.01	0.31	0.19	'AF'	0.52	0.02	0.32	0.14	'AF'	0.37	0.08	0.35	0.20
Shovel DR Wk 2	'DR'	0.15	0.07	0.51	0.27	'DR'	0.19	0.07	0.52	0.21	'DR'	0.12	0.12	0.52	0.24
Shovel CF Wk 2	'CF'	0.09	0.90	0.00	0.01	'CF'	0.04	0.92	0.01	0.03	'CF'	0.04	0.87	0.04	0.05
Shovel TY Wk 2	'TY'	0.25	0.06	0.33	0.36	**'DR'**	**0.21**	**0.01**	**0.40**	**0.38**	'TY'	0.19	0.07	0.32	0.42
Sneakers AF Wk 2	'AF'	0.49	0.01	0.33	0.17	'AF'	0.56	0.02	0.30	0.11	'AF'	0.42	0.08	0.32	0.19
Sneakers DR Wk 2	'DR'	0.17	0.01	0.52	0.30	'DR'	0.17	0.05	0.57	0.21	'DR'	0.12	0.09	0.53	0.27
Sneakers CF Wk 2	'CF'	0.05	0.91	0.01	0.03	'CF'	0.03	0.89	0.02	0.05	'CF'	0.03	0.86	0.06	0.05
Sneakers TY Wk 2	**'DR'**	**0.26**	**0.00**	**0.37**	**0.37**	'TY'	0.14	0.01	0.40	0.45	'TY'	0.14	0.05	0.35	0.46
Jeans AF Wk 2	'AF'	0.57	0.01	0.29	0.14	'AF'	0.50	0.02	0.38	0.10	'AF'	0.41	0.05	0.39	0.15
Jeans DR Wk 2	'DR'	0.09	0.05	0.53	0.33	'DR'	0.14	0.06	0.52	0.29	'DR'	0.10	0.11	0.53	0.26
Jeans CF Wk 2	'CF'	0.12	0.81	0.03	0.04	'CF'	0.07	0.78	0.09	0.06	'CF'	0.05	0.73	0.12	0.09
Jeans TY Wk 2	**'DR'**	**0.21**	**0.00**	**0.45**	**0.33**	'TY'	0.25	0.03	0.35	0.37	'TY'	0.20	0.07	0.35	0.38

Table H28 (cont'd).

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 3	'AF'	0.52	0.03	0.31	0.13	'AF'	0.49	0.03	0.36	0.12	'AF'	0.39	0.09	0.31	0.21
Shovel DR Wk 3	'DR'	0.12	0.03	0.61	0.25	'DR'	0.18	0.07	0.55	0.20	'DR'	0.13	0.10	0.51	0.26
Shovel CF Wk 3	'CF'	0.07	0.92	0.01	0.00	'CF'	0.05	0.89	0.02	0.05	'CF'	0.04	0.86	0.05	0.06
Shovel TY Wk 3	**'DR'**	**0.27**	**0.02**	**0.41**	**0.31**	**'DR'**	**0.19**	**0.03**	**0.44**	**0.34**	'TY'	0.19	0.09	0.33	0.39
Sneakers AF Wk 3	'AF'	0.49	0.02	0.31	0.17	'AF'	0.45	0.03	0.40	0.12	'AF'	0.37	0.08	0.34	0.21
Sneakers DR Wk 3	'DR'	0.11	0.05	0.56	0.29	'DR'	0.14	0.06	0.55	0.25	'DR'	0.11	0.12	0.51	0.27
Sneakers CF Wk 3	'CF'	0.09	0.84	0.04	0.03	'CF'	0.10	0.74	0.09	0.08	'CF'	0.05	0.76	0.11	0.08
Sneakers TY Wk 3	**'DR'**	**0.24**	**0.01**	**0.38**	**0.37**	**'DR'**	**0.17**	**0.04**	**0.40**	**0.39**	'TY'	0.22	0.09	0.33	0.37
Jeans AF Wk 3	'AF'	0.56	0.08	0.17	0.19	'AF'	0.46	0.10	0.29	0.15	**'DR'**	**0.29**	**0.15**	**0.34**	**0.23**
Jeans DR Wk 3	'DR'	0.15	0.01	0.56	0.28	'DR'	0.20	0.04	0.57	0.19	'DR'	0.14	0.09	0.56	0.21
Jeans CF Wk 3	'CF'	0.11	0.79	0.05	0.05	'CF'	0.10	0.73	0.10	0.07	'CF'	0.06	0.68	0.15	0.11
Jeans TY Wk 3	'TY'	0.22	0.02	0.29	0.47	'TY'	0.18	0.03	0.36	0.43	'TY'	0.17	0.07	0.28	0.49
Shovel AF Wk 4	'AF'	0.45	0.03	0.33	0.19	'AF'	0.42	0.07	0.37	0.15	**'DR'**	**0.34**	**0.10**	**0.38**	**0.18**
Shovel DR Wk 4	'DR'	0.12	0.04	0.58	0.26	'DR'	0.20	0.08	0.50	0.22	'DR'	0.16	0.12	0.47	0.25
Shovel CF Wk 4	'CF'	0.12	0.86	0.01	0.01	'CF'	0.08	0.79	0.08	0.05	'CF'	0.05	0.77	0.10	0.08
Shovel TY Wk 4	**'DR'**	**0.21**	**0.03**	**0.39**	**0.37**	'TY'	0.19	0.03	0.36	0.43	'TY'	0.16	0.07	0.30	0.47
Sneakers AF Wk 4	'AF'	0.43	0.05	0.31	0.21	'AF'	0.44	0.06	0.36	0.14	'AF'	0.36	0.08	0.33	0.23
Sneakers DR Wk 4	'DR'	0.15	0.03	0.55	0.27	'DR'	0.17	0.06	0.55	0.22	'DR'	0.11	0.12	0.49	0.28
Sneakers CF Wk 4	'CF'	0.08	0.90	0.01	0.01	'CF'	0.06	0.85	0.03	0.06	'CF'	0.05	0.81	0.07	0.07
Sneakers TY Wk 4	'TY'	0.19	0.06	0.36	0.39	'TY'	0.15	0.04	0.35	0.45	'TY'	0.16	0.10	0.25	0.50
Jeans AF Wk 4	'AF'	0.46	0.03	0.34	0.17	'AF'	0.42	0.07	0.33	0.18	'AF'	0.35	0.11	0.34	0.20
Jeans DR Wk 4	'DR'	0.15	0.02	0.59	0.25	'DR'	0.20	0.05	0.55	0.20	'DR'	0.11	0.08	0.57	0.25
Jeans CF Wk 4	'CF'	0.19	0.73	0.04	0.05	'CF'	0.15	0.59	0.12	0.14	'CF'	0.10	0.62	0.15	0.14
Jeans TY Wk 4	'TY'	0.23	0.05	0.31	0.41	'TY'	0.26	0.04	0.32	0.39	'TY'	0.17	0.10	0.32	0.41

