Nature in Focus

Rapid Ecological Assessment

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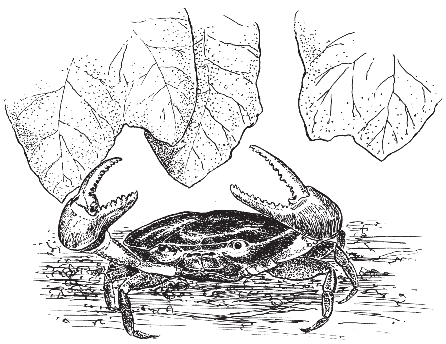

The REA Process and Sampling Framework

Roger Sayre

There are two aspects of REA that are fundamental to the understanding of the overall concept: the ten-step implementation sequence, and the sampling approach and framework. This chapter begins by characterizing the ten steps in the REA process. It then describes the sampling framework, beginning with a discussion of classification and mapping of vegetation types. This is followed by a discussion of the difference between vegetation classifications and imagery-based classifications, and how these two are reconciled. The chapter concludes by addressing species-level sampling, sampling intensity, and sampling plans.

The Process

The typical REA process is a ten-step sequence of events, with each step consisting of a set of related activities. The sequence is as follows:

1. Conceptual Development
2. Initial Planning
3. Initial Landscape Characterization
4. Planning Workshop
5. Training Workshop
6. Field Implementation
7. Report Generation by Discipline
8. Information Integration and Synthesis
9. Preparation of Final Report and Maps
10. Publication and Dissemination of Products

Although not all REAs incorporate each of the ten steps in the exact order depicted above, REAs generally follow this sequence.

Conceptual Development

In the Conceptual Development phase, the idea to conduct an REA emerges, and initial discussions about the merits and shortcomings of the approach are held. The need to generate biological information for an area can be identified by governments, local people, international scientists, in-country conservation nongovernmental organizations (NGOs), and other parties. If the need to generate this information can be coupled with a financial mechanism for accomplishing the work, an REA is conceptualized. The primary implementor usually conceptualizes the REA and is ultimately responsible for all planning and implementation.

Initial Planning

The Initial Planning stage follows closely upon the conceptualization of the REA. During this phase, the primary implementor officially proposes to do an REA and usually attempts to identify the geographic extent, determine the objectives, secure financing, identify collaborators, develop time frames, and solicit input from the scientific community, the government, and the local people. Financial security for the project should be established before the REA is highly publicized in case funding does not materialize and the REA cannot be executed. Identifying collaborating institutions and individuals is critically important and requires a thoughtful consideration of the role, reputation, availability, cost, biases, and political constraints of the potential collaborators.

Initial Landscape Characterization

The Initial Landscape Characterization phase entails the interpretation of imagery (satellite images or aerial photographs) to classify the landscape under study into a system of vegetation units, typically vegetation types or land use–land cover classes. Delineating these discernible landscape features from imagery (entitation) reveals the number and distribution of all unique vegetation types. Classification of the study area into vegetation types is fundamental to the REA concept, and it distinguishes REA from other rapid biodiversity assessments. The classification is preliminary, and the vegetation types need not be identified during the initial entitation because they will necessarily be verified in subsequent fieldwork. It is, however, extremely important to assign all of the land area that constitutes the study site into some system of vegetation units. This delineation of classes is necessary for two major reasons: (1) to characterize and map biodiversity at the landscape level, and (2) to establish a sampling framework within which to conduct field sampling. Once the area has been preliminarily delineated into vegetation types, the number and logistical details of the field visits can be organized. The Initial Landscape Characterization step often involves helicopter or aircraft overflight reconnaissance missions to begin the process of identifying unknown vegetation units and to provide a greater familiarity with the area.

Planning and Training Workshops

The Planning Workshop is the most critical step in the process. During this workshop, all identified collaborators come together to develop a shared vision. The workshop produces a consensus on the objectives, which often change from previously formulated objectives. The workshop also results in a workplan, derived by consensus, that assigns specific tasks, identifies responsible individuals, and establishes benchmarks and deadlines.

