Methodology for Grazing in Vineyard Systems

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1. METHODOLOGY

1.1. Scope and justification

The fundamental concept driving the implementation of Environmental Stewardship methodologies is that, for certain practices related to agriculture and natural resource management, there is sufficient science-based evidence indicating the practice will have a positive impact on ecosystem function and implementation of those practices should be supported to the extent possible.

This Environmental Stewardship methodology is designed to support the use of high-density, short duration rotational targeted sheep grazing in vineyard systems to improve ecosystem functioning within the soil and herbaceous cover. As with other Environmental Stewardship methodologies, the environmental benefits are implicit in the practice. Rewards are calculated based on the practice, this is not an outcome-based methodology. The goal of this methodology document is to define the practice and constraints as well as outline how the practice will be verified. The document also specifies data collection requirements that are inherent in Environmental Stewardship methodologies to improve our knowledge of the practice.

The intent of this methodology is to encourage the adoption of agricultural practices that improve soil and ecosystem health, in this case, targeted sheep grazing, and collect data to improve our understanding of ecosystem health benefits from these practices. The methods are straightforward and easy to understand, and the project approval process will be relatively quick compared to methodologies such as those focused on carbon sequestration. Credits derived from this methodology will be split to reward both the grazers and the vineyard owners.

Research and a long history of practice have shown that planting appropriate ground cover between rows of perennial crops and introducing sheep grazing as a means to control vegetative growth results in many benefits to ecosystem health (de Faccio Carvalho et al. 2021), reducing pesticide, herbicide, and fuel use, decreasing mowing, and building soil organic carbon and soil fertility (Ryschawy et al. 2021, Schoof et al. 2021, Niles et al. 2017). Not all of these benefits can be expected in all soils and climates. For example, in northern California, soil carbon storage has not yet been shown to be a significant benefit derived from grazing despite other environmental benefits.

1.2. Defining the practice

This section defines the methods required to qualify for *ecosystem grazing credits* using this sheep grazing in vineyard systems methodology. A goal of implementing this methodology is to improve ecosystem functioning within a managed vineyard system. Potential benefits include:

1. Improved rates of nutrient cycling during active growing periods (i.e. when active periods of growth between rows and/or active vine growing periods)
2. Improved nutrient retention during less active growing periods (i.e. during dry periods in between vineyards rows and/or dormant vine periods)
3. Reductions in external inputs (i.e. pesticides, fertilizers, petroleum-based management inputs like tillage and mowing, etc.)
4. Increased soil microbial biomass
5. Improved soil structure and hydrological properties
6. Increased soil carbon storage

Management activities are expected to induce net positive ecosystem benefits for soil as well as vineyard flora and fauna. Any questions about this methodology should be directed to Regen Network at science@regen.network.

1.2.1 History and other characteristics of individual projects

For each project, the project proponent will need to provide information that describes characteristics that help to put the project and its potential into perspective. This should include but is not limited to: historical land management practices, current operations and site characteristics, farm goals, and how the project supports those goals. A brief statement of expected goals and outcomes from implementing this methodology should also be included.

1.2.2 Project and grazing boundaries

The project boundary defines the area within which all grazing may take place over the duration of the project. Non-grazing areas as well as grazing areas outside of the vineyard can be included in the project boundary for convenience but the project proponent must provide documentation that the project has permission to

graze throughout the entire project area. It is not expected that the project boundary will change over the duration of the project. The project area can be fragmented into multiple temporary or permanent grazing areas . All project boundaries need to include the following attribute information: Project name, project start date, and a unique identifier for each parcel within the project boundary.

Within the project boundary, vineyard grazing areas will need to be defined that indicate precisely where each grazing event that is to be credited took place. These grazing area shape and locations can be different from year to year so each year, the grazing area perimeters must be submitted with the grazing data at the end of each grazing period. All grazing areas will need the following attribute information: grazing start date and time, grazing end date and time, number of sheep grazed, unique identifier for each grazing area, date and time of pre-grazing and post-grazing photos.

All project and grazing boundaries must be submitted as polygons using a common GIS data format such as ESRI Shapefile, GeoJSON, or Keyhole Markup Language. Each polygon needs to include relevant attribute data as noted above.