Table H29. Bagged trees using random forests classification and scores for the soils collected each week (Wk) for two months (weeks 5 – 8) from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 5	'AF'	0.38	0.06	0.37	0.19	'AF'	0.41	0.05	0.30	0.24	**'DR'**	**0.31**	**0.12**	**0.38**	**0.19**
Shovel CF Wk 5	'CF'	0.11	0.77	0.05	0.07	'CF'	0.14	0.70	0.08	0.08	'CF'	0.07	0.71	0.14	0.09
Jeans TY Wk 5	'TY'	0.17	0.03	0.28	0.52	'TY'	0.14	0.05	0.30	0.51	'TY'	0.13	0.10	0.24	0.53
Shovel TY Wk 5	'TY'	0.12	0.03	0.29	0.56	'TY'	0.12	0.06	0.28	0.54	'TY'	0.11	0.08	0.32	0.49
Sneakers AF Wk 5	**'DR'**	**0.37**	**0.07**	**0.43**	**0.12**	'AF'	0.38	0.05	0.37	0.20	**'DR'**	**0.27**	**0.10**	**0.43**	**0.20**
Sneakers DR Wk 5	'DR'	0.16	0.11	0.55	0.19	'DR'	0.18	0.09	0.48	0.25	'DR'	0.11	0.15	0.54	0.21
Sneakers CF Wk 5	'CF'	0.09	0.79	0.05	0.07	'CF'	0.11	0.75	0.05	0.08	'CF'	0.07	0.75	0.11	0.07
Sneakers TY Wk 5	'TY'	0.21	0.04	0.15	0.59	'TY'	0.19	0.06	0.22	0.53	'TY'	0.16	0.10	0.26	0.49
Jeans AF Wk 5	'AF'	0.43	0.11	0.26	0.19	'AF'	0.38	0.11	0.24	0.27	**'DR'**	**0.26**	**0.21**	**0.33**	**0.21**
Jeans DR Wk 5	'DR'	0.18	0.12	0.53	0.17	'DR'	0.17	0.10	0.45	0.27	'DR'	0.11	0.17	0.51	0.22
Shovel DR Wk 5	'DR'	0.20	0.14	0.49	0.17	'DR'	0.18	0.14	0.47	0.22	'DR'	0.13	0.16	0.51	0.20
Jeans CF Wk 5	'CF'	0.10	0.82	0.03	0.05	'CF'	0.11	0.80	0.04	0.05	'CF'	0.08	0.78	0.09	0.05
Shovel AF Wk 6	'AF'	0.41	0.09	0.35	0.15	'AF'	0.42	0.08	0.29	0.21	**'DR'**	**0.30**	**0.14**	**0.37**	**0.19**
Shovel DR Wk 6	'DR'	0.17	0.08	0.56	0.19	'DR'	0.19	0.10	0.43	0.28	'DR'	0.13	0.18	0.47	0.23
Shovel CF Wk 6	'CF'	0.11	0.79	0.05	0.06	'CF'	0.12	0.79	0.05	0.04	'CF'	0.09	0.76	0.10	0.06
Shovel TY Wk 6	'TY'	0.21	0.06	0.19	0.53	'TY'	0.16	0.07	0.26	0.50	'TY'	0.13	0.08	0.28	0.51
Sneakers AF Wk 6	'AF'	0.48	0.05	0.31	0.16	'AF'	0.45	0.05	0.28	0.22	**'DR'**	**0.32**	**0.11**	**0.37**	**0.20**
Sneakers DR Wk 6	'DR'	0.13	0.11	0.57	0.19	'DR'	0.17	0.09	0.50	0.24	'DR'	0.10	0.16	0.52	0.22
Sneakers CF Wk 6	'CF'	0.06	0.87	0.03	0.05	'CF'	0.10	0.79	0.05	0.06	'CF'	0.07	0.76	0.08	0.09
Sneakers TY Wk 6	'TY'	0.25	0.06	0.18	0.51	'TY'	0.23	0.04	0.25	0.48	'TY'	0.15	0.08	0.27	0.51
Jeans AF Wk 6	'AF'	0.45	0.11	0.35	0.09	'AF'	0.42	0.11	0.32	0.15	**'DR'**	**0.31**	**0.17**	**0.36**	**0.17**
Jeans DR Wk 6	'DR'	0.12	0.13	0.52	0.23	'DR'	0.15	0.12	0.50	0.22	'DR'	0.11	0.17	0.53	0.19
Jeans CF Wk 6	'CF'	0.13	0.73	0.05	0.08	'CF'	0.16	0.66	0.09	0.09	'CF'	0.09	0.62	0.18	0.12
Jeans TY Wk 6	'TY'	0.22	0.08	0.31	0.39	'TY'	0.19	0.09	0.31	0.41	'TY'	0.17	0.14	0.25	0.44

Table H29 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 7	'AF'	0.48	0.04	0.28	0.20	'AF'	0.45	0.09	0.22	0.25	**'DR'**	**0.30**	**0.16**	**0.30**	**0.24**
Shovel DR Wk 7	'DR'	0.13	0.07	0.58	0.23	'DR'	0.16	0.08	0.44	0.32	'DR'	0.12	0.17	0.43	0.29
Shovel CF Wk 7	'CF'	0.16	0.69	0.03	0.11	'CF'	0.16	0.68	0.08	0.08	'CF'	0.10	0.68	0.14	0.08
Shovel TY Wk 7	'TY'	0.21	0.03	0.34	0.42	'TY'	0.15	0.05	0.31	0.48	'TY'	0.15	0.08	0.35	0.42
Sneakers AF Wk 7	**'DR'**	**0.37**	**0.07**	**0.39**	**0.17**	'AF'	0.43	0.05	0.30	0.22	**'DR'**	**0.31**	**0.10**	**0.38**	**0.21**
Sneakers DR Wk 7	'DR'	0.13	0.07	0.59	0.21	'DR'	0.16	0.09	0.47	0.28	'DR'	0.12	0.13	0.53	0.22
Sneakers CF Wk 7	'CF'	0.08	0.79	0.04	0.09	'CF'	0.13	0.71	0.07	0.09	'CF'	0.08	0.73	0.13	0.07
Sneakers TY Wk 7	'TY'	0.27	0.03	0.21	0.49	'TY'	0.18	0.07	0.26	0.49	'TY'	0.17	0.09	0.30	0.44
Jeans AF Wk 7	'AF'	0.43	0.15	0.33	0.09	'AF'	0.41	0.10	0.32	0.17	**'DR'**	**0.30**	**0.17**	**0.38**	**0.15**
Jeans DR Wk 7	'DR'	0.13	0.10	0.60	0.17	'DR'	0.17	0.10	0.52	0.22	'DR'	0.11	0.16	0.54	0.19
Jeans CF Wk 7	'CF'	0.11	0.73	0.09	0.07	'CF'	0.14	0.64	0.12	0.10	'CF'	0.10	0.58	0.18	0.14
Jeans TY Wk 7	'TY'	0.25	0.09	0.27	0.38	'TY'	0.18	0.11	0.33	0.38	'TY'	0.16	0.12	0.33	0.39
Shovel AF Wk 8	'AF'	0.43	0.07	0.38	0.12	'AF'	0.50	0.09	0.25	0.17	**'DR'**	**0.33**	**0.13**	**0.39**	**0.15**
Shovel DR Wk 8	'DR'	0.17	0.11	0.52	0.20	'DR'	0.18	0.11	0.45	0.26	'DR'	0.13	0.16	0.47	0.24
Shovel CF Wk 8	'CF'	0.13	0.78	0.03	0.06	'CF'	0.15	0.73	0.06	0.06	'CF'	0.10	0.69	0.12	0.08
Shovel TY Wk 8	'TY'	0.16	0.02	0.23	0.59	'TY'	0.14	0.07	0.24	0.56	'TY'	0.10	0.10	0.27	0.54
Sneakers AF Wk 8	'AF'	0.44	0.06	0.31	0.19	'AF'	0.43	0.06	0.31	0.20	**'DR'**	**0.32**	**0.13**	**0.37**	**0.18**
Sneakers DR Wk 8	'DR'	0.17	0.06	0.58	0.19	'DR'	0.17	0.05	0.52	0.26	'DR'	0.09	0.11	0.57	0.23
Sneakers CF Wk 8	'CF'	0.09	0.79	0.05	0.07	'CF'	0.11	0.77	0.06	0.06	'CF'	0.06	0.77	0.10	0.07
Sneakers TY Wk 8	'TY'	0.19	0.07	0.24	0.50	'TY'	0.13	0.09	0.25	0.53	'TY'	0.11	0.11	0.30	0.47
Jeans AF Wk 8	'AF'	0.45	0.07	0.39	0.09	'AF'	0.44	0.08	0.30	0.19	**'DR'**	**0.31**	**0.16**	**0.36**	**0.17**
Jeans DR Wk 8	'DR'	0.13	0.07	0.59	0.21	'DR'	0.18	0.07	0.54	0.21	'DR'	0.12	0.15	0.54	0.20
Jeans CF Wk 8	'CF'	0.15	0.67	0.07	0.10	'CF'	0.13	0.64	0.13	0.10	'CF'	0.09	0.58	0.21	0.12
Jeans TY Wk 8	'DR'	0.29	0.07	0.36	0.29	'TY'	0.19	0.08	0.35	0.37	'TY'	0.19	0.12	0.31	0.38

Table H30. Bagged trees using random forests classification and scores for the soils collected monthly (weeks [Wk] 12 – 24) between months three thru six from shovels, sneakers, and jeans (n = 12 per habitat) and known soils (n = 5 per habitat) stored at -80°C. The habitat the evidence classified to is denoted in-between single quotation marks. Samples **bolded** indicate the evidence failed to classify. Samples **bolded** and highlighted indicate the evidence misclassified.