The Training Workshop can be coupled with the planning workshop or held at a later date. This workshop provides training related to technically oriented activities, such as mapping, field plot establishment, and data collection. The training workshop allows disciplinary specialists to obtain instruction in the use of standardized sampling techniques and field forms. Experienced REA scientists provide this instruction.

Field Implementation

During the Field Implementation phase, field data collection activities are undertaken. The field team consists of highly specialized scientists with expertise in several disciplinary areas. These scientists are often organized into groups representing taxonomic disciplines (e.g., botany, herpetofauna, and avifauna). The groups sample the area by visiting a number of pre-established sampling locations within representative vegetation types identified during the Initial Landscape Characterization. Field sampling operations require a great deal of logistical coordination. For maximum efficiency and concentration of effort, fewer, well-coordinated, longer-duration, team-based field sampling initiatives are preferred to several short sampling efforts by individual scientists. All field data are precisely georeferenced using global positioning system (GPS) technologies for subsequent mapping and data analysis.

Report Generation by Discipline

The Report Generation by Discipline phase includes the data analysis and presentation of results by individual groups following the completion of data collection activities. Each group produces a stand-alone document detailing objectives, methodologies, major findings, and conclusions. These reports constitute the major input into the integration and synthesis of all of the REA-derived information for the preparation of the final REA report. Many of the individual collaborators withdraw from the REA initiative after generating their own taxa- or discipline-based reports for three reasons: (1) their individual reports constitute major contributions to science and biodiversity management in and of themselves, (2) someone else is identified to integrate the final information and prepare the report, or (3) the lack of continued funding precludes subsequent dedication of effort.

Information Integration and Synthesis

After all of the individual discipline reports are submitted to the primary implementor, the Information Integration and Synthesis phase begins. This work is best done by a small team of individuals with both extensive knowledge of the area and broad ecological perspectives. The integration step involves reviewing all of the single discipline reports and maps, analyzing the results with a multidisciplinary focus, extracting the most important information from each report, repackaging this information in a new multidisciplinary context, and developing conclusions and recommendations for site management that will be presented in the REA report.

The integration step is the most difficult part of the REA process. It is not a trivial exercise to review several documents, extract the most useful information from each, and combine all of this information into a cohesive synthesis. The original vision of the REA is frequently lost at this juncture because it can be challenging to relate large amounts of raw information to the satisfaction of the objectives. The difficulty of accomplishing this work can also be exacerbated by a growing impatience to finish the project. The integration step is normally accomplished in a workshop format.

Final Report, Publication, and Dissemination

The last two phases—Preparation of Final Report and Maps, and Publication and Dissemination of Products—require a great effort to turn the draft document from the Information Integration and Synthesis into a concise, useful, visually appealing document and associated maps. Many draft versions are commonly produced, and they should be widely reviewed for content and style. Donors may wish to review documents prior to publication. If the document is to be translated into another language, substantial staff and/or financial resources are necessary. The decision to translate should be made early in the REA process so that the translation work may begin as soon as possible after an acceptable final report is produced.

These ten steps describe the process of an REA and can be used to measure progress. We now turn our attention to the REA sampling framework.

The Sampling Framework

Vegetation types constitute the sampling framework of an REA. Species are surveyed within vegetation types. Vegetation types are organized and described in vegetation classification systems.

Vegetation Classification

A vegetation classification is a grouping of similar types of vegetation according to logical criteria. The classification is usually organized hierarchically, and it contains descriptions of the types of classified units (FGDC, 1996; Grossman et al., 1998). A vegetation classification is presented as an ordered, hierarchical, and logical list of characterized vegetation types in some area or region. A partial example of a vegetation classification from an REA in Guantanamo, Cuba (Sedaghatkish and Roca, 1999) appears in box 1-1. Different classification systems are used in different regions of the world and are based on vegetation structure (physiognomic criteria), vegetation composition (floristics), or a mixed classification combining both structure (at upper hierarchy levels) and composition (at lower hierarchy levels) (FGDC, 1996; Grossman et al., 1998). For each REA, an appropriate vegetation classification is selected to describe the vegetation types that will be sampled and characterized.