1.2.3 **P*roject duration***

The project duration defines the number of crediting periods (years) the project proponent commits to continue this grazing practice. The minimum acceptable number of years is three and the maximum is five. The five year maximum is in place to reduce the risk of continuing a practice that has been revised or dropped from the registry due to poor performance or other reasons. To continue to receive credits for this grazing practice after the project duration ends, the project proponent would need to re-register the project using the most suitable methodology at that time.

1.2.4 Grazing requirements and constraints

These requirements are in place to ensure grazing adheres to the widely accepted practice of grazing during vine dormancy (Ryschawy et al. 2021, Schoof et al. 2021, Niles et al. 2017). The thresholds described below are from available data and primarily stakeholder input. These requirements and constraints are intended to reduce the possibility of overgrazing and should be integrated into a custom grazing plan that must accompany the project plan. If a project proponent deems any of these thresholds to be inappropriate a petition justifying the need for an

exception can be sent to the methodology developer, Regen Network, for consideration.

1.2.4.1 Grazing period, frequency and duration

Grazing must be conducted within the grazing period. A single grazing period for each year, of no more than five months, must be defined in the project document. The period is the annual temporal window within which grazing will be permitted to qualify for grazing credits. In most cases this will correspond with vine dormancy in a vineyard but other timing strategies for periods are also acceptable.

Within a grazing period, credits will only be allocated for only one grazing event per grazing area to avoid overgrazing.

1.2.4.2 Herd density and grazing time per parcel

Herd density must be at least 20 per acre (0.4 ha). Grazing with fewer sheep than the lower limit will disqualify that grazing event from receiving credits since the density is likely too low to generate sufficient ecosystem benefits. Minimum stocking rates are difficult to define but based on conversations and published recommendations (e.g., Salzer et al. n.d.) for short, typically 3 to 4 day, rotation periods we decided 20 sheep per acre (0.4 ha) should be a minimum. This lower limit, currently below most recommended optimum densities, is likely to change as we learn more about the impact of high density sheep grazing on soil.

1.2.5 Reporting requirements

Each grazing event must be recorded using the information noted in section 1.2.1. In addition, photographs must be taken of the pasture within 24 hours before grazing starts and again within 24 hours after grazing ends for each grazing event within a grazing area. The photographs should have sufficient detail to clearly see that the area was in need of grazing and that the area had been sufficiently grazed. Multiple before and after photographs can be submitted as long as they were acquired within 30 minutes of each other. The photographs must have accurate timestamps and they must be accurately labeled so they can be easily matched to the correct grazing event and grazing area.

A report with the above-mentioned information must be submitted to Regen Ledger by the project proponent within 90 days of the end of the grazing period detailing grazing events during that grazing period. The report must include the project

reference number, project proponent contact information, photographs with accurate time stamp and labels documenting each grazing event and grazing event data stored as attributes in a polygon GIS file as noted in section 1.2.1.

1.2.5.1 Missing data in the report

Grazing area polygons that are missing, not accurately digitized, contain topology errors, or those that lack start or end date/time information will be eliminated from credit calculations. We will allow for a maximum of 10% or the grazing area polygons to not have associated start and end photographs. If more than 10% of the grazing area polygons do not have photographs associated with them, the smallest area, polygons from the missing photographs set will be eliminated from credit calculations until the 10% threshold is met. Once the threshold is met the polygons that were not reviewed can be used to calculate credits for the period.

1.3 Verification of practices

Verification of documented grazing events will be managed by the methodology developer (RND Inc.) using the polygon grazing claims data submitted with the report. If the polygon data are not suitable for analysis the project proponent will be notified and the issues will need to be resolved and resubmitted within 30 days of notification. Failure to do so will result in forfeiting credits for that grazing period as noted in section 1.2.4.1.

The project proponent will be notified of the verification outcome and once the outcome is approved by the project proponent the credit issuance process will begin.

Example R and Google Earth Engine scripts for verifying grazing claims using PlanetScope imagery can be found in this GitHub repository: https://github.com/regen-network/open-science/tree/master/Fibershed

1.3.1 Disagreements between the verifier and project documents

In instances when the verifier does not agree with grazing records in a grazing report the project proponent will be notified. The project proponent will have 30 days to respond providing additional evidence of specific grazing events that are being contested. Failure to provide sufficient proof of grazing will result in forfeiting the credits associated with that particular grazing event.

