BIODIVERSITY

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THE RAINFOREST STANDARD

Integrating Social, Environmental, and Economic Well-being

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THE RAINFOREST STANDARD

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STRUCTURE: REQUIREMENTS AND PROTOCOLS

[Methodologies]

The Rainforest Standard consists of *Requirements* and protocols organized into five subject Sections: *Initial Conditions* (IC1-3) requiring a description of the natural, social, and legal status of the project area at the outset; Socio-cultural and Socio-economic requirements (S1-3), biodiversity considerations (B1-7), emission reduction considerations (ER1-5), and administrative operations (A1-8). A Glossary follows the five subject sections. Exhibits, Schedules, Templates, and an Appendix (*RFS Interactive Permanence Tool* link) follow the Glossary.

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THE RAINFOREST STANDARD

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BIODIVERSITY

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B1: BIODIVERSITY

OBJECTIVE:

A key objective of *The RFS* is for its *Projects* to retain the *Biodiversity* of their *Eligible Forested Lands*. Under **The Rainforest Standard**, *Biodiversity* is an umbrella concept defined to encompass two of three levels of biological organization: the species level and the ecosystem level. While the genetic level is generally considered important, measuring changes at that level is deemed impracticably fine-grained in the context of forest projects at the present time. *RFS Biodiversity* Requirements strive to accomplish the goal of *Biodiversity* conservation by applying protocols that are validated scientifically and that are also practicable.

RATIONALE:

The principles described here as they relate to forest *Biodiversity* conservation align closely with those developed by CIFOR (Prabhu et al 1996, CIFOR 1999, Prabhu et al 1999) and FSC (2002). Foremost among these principles is the conservation of ecosystem and species diversity. This means that *RFS Projects* should periodically monitor the health of ecosystems and the species they host. Evidence of negative trends in these systems requires *RFS Projects* to take effective steps to counteract those trends and to reestablish positive performance.

The RFS recognizes that to give effect to these principles, its protocols need to be clear and practicable. Therefore, in lieu of costly, time-consuming, and often impracticable methods for measuring directly changes in all ecosystems and species in the *Project*'s *Eligible Forested Lands*, *The RFS* relies on subsets of biological organization for measuring changes at the ecosystem level and at the species level. To measure changes at the ecosystem level, selected *Habitat-Types* are identified to act as ecosystem surrogates. To measure changes at the species level, *Ecological Indicator Group Species* are selected from among carefully chosen *Ecological Indicator Groups* to act as species surrogates.

The purpose for measuring changes in these carefully chosen *Biodiversity* surrogates is to address whether *The RFS Project* is effectively maintaining the area's benchmark *Biodiversity*.

It is worth noting again that *The RFS* is, generally speaking, a performance standard rather than a process or prescriptive process standard. For the purposes of the *Biodiversity* section, this means that *The RFS* does not monitor or regulate management practices, but rather monitors outcomes. An underlying assumption of *The RFS* is that the more a forest is left undisturbed, the more its ecosystems will be maintained; the more a forest is disturbed, the more its ecosystems' structure and function will be altered and negatively affected.

REQUIREMENTS:

B1-1 Project Biodiversity Benchmarks Assessment. As part of its *Final Project Submission Documents*, the *Project Proponent* shall provide a *Project Biodiversity Benchmarks Assessment* prepared by the *Proponent Forest Ecologist*, which shall describe the procedures performed to comply with the Requirements of Section B1-2 for establishing the *Habitat-Type Benchmark*, and Section B1-3 for establishing the *Ecological Indicator Group Species Benchmark.* The *Project Biodiversity Benchmarks Assessment* shall include the data and statistical analysis associated with the results of those procedures, including the *Project Biodiversity Benchmarks* for *Habitat-Type* and for *Ecological Indicator Group Species.*

B1-2 Habitat-Type Benchmark.

A. As high-level *Biodiversity* surrogates, the same *Forest Types* by *Forest Condition* identified and mapped for the *Benchmark Eligible Forested Lands Map* shall be treated as *Habitat-Types* for the purposes of the *Biodiversity* subsection.