Vegetation Types

Vegetation types commonly mapped in REAs include vegetation communities and vegetation cover classes. Vegetation communities are natural assemblages of coexisting and interacting plant species that depend on and modify their environments (Mueller-Dombois and Ellenberg, 1974). They are often named with both physiognomic and floristic descriptors (FGDC, 1996; Grossman et al., 1998). Vegetation cover classes, on the other hand, are broader groupings of similar kinds of vegetation, such as forests, wetlands, and scrublands (Anderson et al., 1976). Imagery with relatively high spatial resolution (aerial photographs or high-resolution satellite imagery) often permits the delineation of actual vegetation communities, whereas lower resolution imagery may permit only the delineation of vegetation cover. We use the term *vegetation types* throughout this book to represent either vegetation communities or vegetation cover classes.

Vegetation types frequently represent logical management units because they have a discernible spatial extent for which conservation management strategies can be formulated. Because REA results provide the information necessary for making conservation management decisions, the most useful representation of REA information is in the context of ecologically based landscape units with their associated elements of species biodiversity. Mapped vegetation types are often ideal for this purpose.

TROPICAL ARID FOREST

Phyllostylon forest

Phyllostylon brasiliensis Forest Alliance

Association: *P. brasiliensis—Senna* sp.—*Stenocereus histrix*

Phyllostylon cactus forest

Phyllostylon brasiliensis Forest Alliance

Association: *P. Phyllostylon brasiliensis* Forest

MANGROVE FORESTS/SCRUB

Red mangrove tidal forest

Rhizophora mangle Tidally Flooded Forest

R. mangle Medium Island Forest

Black mangrove scrub

Avicennia germinans Tidally Flooded Shrubland

Association: *A. germinans/Batis maritima* Shrubland

PALM WOODLAND

Bucida woodland

Bucida spinosa Seasonally Flooded Woodland Alliance

Association: *B. spinosa—Harrisia taylori/Cordia globosa* Woodland

Cordia woodland

Bucida spinosa Seasonally Flooded Woodland Alliance

Association: *Cordia dentata—Citharexylum fruticosum—Capparis ferruginea/Cordia globosa—Lycium tweedianum* Woodland

PALM SCRUB

Coccothrinax scrub

Coccothrinax fragrans Shrubland Alliance

Association: *C. fragrans* Shrubland

Croton—Coccothrinax scrub

Coccothrinax fragrans—Croton (rosmarinoides, stenophyllus) Shrubland Alliance

Association: *C. fragrans—Croton (rosmarinoides, stenophyllus)* Shrubland

TROPICAL ARID SCRUB

Cactus scrub/Thorn scrub

Stenocereus peruvianus Woodland Alliance

Association: *S. peruvianus—Plumeria tuberculata* Woodland

Randia aculeata Shrubland Alliance

Association: *R. aculeata—Tabebuia myrtifolia* Shrubland

Colubrina scrub

Colubrina elliptica Shrubland Alliance

Association: *C. elliptica* Shrubland

SPARSELY VEGETATED ROCK

Coastal rock pavement

Rachicallis americana Sparsely Vegetated Alliance

Association: *R. americana/Caribea littoralis* Sparse Vegetation

Open shrub outcrop

Melocactus harlowii Sparsely Vegetated Alliance

Association: *M. harlowii—Agave albescens* Sparse Vegetation

Box 1-1. Vegetation classification (partial) from an REA of U.S. Naval Station at Guantanamo Bay, Cuba (Sedaghatkish and Roca, 1999).

Mapping vegetation types necessarily involves interpreting remotely sensed imagery to characterize landscape units (Lillesand and Kiefer, 1994). This interpretation is accomplished by a preclassification of imagery, a field verification effort, and a classification and map refinement process, all described in subsequent sections.

Imagery-Based Classification

A remotely sensed image (aerial photograph or satellite image) contains polygon features that represent areas of differing land cover or vegetation. For example, when looking at a satellite image or color aerial photograph, areas with a variety of different spectral characteristics can usually be discerned. Delineating these features onto a map base results in a set of polygons, which can then be classified. This activity is completed in the Initial Landscape Characterization step and results in a map of preliminarily classified polygons, often referred to as the "unknown polygon map" (figure 1-1). These mapped polygons constitute the remote sensing classification, which is differentiated from a nonmapped vegetation community classification. The vegetation classification can be spatially distributed (mapped) by assigning the different vegetation units described in the classification system to the polygons resulting in the image and then