Bagged Trees using Random Forests	**100 OTUs**					**200 OTUs**					**500 OTUs**				
Shovel AF Wk 12	'AF'	0.41	0.10	0.25	0.24	'AF'	0.39	0.10	0.30	0.20	**'DR'**	**0.26**	**0.18**	**0.40**	**0.17**
Shovel DR Wk 12	'DR'	0.10	0.09	0.45	0.36	'DR'	0.22	0.09	0.42	0.27	'DR'	0.14	0.18	0.47	0.22
Shovel CF Wk 12	'CF'	0.14	0.59	0.15	0.12	'CF'	0.16	0.56	0.20	0.09	'CF'	0.09	0.62	0.18	0.10
Shovel TY Wk 12	'TY'	0.05	0.02	0.31	0.62	'TY'	0.15	0.09	0.29	0.47	'TY'	0.09	0.11	0.25	0.56
Sneakers AF Wk 12	'AF'	0.45	0.08	0.29	0.18	'AF'	0.38	0.11	0.29	0.22	**'DR'**	**0.26**	**0.16**	**0.41**	**0.16**
Sneakers DR Wk 12	**'TY'**	**0.12**	**0.13**	**0.36**	**0.39**	'DR'	0.15	0.08	0.45	0.32	'DR'	0.13	0.20	0.50	0.17
Sneakers CF Wk 12	'CF'	0.12	0.52	0.19	0.17	'CF'	0.16	0.46	0.25	0.12	'CF'	0.11	0.53	0.21	0.14
Sneakers TY Wk 12	'TY'	0.08	0.06	0.25	0.61	'TY'	0.19	0.08	0.31	0.42	'TY'	0.16	0.11	0.23	0.50
Jeans AF Wk 12	'AF'	0.37	0.17	0.29	0.17	'AF'	0.40	0.15	0.31	0.14	**'DR'**	**0.23**	**0.23**	**0.37**	**0.16**
Jeans DR Wk 12	'DR'	0.19	0.13	0.41	0.27	'DR'	0.20	0.14	0.44	0.23	'DR'	0.13	0.18	0.55	0.15
Jeans CF Wk 12	'CF'	0.09	0.75	0.09	0.07	'CF'	0.22	0.54	0.15	0.09	'CF'	0.12	0.55	0.21	0.12
Jeans TY Wk 12	'TY'	0.17	0.01	0.31	0.52	**'DR'**	**0.16**	**0.05**	**0.40**	**0.38**	'TY'	0.14	0.11	0.27	0.48
Shovel AF Wk 16	'AF'	0.37	0.10	0.37	0.15	'AF'	0.38	0.10	0.37	0.15	**'DR'**	**0.27**	**0.18**	**0.41**	**0.15**
Shovel DR Wk 16	'DR'	0.23	0.13	0.37	0.27	'DR'	0.21	0.13	0.40	0.26	'DR'	0.14	0.23	0.42	0.21
Shovel CF Wk 16	'CF'	0.09	0.80	0.05	0.05	'CF'	0.19	0.65	0.10	0.06	'CF'	0.11	0.66	0.14	0.10
Shovel TY Wk 16	'TY'	0.06	0.04	0.27	0.63	'TY'	0.19	0.05	0.35	0.40	'TY'	0.11	0.10	0.30	0.50
Sneakers AF Wk 16	'AF'	0.41	0.09	0.29	0.21	'AF'	0.43	0.10	0.28	0.19	**'DR'**	**0.26**	**0.21**	**0.37**	**0.17**
Sneakers DR Wk 16	'DR'	0.11	0.09	0.44	0.35	'DR'	0.11	0.08	0.53	0.29	'DR'	0.13	0.19	0.50	0.19
Sneakers CF Wk 16	'CF'	0.09	0.79	0.07	0.05	'CF'	0.14	0.70	0.09	0.08	'CF'	0.11	0.66	0.13	0.10
Sneakers TY Wk 16	'TY'	0.15	0.03	0.33	0.50	'TY'	0.18	0.11	0.30	0.40	'TY'	0.13	0.15	0.25	0.47
Jeans AF Wk 16	'AF'	0.40	0.10	0.35	0.15	**'DR'**	**0.36**	**0.11**	**0.37**	**0.15**	**'DR'**	**0.25**	**0.21**	**0.37**	**0.17**
Jeans DR Wk 16	'DR'	0.15	0.11	0.48	0.27	'DR'	0.21	0.13	0.45	0.21	'DR'	0.13	0.22	0.47	0.18
Jeans CF Wk 16	'CF'	0.11	0.68	0.11	0.10	'CF'	0.22	0.52	0.15	0.11	'CF'	0.14	0.52	0.21	0.13
Jeans TY Wk 16	'TY'	0.11	0.09	0.25	0.55	**'DR'**	**0.18**	**0.11**	**0.39**	**0.31**	'TY'	0.14	0.19	0.29	0.39

Table H30 (cont'd).

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
Shovel AF Wk 20	**'DR'**	**0.31**	**0.08**	**0.38**	**0.23**	**'DR'**	**0.30**	**0.10**	**0.34**	**0.26**	**'DR'**	**0.26**	**0.16**	**0.38**	**0.20**
Shovel DR Wk 20	'DR'	0.13	0.10	0.52	0.25	'DR'	0.15	0.10	0.52	0.24	'DR'	0.13	0.21	0.46	0.21
Shovel CF Wk 20	'CF'	0.11	0.79	0.07	0.03	'CF'	0.20	0.63	0.10	0.06	'CF'	0.11	0.67	0.14	0.08
Shovel TY Wk 20	'TY'	0.03	0.02	0.27	0.68	'TY'	0.18	0.07	0.34	0.41	'TY'	0.12	0.12	0.29	0.49
Sneakers AF Wk 20	'AF'	0.35	0.10	0.35	0.19	'AF'	0.44	0.11	0.33	0.12	**'DR'**	**0.24**	**0.21**	**0.39**	**0.15**
Sneakers DR Wk 20	'DR'	0.13	0.11	0.51	0.25	'DR'	0.12	0.11	0.52	0.25	'DR'	0.11	0.19	0.51	0.19
Sneakers CF Wk 20	'CF'	0.10	0.77	0.05	0.08	'CF'	0.15	0.73	0.07	0.05	'CF'	0.11	0.71	0.10	0.09
Sneakers TY Wk 20	'TY'	0.06	0.06	0.27	0.61	'TY'	0.18	0.09	0.32	0.42	'TY'	0.11	0.15	0.26	0.49
Jeans AF Wk 20	**'DR'**	**0.30**	**0.19**	**0.31**	**0.20**	**'DR'**	**0.28**	**0.16**	**0.40**	**0.16**	**'DR'**	**0.19**	**0.28**	**0.38**	**0.16**
Jeans DR Wk 20	'DR'	0.17	0.10	0.39	0.34	'DR'	0.20	0.12	0.44	0.24	'DR'	0.14	0.19	0.50	0.18
Jeans CF Wk 20	'CF'	0.09	0.69	0.13	0.09	'CF'	0.21	0.55	0.15	0.09	'CF'	0.13	0.50	0.23	0.14
Jeans TY Wk 20	'TY'	0.05	0.05	0.27	0.64	'TY'	0.12	0.07	0.39	0.42	'TY'	0.14	0.18	0.32	0.37
Shovel AF Wk 24	**'DR'**	**0.33**	**0.09**	**0.37**	**0.21**	**'DR'**	**0.35**	**0.08**	**0.40**	**0.17**	**'DR'**	**0.26**	**0.18**	**0.39**	**0.17**
Shovel DR Wk 24	'DR'	0.10	0.10	0.49	0.31	'DR'	0.16	0.11	0.46	0.27	'DR'	0.12	0.22	0.47	0.18
Shovel CF Wk 24	'CF'	0.10	0.75	0.06	0.09	'CF'	0.23	0.60	0.12	0.05	'CF'	0.13	0.61	0.15	0.12
Shovel TY Wk 24	'TY'	0.12	0.03	0.22	0.63	'TY'	0.17	0.07	0.32	0.43	'TY'	0.09	0.11	0.27	0.53
Sneakers AF Wk 24	'AF'	0.43	0.09	0.27	0.21	'AF'	0.39	0.12	0.30	0.20	**'DR'**	**0.25**	**0.19**	**0.41**	**0.15**
Sneakers DR Wk 24	'DR'	0.13	0.13	0.45	0.30	'DR'	0.15	0.12	0.46	0.27	'DR'	0.12	0.22	0.47	0.19
Sneakers CF Wk 24	'CF'	0.10	0.74	0.07	0.09	'CF'	0.16	0.63	0.13	0.08	'CF'	0.10	0.66	0.14	0.10
Sneakers TY Wk 24	'TY'	0.09	0.07	0.23	0.61	'TY'	0.21	0.08	0.28	0.42	'TY'	0.13	0.13	0.25	0.49
Jeans AF Wk 24	'AF'	0.35	0.14	0.33	0.18	'AF'	0.37	0.15	0.30	0.18	**'DR'**	**0.22**	**0.24**	**0.37**	**0.17**
Jeans DR Wk 24	'DR'	0.16	0.13	0.45	0.26	'DR'	0.20	0.13	0.49	0.19	'DR'	0.13	0.23	0.48	0.17
Jeans CF Wk 24	'CF'	0.08	0.75	0.10	0.07	'CF'	0.15	0.61	0.16	0.07	'CF'	0.10	0.54	0.25	0.11
Jeans TY Wk 24	'TY'	0.13	0.08	0.24	0.55	**'DR'**	**0.20**	**0.09**	**0.39**	**0.33**	'TY'	0.15	0.15	0.30	0.41

Sensitivity Study

Table H31. Support vector machines classification of soils of different masses (n = 7 per habitat) and from the April training set (n = 13 per habitat, except dirt road n = 7). Each soil was amplified with 2 µL DNA. The habitat the evidence classified to is denoted in-between single quotation marks.