B. *Habitat-Type* data shall be created using remote sensor imagery and GIS analytical tools. All information derived from remote sensor images and their corresponding maps

must be *Ground-Truthed* in accordance with a protocol published in *Peer-reviewed Literature*.

C. *Habitat-Type* descriptions and *Habitat-Type* monitoring must encompass the entire *Project Area*.

D. The *Habitat-Type Benchmark* must use a minimum of the three variables cited below in subsections B1-2_D.1-3 to monitor changes at the habitat level.[1]

1. Total area covered by each *Habitat-Type* – these data are described and presented in Table IC1-4F and will provide information on the general habitat composition and the particular dominance of different *Habitat-Types* in the *Project Area*.

2. Spatial arrangement of *Habitat-Types*. The length of the boundary of each *Habitat-Type* in each location where that *Habitat-Type* occurs shall be calculated using the *Benchmark Eligible Forested Lands Map*.

3. Habitat fragmentation. At a minimum, the *Project Biodiversity Benchmarks Assessment* shall calculate the ratio of edge to area for each Habitat-Type[2].

[1] The *Project Biodiversity Baseline* may also include additional variables, provided their use is consistent with and supported by relevant *Peer-reviewed Literature* such as Ferraz, S. F. D. B., Vettorazzi, C. A., & Theobald, D. M. (2009). Using indicators of deforestation and land-use dynamics to support conservation strategies: A case study of central Rondônia, Brazil. *Forest Ecology and Management*, *257*(7), 1586-1595.

(Peer reviewed software programs may also be used to support these analyses: see for example: http://resources.arcgis.com/gallery/file/geoprocessing/details?entryID=0C61934D-1422-2418-7F7A-54DE2A0799E5).

[2] The RFS acknowledges that several variables are commonly used to estimate habitat fragmentation based on GIS and habitat maps. For example, information on the perimeter of *Habitat-Type* polygons may be readily calculated using spatial analysis software. Other informative variables include number of fragments, fragment density, average fragment size, fragment shape index, average distance to nearest neighbor (fragment).

B1-3 Ecological Indicator Groups and Ecological Indicator Groups Species Benchmark. Assessing the impacts of environmental changes at the species level during periodic biodiversity monitoring requires a focused strategy of sampling certain groups of species that are likely to reflect those changes. *The RFS* strategy is to select *Ecological Indicator Group Species* from among a carefully chosen subset of *Ecological Indicator Groups.* Generally, indicator groups are broad taxa or guilds that are sensitive to particular environmental changes and are likely to be consistently present in the areas once monitoring commences (see Gardner et al 2008, and Gardner 2010, Figure 12.2). They are selected according to widely accepted scientific methods. Broadly speaking, the process for choosing appropriate *Ecological Indicator Groups* and their *Ecological Indicator Group Species* and establishing their benchmark values involves two steps. In the first step, the *Proponent Forest Ecologist* prepares a taxonomically broad survey of presence or absence and relative abundance of species based on either systematic sampling, or stratified-random or stratified-systematic sampling depending upon the complexity of *Habitat Types* in the *Project Area*. In the second step, the *Proponent Forest Ecologist* first chooses the appropriate *Ecological Indicator Groups* (B1-3B). Then the *Proponent Forest Ecologist* selects the specific *Ecological Indicator Group Species* from those *Ecological Indicator Groups*. A minimum of 10 *Ecological Indicator Group Species* must be selected from each *Ecological Indicator Group*. *The Ecological Indicator Groups Species Benchmark* is then established by noting the presence or absence of each *Ecological Indicator Group Species* and its relative abundance obtained in the first step to the *Ecological Indicator Group Species*.

A. Step One - Species level descriptions. The species-level description shall be prepared by the *Proponent Forest Ecologist* in accordance with the following protocols.