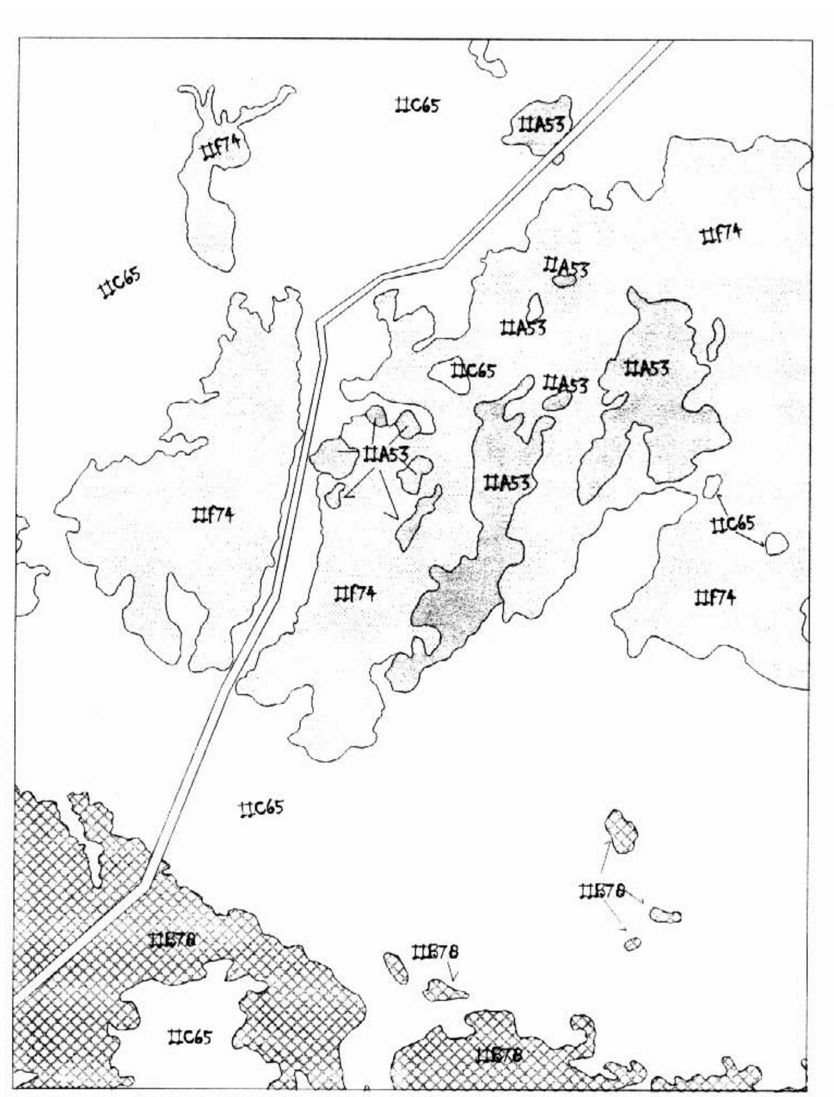

Figure 1-1. An unknown polygon map from an Initial Landscape Characterization analysis. Unique vegetation types are coded with a label that may contain information about the vegetation unit (e.g., which individual, from which spectral signature class, in which sampling region), but the true identity of the polygons is not determined until the field sampling and verification work.

verifying that the actual vegetation units at a particular location on the ground correspond with the mapped unit at that same location (Lillesand and Kiefer, 1994).

Reconciling Classification Systems

The mapping of a vegetation classification by assigning described vegetation types into features delineated from image interpretation can be a difficult endeavor, and it occasionally creates conflict between vegetation classification ecologists and remote sensing specialists. This conflict occurs because (1) some described vegetation types cannot be distinguished in the imagery, and (2) distinguishable features in aerial photographs and satellite imagery may not always correspond with described vegetation types. For example, although a vegetation ecologist may identify a pine forest, a spruce/fir forest, and a hemlock forest as three distinct vegetation types, these types may not be separable in a remote sensing classification in which all types might be singularly grouped as needle-leaf evergreen forests. The map produced ultimately, which shows the spatial distribution of vegetation types, will likely represent a compromise between the vegetation that can be identified in an image and the vegetation types that are described in a classification and verified in the field.