Support Vector Machines	**100 OTUs**					**200 OTUs**					**500 OTUs**				
250mg AF	'AF'	-0.04	-1.08	-0.16	-0.77	'AF'	-0.05	-0.83	-0.15	-0.52	'AF'	-0.05	-0.63	-0.16	-0.31
100mg AF	'AF'	-0.12	-0.78	-0.18	-0.47	'AF'	-0.10	-0.66	-0.14	-0.36	'AF'	-0.06	-0.55	-0.19	-0.27
50mg AF	'AF'	-0.04	-0.95	-0.18	-0.59	'AF'	-0.04	-0.73	-0.17	-0.42	'AF'	-0.04	-0.57	-0.19	-0.29
25mg AF	'AF'	-0.10	-0.58	-0.14	-0.39	'AF'	-0.08	-0.54	-0.15	-0.30	'AF'	-0.07	-0.47	-0.21	-0.25
10mg AF	'AF'	-0.12	-0.88	-0.15	-0.59	'AF'	-0.06	-0.75	-0.16	-0.40	'AF'	-0.04	-0.59	-0.17	-0.29
5mg AF	'AF'	-0.05	-0.96	-0.17	-0.58	'AF'	-0.04	-0.76	-0.17	-0.42	'AF'	-0.06	-0.60	-0.16	-0.30
1mg AF	'AF'	-0.05	-0.99	-0.23	-0.40	'AF'	-0.03	-0.93	-0.24	-0.35	'AF'	-0.01	-0.73	-0.27	-0.27
250mg DR	'DR'	-0.29	-0.48	-0.09	-0.30	'DR'	-0.28	-0.37	-0.04	-0.31	'DR'	-0.29	-0.34	-0.06	-0.30
100mg DR	'DR'	-0.22	-0.57	-0.09	-0.37	'DR'	-0.24	-0.38	-0.08	-0.33	'DR'	-0.24	-0.38	-0.08	-0.30
50mg DR	'DR'	-0.24	-0.52	-0.09	-0.34	'DR'	-0.25	-0.39	-0.05	-0.33	'DR'	-0.27	-0.42	-0.03	-0.28
25mg DR	'DR'	-0.31	-0.41	-0.09	-0.24	'DR'	-0.32	-0.34	-0.07	-0.27	'DR'	-0.30	-0.38	-0.06	-0.26
10mg DR	'DR'	-0.28	-0.50	-0.03	-0.34	'DR'	-0.31	-0.47	0.00	-0.34	'DR'	-0.28	-0.55	0.00	-0.35
5mg DR	'DR'	-0.51	-0.61	-0.01	-0.32	'DR'	-0.42	-0.46	0.00	-0.34	'DR'	-0.43	-0.42	0.00	-0.34
1mg DR	'DR'	-0.42	-0.54	-0.03	-0.28	'DR'	-0.54	-0.49	0.00	-0.25	'DR'	-0.49	-0.57	0.00	-0.26
250mg CF	'CF'	-0.20	-0.01	-0.30	-0.73	'CF'	-0.24	-0.03	-0.31	-0.42	'CF'	-0.21	-0.04	-0.34	-0.41
100mg CF	'CF'	-0.37	0.00	-0.20	-0.75	'CF'	-0.28	0.00	-0.33	-0.46	'CF'	-0.24	0.00	-0.32	-0.46
50mg CF	'CF'	-0.20	-0.02	-0.29	-0.75	'CF'	-0.23	-0.04	-0.34	-0.44	'CF'	-0.20	-0.02	-0.36	-0.42
25mg CF	'CF'	-0.24	0.00	-0.26	-0.73	'CF'	-0.42	-0.03	-0.37	-0.28	'CF'	-0.27	-0.02	-0.36	-0.35
10mg CF	'CF'	-0.18	0.00	-0.39	-0.85	'CF'	-0.17	0.00	-0.33	-0.58	'CF'	-0.21	0.00	-0.37	-0.49
5mg CF	'CF'	-0.25	0.00	-0.32	-0.80	'CF'	-0.23	0.00	-0.33	-0.53	'CF'	-0.27	0.00	-0.35	-0.46
1mg CF	'CF'	-0.19	0.00	-0.33	-0.86	'CF'	-0.17	0.00	-0.39	-0.61	'CF'	-0.22	0.00	-0.37	-0.49
250mg TY	'TY'	-0.28	-0.85	-0.23	-0.01	'TY'	-0.24	-0.62	-0.25	-0.01	'TY'	-0.28	-0.59	-0.21	-0.01
100mg TY	'TY'	-0.36	-0.94	-0.19	0.00	'TY'	-0.30	-0.69	-0.23	0.00	'TY'	-0.30	-0.58	-0.19	-0.03
50mg TY	'TY'	-0.25	-0.73	-0.25	0.00	'TY'	-0.23	-0.66	-0.26	-0.01	'TY'	-0.24	-0.57	-0.23	-0.04
25mg TY	'TY'	-0.26	-0.87	-0.26	0.00	'TY'	-0.22	-0.64	-0.27	-0.02	'TY'	-0.24	-0.59	-0.24	-0.02
10mg TY	'TY'	-0.32	-0.74	-0.25	0.00	'TY'	-0.28	-0.76	-0.29	0.00	'TY'	-0.31	-0.64	-0.23	0.00
5mg TY	'TY'	-0.35	-0.78	-0.20	0.00	'TY'	-0.31	-0.76	-0.27	0.00	'TY'	-0.34	-0.65	-0.21	0.00
1mg TY	'TY'	-0.36	-1.04	-0.26	0.00	'TY'	-0.31	-0.83	-0.30	0.00	'TY'	-0.31	-0.71	-0.25	0.00

Table H32. Support vector machines classification of soils of different masses (n = 3 per habitat) and from the April training set (n = 13 per habitat, except dirt road n = 7). Each soil mass was amplified with 5 and 1 µL DNA. The habitat the evidence classified to is denoted in-between single quotation marks.

Support Vector Machines	100 OTUs					200 OTUs					500 OTUs				
10mg AF 5µL	'AF'	-0.04	-1.20	-0.18	-0.68	'AF'	-0.04	-0.91	-0.18	-0.46	'AF'	-0.03	-0.70	-0.18	-0.30
5mg AF 5µL	'AF'	-0.01	-0.88	-0.16	-0.69	'AF'	-0.01	-0.75	-0.17	-0.49	'AF'	-0.01	-0.63	-0.17	-0.33
1mg AF 5µL	'AF'	-0.03	-1.03	-0.27	-0.41	'AF'	-0.03	-0.96	-0.27	-0.35	'AF'	-0.02	-0.75	-0.29	-0.25
10mg DR 5µL	'DR'	-0.28	-0.55	-0.02	-0.37	'DR'	-0.29	-0.52	0.00	-0.41	'DR'	-0.26	-0.55	0.00	-0.36
5mg DR 5µL	'DR'	-0.49	-0.59	-0.03	-0.24	'DR'	-0.41	-0.47	0.00	-0.27	'DR'	-0.39	-0.47	0.00	-0.34
1mg DR 5µL	'DR'	-0.36	-0.80	-0.01	-0.31	'DR'	-0.51	-0.59	0.00	-0.25	'DR'	-0.43	-0.56	0.00	-0.24
10mg CF 5µL	'CF'	-0.18	0.00	-0.36	-0.75	'CF'	-0.20	0.00	-0.35	-0.49	'CF'	-0.21	0.00	-0.42	-0.43
5mg CF 5µL	'CF'	-0.33	0.00	-0.30	-0.76	'CF'	-0.35	0.00	-0.31	-0.49	'CF'	-0.30	0.00	-0.35	-0.46
1mg CF 5µL	'CF'	-0.21	0.00	-0.32	-0.95	'CF'	-0.17	0.00	-0.41	-0.60	'CF'	-0.19	0.00	-0.36	-0.51
10mg TY 5µL	'TY'	-0.34	-0.79	-0.23	0.00	'TY'	-0.30	-0.72	-0.27	0.00	'TY'	-0.33	-0.65	-0.21	0.00
5mg TY 5µL	'TY'	-0.28	-0.74	-0.25	0.00	'TY'	-0.26	-0.73	-0.30	0.00	'TY'	-0.27	-0.64	-0.26	0.00
1 TY 5µL	'TY'	-0.37	-0.94	-0.23	0.00	'TY'	-0.28	-0.79	-0.29	0.00	'TY'	-0.28	-0.71	-0.24	0.00
10mg AF 1µL	'AF'	-0.05	-0.91	-0.16	-0.61	'AF'	-0.03	-0.79	-0.17	-0.41	'AF'	-0.03	-0.64	-0.18	-0.30
5mg AF 1µL	'AF'	-0.04	-0.87	-0.15	-0.63	'AF'	-0.04	-0.77	-0.16	-0.43	'AF'	-0.04	-0.63	-0.17	-0.29
1mg AF 1µL	'AF'	-0.05	-1.03	-0.23	-0.41	'AF'	-0.03	-0.91	-0.24	-0.35	'AF'	-0.02	-0.68	-0.27	-0.26
10mg DR 1µL	'DR'	-0.29	-0.52	-0.03	-0.34	'DR'	-0.29	-0.53	0.00	-0.35	'DR'	-0.31	-0.56	0.00	-0.34
5mg DR 1µL	'DR'	-0.49	-0.65	-0.02	-0.32	'DR'	-0.40	-0.45	0.00	-0.33	'DR'	-0.35	-0.44	0.00	-0.34
1mg DR 1µL	'DR'	-0.31	-0.77	-0.01	-0.33	'DR'	-0.52	-0.59	0.00	-0.26	'DR'	-0.45	-0.58	0.00	-0.24
10mg CF 1µL	'CF'	-0.18	0.00	-0.33	-0.59	'CF'	-0.26	0.00	-0.33	-0.42	'CF'	-0.30	0.00	-0.41	-0.36
5mg CF 1µL	'CF'	-0.31	0.00	-0.31	-0.78	'CF'	-0.26	0.00	-0.33	-0.55	'CF'	-0.30	0.00	-0.33	-0.48
1mg CF 1µL	'CF'	-0.17	0.00	-0.37	-0.95	'CF'	-0.16	0.00	-0.46	-0.63	'CF'	-0.19	0.00	-0.39	-0.53
10mg TY 1µL	'TY'	-0.25	-0.71	-0.27	0.00	'TY'	-0.23	-0.70	-0.32	0.00	'TY'	-0.29	-0.62	-0.25	0.00
5mg TY 1µL	'TY'	-0.28	-0.68	-0.25	0.00	'TY'	-0.29	-0.75	-0.29	0.00	'TY'	-0.30	-0.69	-0.24	0.00
1mg TY 1µL	'TY'	-0.30	-0.92	-0.23	0.00	'TY'	-0.28	-0.82	-0.29	0.00	'TY'	-0.32	-0.69	-0.22	0.00