1. Scale: Spatial. The boundaries for a *Biodiversity* benchmark and its monitoring could be the entire *Project Area*, but generally this is neither logistically nor financially feasible. It is not clear that an appreciably better picture of changes occurring over the duration of the *Project* would be obtained by surveying the entire *Project Area* rather than systematically and periodically sampling a smaller but representative sub-area. Following Magnusson et al. (2005) and the Brazilian Government Research Program on Biodiversity (PPBio), the *Project*

Biodiversity Benchmarks Assessment shall use a minimum representative sampling area of 15 km^2 (3 sampling modules according to the RAPELD system) in each *Habitat-Type* (see Stratification). The RAPELD system allows surveys of taxa best surveyed in line transects (e.g. Buckland et al. 2010) and species best surveyed in plots (e.g. Castilho et al. 2010), and can be used for a wide variety of taxa and ecosystem processes (Costa & Magusson 2010).

a. Each sampling module shall be laid out as a grid, 5 km x 1 km, with a trail system that defines 1km^2 quadrates.

b. Permanent uniformly-distributed plots (see Hill et al. 2005, Appendix 5) shall be sited along the trails, at 1 km intervals, and consist of 250m transects that follow an altitudinal contour line (see Figure 14.6, Gardner, 2010).

c. Where the landscape configuration does not permit installation of 5-km transects, smaller modules with the same internal configuration should be used.

2. Scale: Temporal.

a. Monitoring intervals must be specified to detect relative rates of change in species presence or absence and relative abundance in accordance with species-specific differences in life history and generation length.

b. To detect relative rates of change in species presence or absence and relative abundance of the *Ecological Indicator Groups* selected to monitor forest *Biodiversity* (see B1-2-F), sampling shall be conducted, and data analyzed and reported, at intervals not longer than every five years from the *Project Start Date.*

3. Stratification. In order to accommodate the environmental heterogeneity of a *Project Area*, stratifying sampling among broad, course-grained *Habitat Types* shall be done in one of two ways:

a. Stratified-systematic sampling requires the application of the replicated grid system as specified in B1-1-A1 for each *Habitat Type* (i.e. each stratum) in a *Project Area*. The modules (combinations of plots and transects) can be placed randomly within strata when practical, and if random placement is not viable, situated to capture the greatest variety of conditions at that location. Where the landscape configuration does not permit installation of 5-km transects within a single stratum, the module can cross several strata.

b. Stratified-random sampling requires a standard algorithm that locates randomly selected sampling locations for each *Habitat Type* and sampling unit (plot or transect) in proportion to percentage of the total area made up of each *Habitat Type*. The sampling locations in each *Habitat Type* must be at least 1 km apart. In either of the above sampling strategies, sampling plots at each site must be 250m long and follow an altitudinal contour line as described in B1-1-A1. Where possible, plots and line transects should be conjugated in modules to increase efficiency and comparability.

c. Features, such as watercourses and rock outcrops, should be sampled, when possible, where they intersect line transects so that they are representative of the area. This is especially important for aquatic and riparian plots.

4. Sampling Methods: Whether for the initial taxonomically broad species benchmark survey or for the subsequent periodic monitoring of a smaller number of taxa of high indicator value, species must be systematically and scientifically sampled.

a. Sampling techniques will vary by taxonomic group, but they must be conducted using generally accepted survey methods (e.g. direct counts, catch returns, pitfall traps, mist nets, etc.), that are specific to each group (e.g. birds, bats, dung beetles, etc.) (cf. Hill et al., 2005).

b. Survey methods must either allow direct density estimates corrected for detectability of individuals, or be repeated within survey periods to allow estimation of detectability of species (e.g., Chelgren et al. 2011).

c. Sampling techniques, sampling effort, and sampling location must be fixed across the original survey and all subsequent periodic monitoring surveys, except where changes in apparent abundance within permanent sampling modules or other aspects of the species life history require additional sampling at alternative locations for verification. Locations of all sampling sites must be permanently marked, and their geographic coordinates reported, even if regular sampling is not feasible in those locations.

5. Taxonomic Diversity: Sampling must include representative vertebrate, invertebrate, and plant taxa in developing the *Project Biodiversity Baseline* to identify a broad range of species with varying potential responses to human induced or natural environmental changes, and both terrestrial and aquatic habitats should be included when present.