Because REAs are rapid, preliminary, and nonexhaustive, predicting where vegetation communities should exist based on a knowledge of the abiotic factors that control their distribution is beyond the scope of an REA. From a practical and simplistic management standpoint, interpreting unique landscape units from imagery and then sampling them on the ground to determine their actual identity is much wiser. Due to limitations of time and budget, not all polygons in the unknown polygon map (e.g., figure 1-1) will be visited on the ground for verification. Again, the final product will represent the best compromise between remotely sensed data and what is verifiable on the ground. The REA mapping approach is, in essence, a remote sensing classification supported by fieldwork.

The Field Sampling Approach

Field sampling occurs at point locations inside preselected examples of each vegetation type. Sampling locations are not determined using grid-based sampling strategies or environmental gradient transects (gradsects). The selection of the actual vegetation units to be sampled is derived from a study of the unknown polygon map (e.g., figure 1-1) produced during the Initial Landscape Characterization. This map contains the set of all vegetation units (polygons) in the study area, a subset of which is chosen for sampling. Two types of vegetation sampling occur during fieldwork: (1) sampling at point locations to verify vegetation type and identify dominant floristic groups, and (2) sampling in plots at a subset of these locations to obtain quantitative information for plant diversity estimates.

REAs always include mapping of the distribution of vegetation types in the study site, which requires that many examples of these vegetation types be visited for field verification. Thus the vegetation team determines the selection of the vegetation units to be sampled, which will include representative examples of all vegetation types in the site. Fauna sampling is conducted in all vegetation types, but typically at fewer replicate sampling locations within each vegetation type due to the sometimes complex methodologies for surveying animals (e.g., pitfall traps and mistnests). Moreover, the fauna team often identifies additional sampling locations that do not necessarily correspond with locations determined by the vegetation team for vegetation type verification. In these cases, the vegetation team agrees to sample these “extra” locations as well.

In plant surveys, sampling locations are point locations whose coordinates are precisely geolocated with a GPS receiver. Species are identified out to 20 meters in a 360-degree “sweep” around the point. Plots established at the sampling location for quantifying diversity are generally 20 meters × 20 meters (forests) or 10 meters × 10 meters (shrublands/grasslands).

Selecting Sampling Locations

Sampling locations within vegetation units are selected by visual inspection of the image and corresponding unknown polygon map; they are based on representativeness, known or suspected biological value, accessibility, proximity to other different landscapes, level of threats, and availability of information. Whereas traditional ecological inventory emphasizes highly objective field sampling based on random coordinate-pair sample locations, transects, or sampling grids laid out over the entire study area (Magurran, 1988; Heyer et al., 1994; Wilson et al., 1996; Kent and Coker, 1992), REA emphasizes sampling in mapped vegetation types. This sampling is frequently determined by access and efficiency. Although replicate units are sampled, the sampling process is not designed to be as statistically rigorous as traditional ecological inventory. Knowledge of the large-scale disturbance history of the area is also very important because disturbance history influences the biota.

The Distribution of Vegetation Types and Fauna

REAs use vegetation types as a practical framework for surveying faunal taxa, but the extent to which animal distributions are influenced by the spatial organization of vegetation is highly variable and difficult to precisely characterize. For example, some fauna respond more to the structural variables in a forest than to the species composition (MacArthur, 1964; Chadwick et al., 1986). REAs are not intended to rigorously determine habitat affinities of faunal groups. Rather, the occurrence of fauna in the vegetation type (or types) in which they are encountered is emphasized. In REA, vegetation types are considered to be the most biologically useful framework for the preliminary description of animal distributions.

Plants are generally distributed according to temperature, precipitation, and geomorphology (Holdridge, 1967; Austin, 1987; Austin and Smith, 1989). Moreover, historical factors, such as barriers to dispersal and past and present interspecific interactions, also influence plant distributions (Mueller-Dombois and Ellenberg, 1974; Connell, 1980). Microclimatic and local physical environmental conditions can control the distribution of vegetation even at submeter scales. In some instances, the distribution of animal communities will be tightly coupled with the distribution of vegetation types. This may be because these animal communities are intimately associated and perhaps even dependent upon the vegetation, or it may simply be because the animal communities are distributed according to ecologically controlling variables and could be similarly present at the location with an entirely different vegetation type.