Table H33. Bagged trees using random forests classification of soils of different masses (n = 7 per habitat) and from the April training set (n = 13 per habitat, except dirt road n = 7). Each soil was amplified with 2 µL DNA. The habitat the evidence classified to is denoted in-between single quotation marks.

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
250mg AF	'AF'	0.64	0.09	0.11	0.16	'AF'	0.68	0.07	0.09	0.16	'AF'	0.71	0.07	0.10	0.12
100mg AF	'AF'	0.66	0.08	0.10	0.17	'AF'	0.71	0.07	0.08	0.14	'AF'	0.75	0.05	0.10	0.11
50mg AF	'AF'	0.71	0.02	0.09	0.18	'AF'	0.70	0.03	0.10	0.17	'AF'	0.72	0.05	0.11	0.12
25mg AF	'AF'	0.70	0.05	0.11	0.13	'AF'	0.72	0.04	0.09	0.15	'AF'	0.71	0.05	0.12	0.12
10mg AF	'AF'	0.72	0.02	0.13	0.13	'AF'	0.72	0.03	0.10	0.15	'AF'	0.76	0.05	0.11	0.09
5mg AF	'AF'	0.68	0.06	0.10	0.16	'AF'	0.64	0.05	0.13	0.18	'AF'	0.68	0.06	0.16	0.10
1mg AF	'AF'	0.64	0.10	0.11	0.15	'AF'	0.73	0.07	0.09	0.12	'AF'	0.69	0.07	0.14	0.11
250mg DR	'DR'	0.17	0.11	0.66	0.05	'DR'	0.12	0.07	0.77	0.04	'DR'	0.11	0.08	0.76	0.05
100mg DR	'DR'	0.16	0.09	0.71	0.04	'DR'	0.14	0.04	0.77	0.05	'DR'	0.09	0.08	0.79	0.04
50mg DR	'DR'	0.13	0.10	0.72	0.06	'DR'	0.12	0.06	0.78	0.04	'DR'	0.12	0.07	0.78	0.04
25mg DR	'DR'	0.17	0.11	0.66	0.06	'DR'	0.14	0.06	0.76	0.04	'DR'	0.12	0.09	0.75	0.05
10mg DR	'DR'	0.18	0.04	0.75	0.03	'DR'	0.16	0.04	0.75	0.05	'DR'	0.12	0.06	0.77	0.05
5mg DR	'DR'	0.18	0.10	0.68	0.04	'DR'	0.14	0.06	0.76	0.04	'DR'	0.10	0.08	0.76	0.06
1mg DR	'DR'	0.18	0.12	0.66	0.03	'DR'	0.16	0.06	0.73	0.05	'DR'	0.15	0.07	0.74	0.04
250mg CF	'CF'	0.01	0.98	0.01	0.01	'CF'	0.03	0.96	0.01	0.00	'CF'	0.04	0.92	0.04	0.01
100mg CF	'CF'	0.01	0.98	0.01	0.00	'CF'	0.00	0.98	0.02	0.00	'CF'	0.02	0.96	0.01	0.01
50mg CF	'CF'	0.01	0.98	0.01	0.00	'CF'	0.01	0.98	0.01	0.00	'CF'	0.03	0.94	0.02	0.01
25mg CF	'CF'	0.00	0.99	0.00	0.00	'CF'	0.02	0.95	0.01	0.02	'CF'	0.03	0.95	0.02	0.01
10mg CF	'CF'	0.00	1.00	0.00	0.00	'CF'	0.01	0.99	0.00	0.00	'CF'	0.01	0.98	0.01	0.00
5mg CF	'CF'	0.06	0.94	0.01	0.00	'CF'	0.04	0.96	0.00	0.00	'CF'	0.03	0.96	0.01	0.00
1mg CF	'CF'	0.01	0.99	0.00	0.00	'CF'	0.00	0.99	0.01	0.00	'CF'	0.01	0.98	0.01	0.00
250mg TY	'TY'	0.01	0.01	0.06	0.92	'TY'	0.07	0.01	0.05	0.87	'TY'	0.03	0.01	0.06	0.90
100mg TY	'TY'	0.03	0.01	0.10	0.86	'TY'	0.11	0.03	0.07	0.79	'TY'	0.04	0.01	0.06	0.89
50mg TY	'TY'	0.07	0.02	0.14	0.76	'TY'	0.12	0.02	0.13	0.73	'TY'	0.09	0.03	0.07	0.82
25mg TY	'TY'	0.08	0.01	0.07	0.84	'TY'	0.15	0.01	0.05	0.79	'TY'	0.07	0.01	0.07	0.85
10mg TY	'TY'	0.05	0.02	0.11	0.82	'TY'	0.08	0.01	0.04	0.86	'TY'	0.04	0.02	0.06	0.89
5mg TY	'TY'	0.03	0.01	0.08	0.88	'TY'	0.06	0.02	0.05	0.88	'TY'	0.04	0.01	0.06	0.90
1mg TY	'TY'	0.05	0.01	0.09	0.84	'TY'	0.06	0.01	0.05	0.88	'TY'	0.05	0.01	0.07	0.87

Table H34. Bagged trees using random forests classification of soils of different masses (n = 3 per habitat) and from the April training set (n = 13 per habitat, except dirt road n = 7). Each soil mass was amplified with 5 and 1 µL DNA. The habitat the evidence classified to is denoted in-between single quotation marks.