B. Step 2 - *Ecological Indicator Groups* and *Ecological Indicator Group Species* selection.

1. Step 2-Phase 1: In the first phase of Step 2, *Ecological Indicator Groups* shall be chosen based on how well they address whether the *Project* is effectively maintaining the area's benchmark species-level biodiversity. The power (or ability) of a given biological group to reflect larger scale phenomena (community or ecosystem scale) can be expressed as its indicator value.

a. Indicator value, or IndVal, shall be determined according to the method described in *Peer-reviewed Literature*, for example: Dufrene and Legendre (1997), as expanded upon in Gardner (2010, Box 12.1). IndVal may also be determined using methods in *Peer-reviewed Literature* derived from studies conducted in the same ecosystem(s) as one finds in the *Project Area*.

b. In most instances, there is sufficient information in both national and international *Peer-reviewed Literature* to make the determinations required in B1-3B1 without engaging in primary research at each *Project* site. The choice of *Ecological Indicator Groups* for monitoring must be justified on the basis of that literature. Where the *Peer-reviewed Literature* does not provide adequate recommendations for determining the *Ecological Indicator Groups*, they will have to be determined through on-site research as described in *Peer-reviewed Literature*, which references shall be cited as a justification for the *Ecological Indicator Groups* chosen.

c. As a result (see Fig. 12.7 in Gardner, 2010) of the filtering process described in subsection B1-3B1a-b, a small subset of *Ecological Indicator Groups*, which can be feasibly surveyed over time, shall be chosen to act as surrogate indicators of the health of the entire array of habitats within the *Project Area*.[3].

d. Selection of the groups to survey should take into account the practical limitations of training surveyors and the accuracy of field or laboratory identifications.

e. Once *Ecological Indicator Groups* are chosen, the cost effectiveness of their monitoring, and secondary factors, such as prior ecological knowledge, functional importance, and the degree to which their reaction to changes represents the reaction of a larger group of taxa, must be taken into consideration (Gardner 2010).

2. Step 2-Phase 2. *Ecological Indicator Group Species* selection. Within each *Ecological Indicator Group* a representative set of a minimum of 10 *Ecological Indicator Group Species* shall be chosen to represent each *Ecological Indicator*

[3] In the case of a large area in the Brazilian Amazon, Gardner et al (2008) reduced a broad array of 14 taxonomic groups to two, birds and dung beetles, which were "both highly sensitive to changes in forest structure and cost-efficient to sample" (Gardner 2010). However, in many areas specialists to identify dung beetles may not be available, and bird sampling requires mist netting, which has strong legal restrictions in most countries, or call surveys which are subjective and have not been validated in many areas.

Group. The presence or absence and relative abundance of these species shall be monitored throughout the *Project Period*.

C. **Automatic Review**. The selection of each *Ecological Indicator Group* and each *Ecological Indicator Group Species* for monitoring shall be subject to *Automatic Review* by an *Assigned Forest Ecology Expert* (see Exhibit E) pursuant to Section A2-4.

D. Allowable alternatives to recommended *RFS Biodiversity* protocols.

1. If the *Project Proponent* opts not to use *The RFS* recommended methods for the *Project Biodiversity Benchmark Assessment*, or for establishing the *Project Biodiversity Benchmark*, the *Ecological Indicator Groups,* the *Ecological Indicator Group Species,* or the *Project Biodiversity Monitoring Protocol* (see B1-3 below), as part of its *Initials*, the *Project Proponent* shall submit the following documents in support of any proposed alternative method:

a. A complete technical report authored by the *Proponent Forest Ecologist* justifying the alternative methods chosen. This justification must include evidence that the methods used have been published in the *Peer-reviewed Literature* and have been tested multiple times in the field; and

b. A *Representation* that the technical report produced by the *Proponent Forest Ecologist* in accordance with B1-6A1 is accurate and complete in all material respects to the best of her/his/its knowledge and belief after a full, good faith investigation.

2. The proposed alternative protocol shall be subject to Automatic Review by an *Assigned Forest Ecology Expert* (see Exhibit E) pursuant to Section A2-4.