Animal mobility and seasonal and diurnal behaviors require an animal sampling effort different from the normal one-point-in-time vegetation sampling effort. For this and other reasons, we recommend (1) preliminary sampling of animal populations within the vegetation communities that are to be characterized in an REA, and (2) additional sampling as necessary (resources permitting) to characterize the spatial and temporal distribution of certain fauna. The habitat preferences of some species are relatively well understood; this information should be used where available to refine sampling approaches for fauna. Additional information on species-level sampling is provided in chapters 5 (vegetation) and 6 (fauna).

Sampling Intensity

The intensity of sampling depends upon the amount of information desired and the resources to support fieldwork. Discussions about sampling intensity should be held during the Initial Planning phase. Time constraints may limit the ability to accomplish replicate sampling in multiple examples within the same vegetation community. In general, there are two types of biodiversity sampling approaches. The most popular and least expensive REA sampling methodology involves characterizing vegetation and the distributions of certain taxa at one moment in time by mapping vegetation types and recording occurrences of species encountered during fieldwork. The second type of sampling aims to at characterize species abundances, and fieldwork frequently includes a seasonality component. Characterizing species abundances, or relative abundances, is more often associated with standard species inventory work, and it requires exhaustive sampling, which is normally outside the scope of a typical REA.

The sampling principle is based on representativeness, with replicates, in all distinct vegetation types. This means that all vegetation types identified from the image interpretation must be visited, and each type should be sampled in multiple locations to capture variation within the same vegetation type. Repeated samples within vegetation types are necessary for confidence in the final map of vegetation types.

Subdividing the study area into different sampling "regions" based on ecological units is often appropriate. For example, watersheds serve well as spatial planning units because (1) they are easy to delineate and map, (2) they are sensible management units for nonconservation purposes (e.g., agricultural production and water development) as well, and (3) they are easily recognized on the ground by humans. Watersheds have been successfully employed as spatial planning and sampling units in REA (FPSNSM, in press). However, establishing sampling regions within the site is more commonly based on considerations of practicality, such as access, study area size, human presence, management urgency, and logistical planning. Sampling emphasis is often restricted to natural areas or to those areas with minimal human-caused alteration. A number of specific polygons are targeted in the sampling plan for visitation. The number and locations of polygons to be sampled are determined from analysis of the unknown polygon map. Decisions about which polygons to sample are usually not based on a statistical analysis, but rather on a combination of practical and rule-of-thumb considerations.

For practicality, sampling should be planned in areas where a maximum number of distinct classes exist in relative proximity, which will enhance sampling efficiency. The decision about which polygons will actually be sampled is made by group consensus and is usually based primarily on objectives, resource constraints, and accessibility. Typically, large polygons with easy access will be chosen for ground-truthing. Other representative polygons with difficult access may have to be verified by aerial survey.

Regardless of the sampling intensity, all vegetation types must be sampled. In typical biological inventory fieldwork, sampling locations are statistically determined and often randomly located. REA sampling is rarely statistically rigorous, but it is as thorough as access and resources permit. A sampling plan should detail the decisions about which polygons were chosen for sampling. The actual techniques used to sample plants and animals vary according to the objectives and budget of an REA. Suggestions on choosing appropriate sampling methods are provided in chapters 5 and 6.

The Sampling Plan

The sampling plan is a document that identifies areas to be sampled during fieldwork, designates field teams responsible for conducting the fieldwork, and establishes a chronogram with schedules for the sampling activities. The sampling plan details the strategy for sampling the entire study area, which is often subdivided. Table 1-1 shows a sampling plan from an REA in the Chaco region of Paraguay.

Table 1-1. A modified sampling plan from an REA in the Defensores del Chaco National Park, Paraguay. Three sampling regions were identified, and sampling locations (Obs. Pt.) were determined in replicate examples of each tentatively identified vegetation type. This plan is modified from the actual plan, which identified many more than forty-four sampling locations.