Bagged Trees using Random Forests	100 OTUs					200 OTUs					500 OTUs				
10mg AF 5µL	'AF'	0.69	0.07	0.09	0.15	'AF'	0.75	0.05	0.08	0.12	'AF'	0.78	0.05	0.10	0.08
5mg AF 5µL	'AF'	0.81	0.01	0.08	0.09	'AF'	0.84	0.01	0.06	0.09	'AF'	0.78	0.04	0.10	0.08
1mg AF 5µL	'AF'	0.64	0.07	0.14	0.15	'AF'	0.72	0.05	0.10	0.13	'AF'	0.74	0.05	0.12	0.09
10mg DR 5µL	'DR'	0.14	0.05	0.74	0.07	'DR'	0.12	0.02	0.78	0.08	'DR'	0.10	0.06	0.79	0.06
5mg DR 5µL	'DR'	0.18	0.09	0.70	0.03	'DR'	0.13	0.04	0.80	0.03	'DR'	0.09	0.05	0.83	0.03
1mg DR 5µL	'DR'	0.16	0.11	0.68	0.05	'DR'	0.15	0.05	0.74	0.06	'DR'	0.11	0.08	0.76	0.05
10mg CF 5µL	'CF'	0.00	1.00	0.00	0.00	'CF'	0.00	0.99	0.00	0.01	'CF'	0.01	0.98	0.01	0.00
5mg CF 5µL	'CF'	0.08	0.89	0.02	0.01	'CF'	0.05	0.94	0.01	0.01	'CF'	0.05	0.93	0.01	0.01
1mg CF 5µL	'CF'	0.02	0.97	0.01	0.00	'CF'	0.02	0.96	0.01	0.01	'CF'	0.03	0.94	0.01	0.01
10mg TY 5µL	'TY'	0.08	0.01	0.10	0.81	'TY'	0.09	0.02	0.06	0.83	'TY'	0.05	0.01	0.07	0.87
5mg TY 5µL	'TY'	0.05	0.01	0.07	0.87	'TY'	0.08	0.01	0.05	0.86	'TY'	0.06	0.01	0.07	0.87
1 TY 5µL	'TY'	0.06	0.01	0.06	0.87	'TY'	0.10	0.01	0.04	0.84	'TY'	0.07	0.01	0.09	0.84
10mg AF 1µL	'AF'	0.65	0.06	0.12	0.16	'AF'	0.72	0.04	0.06	0.18	'AF'	0.75	0.05	0.09	0.12
5mg AF 1µL	'AF'	0.74	0.07	0.09	0.10	'AF'	0.74	0.03	0.09	0.15	'AF'	0.77	0.04	0.10	0.09
1mg AF 1µL	'AF'	0.68	0.04	0.11	0.16	'AF'	0.74	0.05	0.08	0.13	'AF'	0.74	0.05	0.12	0.10
10mg DR 1µL	'DR'	0.05	0.04	0.86	0.04	'DR'	0.04	0.04	0.85	0.06	'DR'	0.05	0.05	0.85	0.05
5mg DR 1µL	'DR'	0.12	0.10	0.75	0.02	'DR'	0.08	0.08	0.81	0.03	'DR'	0.09	0.08	0.79	0.04
1mg DR 1µL	'DR'	0.19	0.06	0.70	0.05	'DR'	0.14	0.03	0.77	0.06	'DR'	0.11	0.07	0.75	0.07
10mg CF 1µL	'CF'	0.02	0.97	0.00	0.01	'CF'	0.01	0.97	0.01	0.01	'CF'	0.03	0.93	0.03	0.01
5mg CF 1µL	'CF'	0.06	0.94	0.00	0.00	'CF'	0.04	0.95	0.00	0.00	'CF'	0.05	0.92	0.02	0.01
1mg CF 1µL	'CF'	0.01	0.99	0.00	0.00	'CF'	0.01	0.98	0.01	0.00	'CF'	0.01	0.97	0.01	0.01
10mg TY 1µL	'TY'	0.03	0.02	0.11	0.84	'TY'	0.07	0.02	0.04	0.86	'TY'	0.05	0.01	0.06	0.87
5mg TY 1µL	'TY'	0.10	0.02	0.13	0.75	'TY'	0.15	0.02	0.07	0.77	'TY'	0.06	0.01	0.09	0.84
1mg TY 1µL	'TY'	0.15	0.01	0.09	0.75	'TY'	0.17	0.01	0.06	0.76	'TY'	0.09	0.01	0.09	0.82

APPENDIX I. Standard Operating Procedure for the Collection of Questioned and Known Soil Evidence

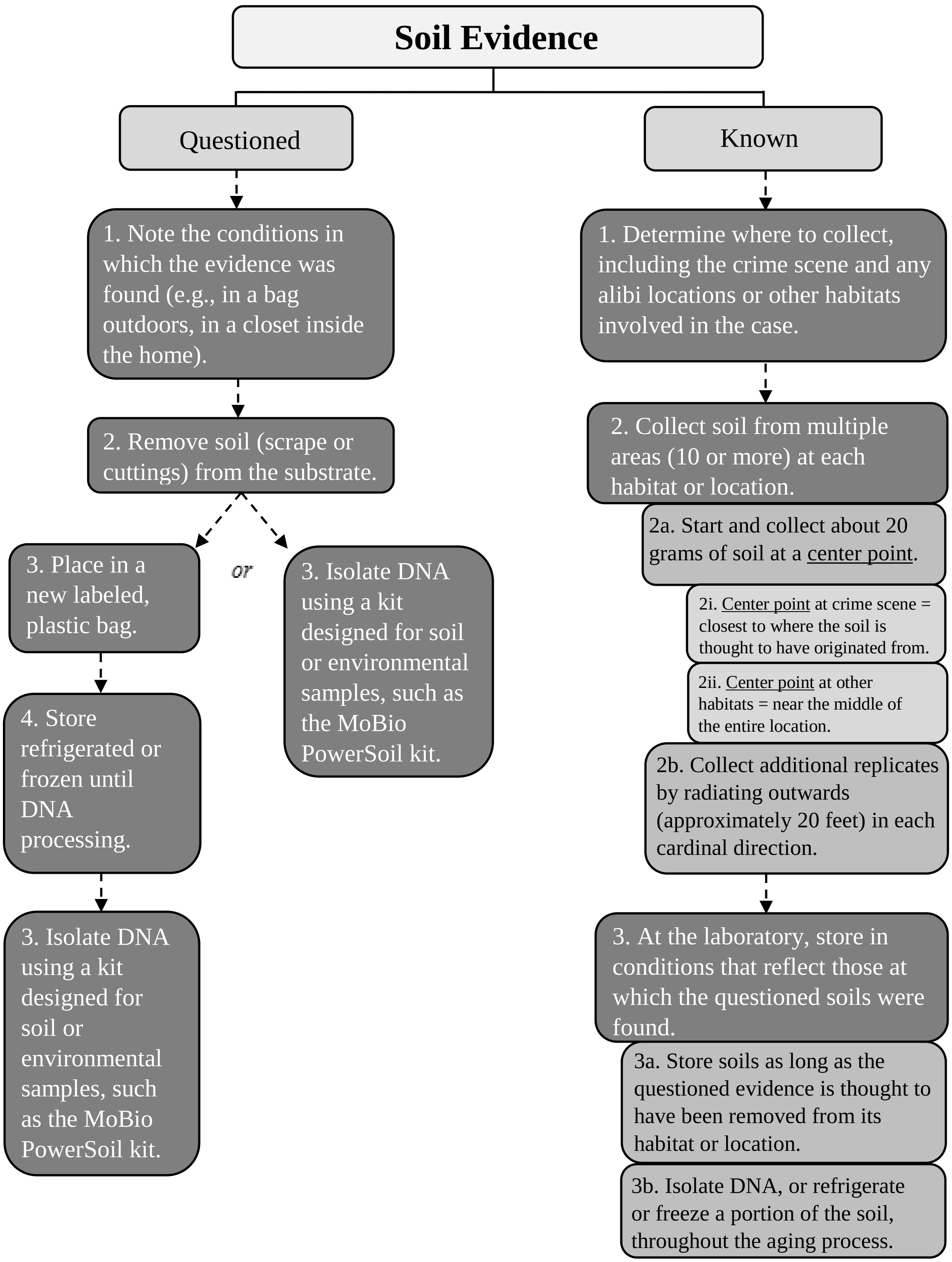


Figure I1. Framework for collecting and storing questioned and known soil evidence at a forensic laboratory.

REFERENCES

REFERENCES

Achtman M and Wagner M. Microbial diversity and the genetic nature of microbial species. Nature Reviews Microbiology 2008; 6(6): 431 – 40.

Amato KR, Yeoman CJ, Cerda G, Schmitt CA, Cramer JD, Miller ME, Gomez A, Turner TR, Wilson BA, Stumpf RM, Nelson KE, White BA, Knight R, Leigh SR. Variable responses of human and non-human primate gut microbiomes to a Western diet. Microbiome 2015; 3(53); 1 – 9.

Anderson IC and Cairney JW. Diversity and ecology of soil fungal communities: increased understanding through the application of molecular techniques. Environmental Microbiology 2004; 6(8): 769 – 79.

Bachoon DS, Otero E, Hodson RE. Effects of humic substances on fluorometric DNA quantification and DNA hybridization. Journal of Microbiological Methods 2001; 47(1): 73 – 82.

Baker KL, Langenheder S, Nicol GW, Ricketts D, Killham K, Campbell CD, Prosser JI. Environmental and spatial characterization of bacterial community composition in soil to inform sampling strategies. Soil Biology and Biochemistry 2009; 41(11): 2292 – 8.

Bent SJ and Forney LJ. The tragedy of the uncommon: Understanding limitations in the analysis of microbial diversity. The ISME Journal 2008; 2(7): 689 – 95.

Bray JR and Curtis JT. An ordination of the upland forest communities of southern Wisconsin. Ecological Monographs 1957; 27(4): 325 – 49.

Breiman L. Random forests. Machine Learning 2001, 45(1): 5 – 32.

Brosius J, Palmer ML, Kennedy PJ, Noller HF. Complete nucleotide sequence of a 16S ribosomal RNA gene from Escherichia coli. Proceedings of the National Academy of Sciences USA 1978; 75(10): 4801 – 5.