B1-4 Monitoring and Reporting. The *Project Biodiversity Monitoring Protocol* is a logistically and financially feasible method of assessing the impact of human activities on biodiversity in the *Project Area*. As part of its *Final Project Submission Documents*, the *Project Proponent*,

through its *Proponent Forest Ecologist*, shall provide a *Project Biodiversity Monitoring Protocol* that incorporates transparent monitoring procedures for each identified *Habitat-Type* and *Ecological Indicator Group Species* in accordance with the following requirements.

A. *Habitat-Type* monitoring protocol. As part of its *Final Project Submission Documents*, the *Project Proponent*, through its *Proponent Forest Ecologist*, shall provide a *Project Biodiversity Monitoring Protocol* that incorporates transparent monitoring procedures for each Habitat-Type identified in the *Project Biodiversity Benchmark Assessment* in accordance with the following requirements.

1. Each variable measured as part of the *Project Biodiversity Benchmark Assessment* shall be re-measured prior to the issuance of any *Project Biodiversity Monitoring Report*.

2. Measurements for subsection B1-4A shall be based on data collected within 180 days prior to the issuance of any *Project Biodiversity Monitoring Report* that is derived from either:

a. a *Carbon Verification Map*, or

b. a map of the *Project Area* that conforms to the requirements for a *Benchmark Eligible Forested Lands Map* except that its resolution can be as great as 5m.

B. *Ecological Indicator Group Species* monitoring protocol. As part of its *Final Project Submission Documents*, the *Project Proponent*, through its *Proponent Forest Ecologist*, shall provide a *Project Biodiversity Monitoring Protocol* that incorporates transparent monitoring procedures for each *Ecological Indicator Group Species* in accordance with the following requirements:

1. The transect system described in subsection B1-3A must be maintained (Hill et al, 2005, Appendix 5) so that monitoring results can be compared to those originally derived for the species-level benchmark assessment surveys.

2. The same sampling strategies and survey techniques used for the species-level benchmark assessment must be employed.

3. The same amount of time and effort used during the species-level benchmark assessment to survey species must be deployed for those same species in each survey.

4. All data should be recorded clearly, according to accepted practices and analyzed to assess changes ((see subsection B1-7 below).

C. *Project Biodiversity Monitoring Report.* Results of monitoring in accordance with the protocols established by the *Project Biodiversity Monitoring Protocol* shall be reported in writing (*Project Biodiversity Monitoring Report*) by the *Proponent Forest Ecologist*, signed by the *Project Proponent* representing that the report has been completed in accordance with the *Project Biodiversity Monitoring Protocol*. Monitoring and reporting shall be conducted and the *Project Biodiversity Monitoring Report* filed not less frequently than once every five years. Thus, the first *Project Biodiversity Monitoring Report* shall be due within five years from the *Project Start Date* and then within five years of the immediately previous *Project Biodiversity Monitoring Report* filing.

D. *Project Proponents* and their *Proponent Forest Ecologist*s are encouraged to design *Project Biodiversity Monitoring Protocol*s that employ local community members for data collection, analysis, and interpretation. To that end, *Project Proponents* and their *Proponent Forest Ecologist*s should consider using existing training courses or developing training courses for interested local community members.

B1-5 Verification

A. For *RFS Credits* to be verified, the *Project Proponent* must have filed a *Project Biodiversity Monitoring Report* within five years of the *Project Start Date* and then every five years from the previous *Project Biodiversity Monitoring Report* filing.

B. *Project Biodiversity Report Card*. Within 30 days of receiving the *Project Biodiversity Monitoring Report*, *The RFSMU* shall issue a *Project Biodiversity Report Card* that

compares the *Project Biodiversity Monitoring Report* results with the *Project Biodiversity Benchmarks* and previous *Project Biodiversity Monitoring Reports*. The *Project Biodiversity Report Card* shall be made public through the *Project Webpage*, *The RFS Website*, and to each *Rightsholder*.