	Sampling Method at Each Observation Point								
Survey Site Name	*Tentative Vegetation Types*	*Obs. Pt.*	*Date*	*Veg/flora*	*Date*	*Mammals*	*Birds*	*Amphibians*	*Reptiles*
Agua Dulce	Gallery forest	1	12/8	Obs.	14/8	Transect	Obs.	Transect	Transect
Agua Dulce	Gallery forest	2	12/8	Obs.	14/8	Transect	Nets	Plot	Transect
Agua Dulce	Gallery forest	4	12/8	Obs.	14/8	Transect		Ttransec	Transect
Agua Dulce	*Aspidosperma quebracho-blanco* dense forest	6	11/8	Obs.	14/8	Transect	Nets.		
Agua Dulce	*A. quebracho-blanco* open forest	7	11/8	Obs.	14/8	Transect	Obs.		
Agua Dulce	*A. quebracho-blanco* dense forest	8	11/8	Obs.	14/8	Transect			
Agua Dulce	*A. quebracho-blanco* tall forest	10	11/8	Obs.					
Agua Dulce	*A. quebracho-blanco* tall forest	11	11/8	Plot					
Agua Dulce	Palm savanna	12	13/8	Plot			Obs.		
Agua Dulce	Tall quebrachal	13	13/8	Obs.					
Agua Dulce	*A. quebracho-blanco* open forest	14	13/8	Obs.					
Cerro Léon	*A. quebracho-blanco* dense forest	15	14/9	Obs.	15/9	Transect	Obs.	Transect	Transect
Cerro Léon	*Aspidosperma quebracho-blanco* dense forest	16	14/9	Obs.	15/9	Transect		Plot	Transect
Cerro Léon	*A. quebracho-blanco* open forest	17	14/9	Plot	15/9	Transect			
Cerro Léon	*Calycophyllum multiflorum* riverine forest	18	14/9	Obs.	15/9	Transect	Obs.		
Cerro Léon	*A. quebracho-blanco/C. multiflorum* transitional forest	19	14/9	Obs.	17/9	Transect			
Cerro Léon	*A. quebracho-blanco* open forest	20	14/9	Plot	17/9	Transect			
Cerro Léon	*A. quebracho-blanco/C. multiflorum* transitional forest	21	14/9	Obs.	17/9	Transect			
Cerro Léon	*A. quebracho-blanco* open forest	22	13/9	Obs.	17/9	Transect			
Cerro Léon	*Elionurus muticus* savanna	23	13/9	Obs.	17/9	Transect	Obs.		
Cerro Léon	*E. muticus* savanna	24	13/9	Plot	17/9	Transect			
Cerro Léon	*A. quebracho-blanco* open forest	25	13/9	Obs.					
Cerro Léon	*C. multiflorum* riverine forest	26	13/9	Obs.					
Cerro Léon	*A. quebracho-blanco* open forest	27	13/9	Obs.					
Cerro Léon	*A. quebracho-blanco* forest/eastern tall forest transition	28	16/9	Obs.					
Cerro Léon	Plateau vegetation	29	16/9	Obs.					
Cerro Léon	Plateau vegetation	30	16/9	Plot					
Cerro Léon	Hillside forest	31	16/9	Obs.					
Cerro Léon	Hillside forest	32	16/9	Plot	16/8	Transect	Obs.	Transect	Transect
Cerro Léon	Forest on foothills	33	16/9	Obs.					
Cerro Léon	Forest on foothills	34	16/9	Plot					
La Jerenza	*Aspidosperma pyrifolium* open forest	35	1/9	Obs.			Obs.		
La Jerenza	*A. pyrifolium* open forest	36	1/9	Obs.	1-6/9	Transect			
La Jerenza	*E. muticus* savanna	37	1/9	Obs.	1-6/9	Transect			
La Jerenza	*A. pyrifolium* dense forest	38	1/9	Obs.	1-6/9	Transect			
La Jerenza	*A. pyrifolium* dense forest	39	1/9	Obs.					
La Jerenza	*A. pyrifolium* open forest	41	3/9	Obs.					
La Jerenza	*A. pyrifolium* dense forest	43	3/9	Obs.	1-6/9	Transect			
La Jerenza	*E. muticus* savanna	44	3/9	Obs.	7-9/9	Transect			

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