Caporaso JG, Lauber CL, Walters WA, Berg-Lyons D, Huntley J, Fierer N, Owens SM, Betley J, Fraser L, Bauer M, Gormley N, Gilbert JA, Smith G, Knight R. Ultra-high-throughput microbial community analysis on the Illumina HiSeq and MiSeq platforms. The ISME Journal 2012; 6(8): 1621 – 4.

Caporaso JG, Lauber CL, Walters WA, Berg-Lyons D, Lozupone CA, Turnbaugh PJ, Fierer N, Knight R. Global patterns of 16S rRNA diversity at a depth of millions of sequences per sample. Proceedings of the National Academy of Sciences USA 2011; 108(suppl. 1): 4516 – 22.

Clarridge JE. Impact of 16S rRNA gene sequence analysis for identification of bacteria on clinical microbiology and infectious diseases. Clinical Microbiology Reviews 2004; 17(4): 840 – 62.

Cortes C and Vapnik V. Support-vector networks. Machine Learning 1995; 20(3): 273 – 97.

Costello EK, Halloy SR, Reed SC, Sowell R, Schmidt SK. Fumarole-supported islands of biodiversity within a hyperarid high-elevation landscape on Socompa Volcano, Puna de Atacama, Andes. Applied and Environmental Microbiology 2009a; 75(3): 735 – 47.

Costello EK, Lauber CL, Hamady M, Fierer N, Gordon JI, Knight R. Bacterial community variation in human body habitats across space and time. Science 2009b; 326(5960): 1694 – 7.

Daniel R. The metagenomics of soil. Nature Reviews Microbiology 2005; 3(6): 470 – 8.

Dent BB, Forbes SL, Stuart BH. Review of human decomposition processes in soil. Environmental Geology 2004; 45(4): 576 – 85.

Dice LR. Measures of the amount of ecologic association between species. Ecology 1945; 26(3): 297 – 302.

Douglas JL, Worgan HJ, Easton GL, Poret L, Wolf BT, Edwards A, Davies E, Ross D, McEwan NR. Microbial diversity in the digestive tract of two different breeds of sheep. Journal of Applied Microbiology 2016; 120(5): 1382 – 9.

Dunbar J, Barns SM, Ticknor LO, Kuske CR. Empirical and theoretical bacterial diversity in four Arizona soils. Applied and Environmental Microbiology 2002; 68(6): 3035 – 45.

Feldbauer R, Schulz F, Horn M, Rattei T. Prediction of microbial phenotypes based on comparative genomics. BMC Bioinformatics 2015; 16: S1.

Fierer N, Bradford MA, Jackson RB. Toward an ecological classification of soil bacteria. Ecology 2007; 86(6): 1354 – 64.

Fierer N, Lauber CL, Zhou N, McDonald D, Costello EK, Knight R. Forensic identification using skin bacterial communities. Proceedings of the National Academy of Sciences USA 2010; 107(14): 6477 – 81.

Fierer N and Jackson RB. The diversity and biogeography of soil bacterial communities. Proceedings of the National Academy of Sciences USA 2006; 103(3): 626 – 31.

Finley SJ, Benbow ME, Javan GT. Microbial communities associated with human decomposition and their potential use as postmortem clocks. International Journal of Legal Medicine 2015; 129(3): 623 – 32.

Fitzpatrick RW. Houck MM ed. *Materials Analysis in Forensic Science*. Section 7: Geo- and Biomaterials, Soils. Academic Press, 2016. 371 – 8.

Fox GE, Pechman KR, Woese CR. Comparative cataloging of 16S ribosomal ribonucleic acid: Molecular approach to procaryotic systems. International Journal of Systematic Bacteriology 1977; 27(1): 44 – 57.

Geurts P, Irrthum A, Wehenkel L. Supervised learning with decision tree-based methods in computational and systems biology. Molecular Biosystems 2009; 5(12): 1593 – 605.

Gevers D, Kugathasan S, Denson LA, Vázquez-Baeza Y, Van Treuren W, Ren B, Schwager E, Knights D, Song SJ, Yassour M, Morgan XC, Kostic AD, Luo C, González A, McDonald D, Haberman Y, Walters T, Baker S, Rosh J, Stephens M, Heyman M, Markowitz J, Baldassano R, Griffiths A, Sylvester F, Mack D, Kim S, Crandall W, Hyams J, Huttenhower C, Knight R, Xavier RJ. The treatment-naïve microbiome in new-onset Crohn's disease. Cell Host & Microbe 2014; 15(3): 382 – 92.

Gutell RR, Gray MW, and Schnare MN. A compilation of large subunit (23S and 23S-like) ribosomal RNA structures. Nucleic Acids Research 1993; 21(13): 3055 – 74.

Hastie T, Tibshirani R, Friedman J. *The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition.* Additive Models, Trees, and Related Methods, 2009a. 9: 295 – 336.

Hastie T, Tibshirani R, Friedman J. *The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition.* Ensemble Learning, 2009b. 16: 605 – 24.

Hastie T, Tibshirani R, Friedman J. *The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition.* Support Vector Machines and Flexible Discriminants, 2009c. 12: 417 – 58.

Heath LE and Saunders VA. Assessing the potential of bacterial DNA profiling for forensic soil comparisons. Journal of Forensic Sciences 2006; 51(5): 1062 – 8.

Holland SM. Non-metric multidimensional scaling (MDS). R Software Tutorial. Department of Geology, University of Georgia, Athens, GA 30602 – 2501, 2008. http://strata.uga.edu/software/pdf/mdsTutorial.pdf

Horswell J, Cordiner SJ, Maas EW, Martin TM, Sutherland KBW, Speir TW, Nogales B, Osborn AM. Forensic comparison of soils by bacterial community DNA profiling. Journal of Forensic Sciences 2002; 47(2): 350 – 3.

Hopkins JM. Forensic soil bacterial profiling using 16S rRNA gene sequencing and diverse statistics. Published Master's Thesis. Michigan State University, 2014.

Jaccard P. Étude comparative de la distribution florale dans une portion des Alpes et des Jura. Bulletin de la Société Vaudoise des Sciences Naturelles 1901; 37: 547 – 79.

Janssen PH. Identifying the dominant soil bacterial taxa in libraries of 16S rRNA and 16S rRNA genes. Applied and Environmental Microbiology 2006; 72(3): 1719 – 28.

Jansson JK and Tas N. The microbial ecology of permafrost. Nature Reviews Microbiology 2014; 12(6): 414 – 25.

Jesmok EM. Adoption of next-generation 16S bacterial sequencing practices for the forensic analysis of soil. Published Master's Thesis. Michigan State University, 2015.

Jesmok EM, Hopkins JM, Foran DR. Next-generation sequencing of the bacterial 16S rRNA gene for forensic soil comparison: A feasibility study. Journal of Forensic Sciences 2016; 61(3): 607 – 17.

Kane AV, Dinh DM, Ward HD. Childhood malnutrition and the intestinal microbiome. Pediatric Research 2015; 77 (1–2): 256 – 62.

Keaney A, Ruffel A, McKinley J. Ritz K, Dawson L, Miller D eds. *Criminal and Environmental Soil Forensics*. Geological Trace Evidence: Forensic and Legal Perspectives. Springer, 2009. 14: 221 – 37.

Keim P, Pearson T, Okinaka R. Microbial forensics: DNA fingerprinting of *Bacillus anthracis* (anthrax). Analytical Chemistry 2008; 80(13): 4791 – 9.

Knights D, Costello EK, Knight R. Supervised classification of human microbiota. FEMS Microbiology Reviews 2011; 35(2): 343 – 59.

Kozich JJ, Westcott SL, Baxter NT, Highlander SK, Schloss PD. Development of a dual-index sequencing strategy and curation pipeline for analyzing amplicon sequence data on the MiSeq Illumina sequencing platform. Applied and Environmental Microbiology 2013; 79(17): 5112 – 20.

Kruskal, JB. Nonmetric multidimensional scaling: A numerical method. Psychometrika 1964; 29(2): 115 – 29.

Kubic TA and Petraco N. James SH, Nordby JJ, Bell S eds. *Forensic Science: An Introduction to Scientific and Investigative Techniques, Second Edition.* Chapter 16 – Microanalysis and Examination of Trace Evidence. CRC Press, 2005. 315 – 39.

Lenz EJ and Foran DR. Bacterial profiling of soil using genus–specific markers and multidimensional scaling. Journal of Forensic Sciences 2010; 55(6): 1437 – 42.

Libbrecht MW and Noble WS. Machine learning applications in genetics and genomics. Nature Reviews Genetics 2015; 16(6): 321 – 32.

Liu W, Marsh TL, Cheng H, Forney LJ. Characterization of microbial diversity by determining terminal restriction fragment length polymorphisms of genes encoding 16S rRNA. Applied and Environmental Microbiology 1997; 63(11): 4516 – 22.

Liu Z, Lozupone C, Hamady M, Bushman FD, Knight R. Short pyrosequencing reads suffice for accurate microbial community analysis. Nucleic Acids Research 2007; 35(18): e120.