1. For each *Habitat-Type*, the *Project Biodiversity Report Card* shall show the presence or absence of a statistically significant:
    a. Decline in total area;
    b. Change in spatial arrangement, and
    c. Increase in fragmentation.
2. *Failing Habitat-Types* are defined as any *Habitat-Type* that, according to the *Project Biodiversity Report Card*, shows:
    a. An increase or decrease of 25% or more in its total area relative to its *Habitat-Type Benchmark*;
    b. An increase in fragmentation as measured by an increase in the ratio of edge to area in excess of 50% relative to its *Habitat-Type Benchmark*.
3. For each *Ecological Indicator Group Species* in each *Habitat-type*, the *Project Biodiversity Report Card* shall show its:
    a. Presence or absence; and
    b. Relative abundance.
4. *Failing Species* are defined as *Ecological Indicator Group Species* that, according to a *Project Biodiversity Report Card*, either:
    a. are no longer present; or
    b. show a unidirectional downward trend in relative abundance compared with the *Ecological Indicator Group Species Benchmark* (or the immediately preceding *Project Biodiversity Report Card*).
5. *Failing Ecological Indicator Group* is defined as any *Ecological Indicator Group* in which 50% or more of its *Ecological Indicator Group Species* are *Failing Species* according to a *Project Biodiversity Report Card*.

6. *Failure Exemption*. Aware of the complexities and uncertainties involved in any response of a natural system to any management intervention, *The RFS* recognizes that undesirable declines in *Habitat-Type* or *Ecological Indicator Group Species* may not be attributable to activities of the *Project*, but may instead be attributable to external factors over which the Project Proponent has no control or significant influence. In such cases, the undesirable decline shall not be considered as indicative of a failure attributable to the Project and shall receive a *Failure Exemption*.

a. A *Failure Exemption Appeal* may be filed at any time by a *Project Proponent*.

b. For the appeal to succeed, the *Project Proponent*, through its *Proponent Forest Ecologist*, shall provide clear and convincing evidence ("*Failure Exemption Excuse*") that for widely accepted scientific reasons the particular Failing *Habitat-Type* or *Ecological Indicator Group Species* was due to factors that:

(1) affected areas greater than the Project Area; and

(2) were beyond the *Project Proponent*'s reasonable control and influence.

c. The *Failure Exemption Excuse* shall be subject to *Automatic Review* by an *Assigned Forest Ecology Expert* (see Exhibit E) pursuant to Section A2-d. If the review finds that the *Failure Exemption Excuse* is valid, the *Failure Exemption* is granted, and the change that was the subject of the *Failure Exemption Appeal* shall be deemed excused and shall not trigger a *Biodiversity Recovery Plan* or RFS Credit suspension.

C. *Biodiversity Recovery Plans.*

1. *Habitat Recovery Plan*. If the *Project Biodiversity Report Card* shows there is a *Failing Habitat-Type* in the *Project Area*, the *Project Proponent* shall provide a *Biodiversity Recovery Plan* within 120 days of the issuance of the *Project*

Biodiversity Report Card. The *Biodiversity Recovery Plan* shall be prepared by a *Proponent Forest Ecologist* and shall provide for each *Failing Habitat-Type* a plan to mitigate the:

a. Increase or decrease in its total area relative to its *Habitat-Type Benchmark*; and

b. Increase in fragmentation as measured by its increase in the ratio of edge to area relative to its *Habitat-Type Benchmark*.

2. *Ecological Indicator Group Recovery Plan*. If the *Project Biodiversity Report Card* shows one or more *Failing Ecological Indicator Groups*, the *Project Proponent* shall provide a *Species Recovery Plan* within 120 days of the issuance of the *Project Biodiversity Report Card.* The *Ecological Indicator Group Recovery Plan* shall be prepared by a *Proponent Forest Ecologist* and shall provide for each *Failing Species*:

a. An explanation for the absence of the species;

b. An explanation for the decline or change in relative abundance;

c. An assessment as to whether the change is reversible; and

d. A set of proposed remedies for reversing the change.

D. *Suspended Biodiversity Verification*. Credits that would otherwise have been verified credits shall be deemed suspended and nontransferable (a "*Suspended Biodiversity Verification*") in accordance with the schedule shown in Table B1-5 if:

1. With respect to a *Failing Habitat-Type*, the *Project Biodiversity Report Card* immediately subsequent to the one that showed a *Failing Habitat-Type* does not show a statistically significant trend in the direction of the *Habitat-Type Benchmark* with respect to:

a. its total area relative to its *Habitat-Type Benchmark*; and

b. the ratio of edge to area relative to its *Habitat-Type Benchmark*.