Luo C, Rodriguez-R LM, Johnston ER, Wu L, Cheng L, Xue K, Tu Q, Deng Y, He Z, Shi JZ, Yuan MM, Sherry RA, Luo Y, Schuur EA, Chain P, Tiedje JM, Zhou J, Konstantinidis KT. Soil microbial community responses to a decade of warming as revealed by comparative genomics. Applied and Environment Microbiology 2014; 80(5): 1777 – 86.

Marlow JJ, Steele JA, Case DH, Connon SA, Levin LA, Orphan VJ. Microbial abundance and diversity patterns associated with sediments and carbonates from the methane seep environments of Hydrate Ridge, OR. Frontiers in Marine Science 2014; 1: 1 – 16.

Macdonald CA, Ang R, Cordiner SJ, Horswell J. Discrimination of soils at regional and local levels using bacterial and fungal T-RFLP profiling. Journal of Forensic Sciences 2011; 56(1): 61 – 9.

Metcalf JL, Wegener Parfrey L, Gonzalez A, Lauber CL, Knights D, Ackermann G, Humphrey GC, Gebert MK, Van Treuren W, Berg-Lyons D, Keepers K, Guo Y, Bullard J, Fierer N, Carter DO, Knight R. A microbial clock provides an accurate estimate of the postmortem interval in a mouse model system. eLife 2013; 2: 1 – 19.

Metzker ML. Sequencing technologies — the next generation. Nature Reviews Genetics 2010; 11(1): 31 – 46.

Meyers MS and Foran DR. Spatial and temporal influences on bacterial profiling of forensic soil samples. Journal of Forensic Sciences 2008; 53(3): 652 – 60.

Miller DN, Bryant JE, Madsen EL, Ghiorse WE. Evaluation and optimization of DNA extraction and purification procedures for soil and sediment samples. Applied and Environmental Microbiology 1999; 65(11): 4715 – 24.

Murch RS. Microbial forensics: Building a national capacity to investigate bioterrorism. Biosecurity & Bioterrorism 2003; 1(2): 117 – 22.

Murray RC. Saferstein R ed. *Forensic Science Handbook, First Edition.* Forensic Examination of Soil. Prentice-Hall, 1982. 13: 653 – 71.

Murray RC and Solebello LP. Saferstein R ed. *Forensic Science Handbook, Volume 1, Second Edition.* Forensic Examination of Soil. Prentice-Hall, 2002. 11: 615 – 33.

National Research Council. *Strengthening Forensic Science in the United States: A Path Forward.* Washington, D.C.: National Academies Press 2009.

Nicholson WL, Munakata N, Horneck G, Melosh HJ, Setlow P. Resistance of *Bacillus* endospores to extreme terrestrial and extraterrestrial environments. Microbiology and Molecular Biology Reviews 2000; 64(3): 548 – 72.

Ning J and Beiko RG. Phylogenetic approaches to microbial community classification. Microbiome 2015; 3(47).

Nübel U, Garcia-Pichel F, Muyzer G. PCR primers to amplify 16S rRNA genes from cyanobacteria. Applied and Environmental Microbiology 1997; 63(8): 3327 – 32.

Osborn AM, Moore ER, Timmis KN. An evaluation of terminal-restriction fragment length polymorphism (T-RFLP) analysis for the study of microbial community structure and dynamics. Environmental Microbiology 2000; 2(1): 39 – 50.

Paissé S, Goni-Urriza MS, Fahy A, Duran R. Timmis KN ed. *Handbook of Hydrocarbon and Lipid Microbiology.* Molecular profiling of bacterial communities via 16s rRNA gene based approaches – focus T-RFLP. Springer, 2010. 4114 – 25.

Parkes RJ, Cragg B, Roussel E, Webster G, Weightman A, Sass H. A review of prokaryotic populations and processes in sub-seafloor sediments, including biosphere:geosphere interactions. Marine Geology 2014; 352: 409 – 25.

Pechal JL, Crippen TL, Benbow ME, Tarone AM, Dowd S, Tomberlin JK. The potential use of bacterial community succession in forensics as described by high throughput metagenomic sequencing. International Journal of Legal Medicine 2014; 128(1): 193 – 205.

Perper, JA. Spitz WU ed. *Medicolegal Investigation of Death, Third Edition.* Chapter 2: Time of Death and Changes after Death. Charles C Thomas Publisher LTD, 1992. 14 – 49.

Pye K. *Geological and Soil Evidence: Forensic Applications*. Sampling and sample handling. CRC Press, 2007. 5: 183 – 223.

Quast C, Pruesse E, Yilmaz P, Gerken J, Schweer T, Yarza P, Peplies J, Glöckner FO. The SILVA ribosomal RNA gene database project: Improved data processing and web-based tools. Nucleic Acids Research, 2013; 41: D590 – 6.

Ritz K, McNicol JW, Nunan N, Grayston S, Millard P, Atkinson D, Gollotte A, Habeshaw D, Boag B, Clegg CD, Griffiths BS, Wheatley RE, Glover LA, McCaig AE, Prosser JI. Spatial structure in soil chemical and microbiological properties in an upland grassland. FEMS Microbiol Ecol 2004; 49: 191 – 205.

Sassoubre LM, Yamahara KM, Boehm AB. Temporal stability of the microbial community in sewage-polluted seawater exposed to natural sunlight cycles and marine microbiota. Applied and Environmental Microbiology 2015; 81(6): 2107 – 16.

Sensabaugh GF. Ritz K, Dawson L, Miller D eds. *Criminal and Environmental Soil Forensics*. Microbial Community Profiling for the Characterization of Soil Evidence: Forensic Considerations. Springer, 2009. 4: 49 – 60.

Schloss PD and Westcott SL. Assessing and improving methods used in operational taxonomic unit-based approaches for 16S rRNA gene sequencing analysis. Applied and Environmental Microbiology 2011; 77(10): 3219 – 26.

Schloss PD, Westcott SL, Ryabin T, Hall JR, Hartmann M, Hollister EB, Lesniewski RA, Oakley BB, Parks DH, Robinson CJ, Sahl JW, Stres B, Thallinger GG, Van Horn DJ, Weber CF. Introducing mothur: Open-source, platform-independent, community-supported software for describing and comparing microbial communities. Applied and Environmental Microbiology 2009; 75(23): 7537 – 41.

Scientific American. Curious use of the microscope. Science and Art 1856; 11: 240.

Shanks OC, Newton RJ, Kelty CA, Huse SM, Sogin ML, McLellan SL. Comparison of the microbial community structures of untreated wastewaters from different geographic locales. Applied and Environmental Microbiology 2013; 79(9): 2906 – 13.

Shokralla S, Spall JL, Gibson JF, Hajibabaei M. Next-generation sequencing technologies for environmental DNA research. Molecular Ecology 2012; 21(8): 1794 – 1805.

Sidstedt M, Jansson L, Nilsson E, Noppa L, Forsman M, Radstrom P, Hedman J. Humic substances cause fluorescence inhibition in real-time polymerase chain reactions. Analytical Biochemistry 2015; 487: 30 – 7.

Sørensen T. A method of establishing groups of equal amplitude in plant sociology based on similarity of species and its application to analyses of the vegetation on Danish commons. Kongelige Danske Videnskabernes Selskab 1948; 5(4): 1 – 34.

Sugita R and Marumo Y. Validity of color examination for forensic soil identification. Forensic Science International 1996; 83(3): 201 – 10.

Tebbe CC and Vahjen W. Interference of humic acids and DNA extracted directly from soil in detection and transformation of recombinant DNA from bacteria and a yeast. Applied and Environmental Microbiology 1993; 59(8): 2657 – 65.

Woese CR. Bacterial evolution. Microbiological Reviews 1987; 51(2): 221 – 71.

Woese CF and Fox GE. Phylogenetic structure of the prokaryotic domain: The primary kingdoms. Proceedings of the National Academy of Sciences USA 1977; 74(11): 5088 – 90.

Xu Z and Knight R. Dietary effects on human gut microbiome diversity. British Journal of Nutrition 2015; 113: S1 – 5.

Yang C, Mills D, Mathee K, Wang Y, Jayachandran K, Sikaroodi M, Gillevet P, Entry J, Narasimham, G. An ecoinformatics tool for microbial community studies: supervised classification of amplicon length heterogeneity (ALH) profiles of 16S RNA. Journal of Microbiological Methods 2006; 65(1): 49–62.

Young JM, Weyrich LS, Breen J, Macdonald LM, Cooper A. Predicting the origin of soil evidence: High throughput eukaryote sequencing and MIR spectroscopy applied to a crime scene scenario. Forensic Science International 2015; 251: 22 – 31.

Young JM, Weyrich LS, Cooper A. High-throughput sequencing of trace quantities of soil provides reproducible and discriminative fungal DNA profiles. Journal of Forensic Sciences 2016; 61(2): 478 – 84.