2. With respect to a *Failing Ecological Indicator Group*, the *Project Biodiversity Report Card* immediately subsequent to the one that showed a *Failing Ecological Indicator Group* continues to show that more than 50% of its *Ecological Indicator Group* Species are *Failing Species*.

a. Does not show a statistically significant trend toward the *Ecological Indicator Groups Species Benchmark* with respect to presence or absence and relative abundance of that *Failing Species*, or

b. shows new *Failing Species* so that in the aggregate one-third or more of the *Ecological Indicator Group Species* are defined as *Failing Species*.

Table B1-5. Suspended Biodiversity Verification schedule

Number of *Failing Habitat-Types*	**Percent of Verifiable Credits Suspended**
1	5%
2	15%
3 or more	25%
Failing Ecological Indicator Groups	**Percent of Verifiable Credits Suspended**
1	5%
2-4	15%
>5	25%

E. Upon the issuance of any *Project Biodiversity Report Card* that follows a *Suspended Biodiversity Verification*, previously suspended credits will be transferable in accordance with the results of the new *Project Biodiversity Report Card* and Table B1-5. The *Project Proponent* may provide a new *Project Biodiversity Monitoring Report* as soon as six months after any suspension and a new *Project Biodiversity Report Card* will be provided within 60 days thereof.

F. *Biodiversity Suspension Appeal*. Aware of the complexities and uncertainties involved in any response of a natural system to any management intervention, *The RFS* will allow a *Biodiversity Suspension Appeal* on the part of the *Project Proponent* if the steps proposed in the *Biodiversity Recovery Plan* are taken, but do not produce the expected trends toward the benchmark values.

1. The *Biodiversity Suspension Appeal* may be filed at any time by a *Project Proponent*.

2. For the appeal to succeed, the *Project Proponent*, through its *Proponent Forest Ecologist*, shall provide clear and convincing evidence ("*Biodiversity Recovery Plan Excuse*") that the expected positive changes from those management measures described in the *Biodiversity Recovery Plan* and implemented to remediate the conditions leading to *Failing Habitat-Types* or *Failing Species* should not be detectable for clear and widely accepted scientific reasons and that a longer period for recovery is required.

3. The *Biodiversity Recovery Plan Excuse* shall be subject to Automatic Review by an *Assigned Forest Ecology Expert* (see Exhibit E) pursuant to Section A2-4.

B1-6 Confirmation of the completeness and accuracy of required biodiversity information. Any document required to be submitted by or through a *Proponent Forest Ecologist*, shall include the *Proponent Forest Ecologist*'s *Representation* that after full investigation, meeting the highest professional standards, the information provided is accurate and complete in all material respects and prepared in strict accordance with the Requirements set forth throughout Section B1 to the best of her/his knowledge and belief.

B1-7 Biodiversity Data.

A. Data Analysis

1. Basic descriptive statistics, measures of change, and modeling forward predictions will be employed using, for example, the methods described in Chapter 15 of Gardner 2010 and Chapter 2 of Hill et al
2. Data analytic methods shall be specific to the data collected and the questions asked. For example, statistical methods for describing the *Project Biodiversity Benchmarks* will differ significantly from methods for establishing periodic monitoring for evidence of change.

B. All original data and metadata necessary to interpret any data cited by a Proponent Expert, Assigned Expert, Referee, or Commentator shall be published on the *Project* webpage with no restrictions to access or use of the data.

C. Metadata should meet the standards necessary for understanding and replication of the study by others.

D. All data must have explicit geographic coordinates to within 4m, or be spatially defined by coordinates within plots to 0.1 m accuracy.

E. Ecological Metadata Language. Metadata structure should meet Ecological Metadata Language (EML) standards, and should include tables of metadata of standard format. Ecological Metadata Language (EML) is a metadata specification developed by the ecology discipline and for the ecology discipline. It is based on prior work done by the Ecological Society of America and associated efforts (Michener et al., 1997, Ecological Applications; for more information go to http://knb.ecoinformatics.org/software/eml/).