1.4 Ancillary data collection and analysis

This methodology incorporates the collection of data relevant to assessing the impact of the methodology on the vineyard environment with the intent of improving our knowledge of regenerative practices and their impact on the environment. Data collection will be supported by setting aside 15% of the credit value specifically for data collection and analysis. These data will only be used to monitor the environment and will be used to improve our knowledge of the relationship between this grazing practice and environmental outcomes. These data will not directly impact the value of the credits generated from applying this methodology. The intent of data collection is to expand our knowledge of how the practice impacts ecosystem function, especially the soil ecosystem.

1.4.1 Data collection

Details related to data collection will be required in the project document. Those details include the person or organization the project proponent will partner with to collect data as well as where the data will be stored, how it will be licensed, and who will be responsible for analyzing the data. A brief justification of the specific data being collected should also be included. In most cases, data collected related to the practice will be collected by the shepherds and processed by the project verifier. Data collected to learn more about the relationship between this grazing practice and resulting environmental outcomes will be handled by a third-party such as an education institution or research organization.

Money to support data collection will be provided from a fund specifically designed to manage Environmental Stewardship data collection. This fund will be replenished using the 15% allocation for data collection and analysis when credits are sold. All data collection plans will be reviewed by a group from the organization or individual that governs the data collection fund. In the near term that organization or individual will likely be the project proponent but in the future the responsibility of managing data collection funds will likely be handled by community organizations such as decentralized autonomous organizations.

Since money from credits required to support data collection will not be available until well after a grazing period is complete, and also because the measurable impacts of the project might take time, the project proponent must agree to permit data to be collected for at least 18 months after the project duration is complete. Eventually a fund will be established to support baseline data collection before a project practice begins. When that is available the 18 month requirement noted above will not be required.

Examples of the types of data that can be collected for a project are: total organic soil carbon, microbial biomass, dissolved organic carbon, bulk density, and water holding capacity.

1.4.2. Partner institution and data analysis

Regen Registry will assist to the extent practical to help project proponents find partner institutions for data collection and analysis services. Regardless of how these partners are identified there must be a written commitment from service providers in the project document as well as a commitment that all data will be licensed with an open access license and that all data will be hosted so that it is easily discoverable and accessible by other researchers. Data storage and licensing will likely be handled by the organization in charge or data collection and analysis but in either case, this information should be included in the project document.

1.5 Credit calculations

The credit unit for this methodology is kilo-sheep-hour. The number of kilo-sheep-hour credits from the vineyard sheep grazing credit class will be calculated within 15 days after the annual grazing report is verified. Sheep-hours for each grazing event (one herd in one grazing area) will be calculated by multiplying the number of sheep in the grazing area by the number of hours grazed. The total kilo-sheep-hours is calculated by adding all of the sheep hours from each grazing area and dividing that sum by 1000.

*kilo-sheep-hours = # of sheep * hours grazed / 1000*

A calculation will also be made to determine if the density of sheep meets the requirement noted in section 1.2.3.2.

A unique characteristic of this methodology is that credits that are earned will be divided between grazers and vineyard owners. The exact split is negotiable and will vary geographically based on the supply and demand dynamics between grazers and vineyard owners. In the United States we propose using a 65%/35% split respectively for grazers and vineyard owners since demand for grazers is high and strong incentives are expected to stimulate growth.

2. Definitions

Additional definitions can be found in the Regen Network Registry Guide: https://library.regen.network/v/regen-registry-program-guide/regen-registry-overview/users

• Credit - Credits are issued in Credit Batches in either a tradable or retired state. The owner of tradable credits can send, retire, or cancel the credits at any time. Tradable credits are only fungible with credits from the same credit batch. Retiring a credit implies the owner of the credit is consuming it as an offset. Retiring a credit is permanent. Canceled credits are credits that have moved to another registry.

• Ecosystem function – Ecological processes such as nutrient, organic matter and energy flows working together for the benefit of the environment.

• Environmental Stewardship initiative – An initiative within Regen Network that encourages the development of methodologies to create projects that generate ecocredits to support the adoption of holistic regenerative practices. An integral component of Environment Stewardship projects is data collection to improve our knowledge of how specific practices impact ecosystem function.

• Grazing period – The contiguous range of dates when grazing is permitted for the purpose of generating credits from this methodology.

• High Density Short Duration Rotational Targeted Grazing – This is a grazing practice where a relatively high density of animals are grazed for relatively short time periods, usually a few days, before being moved to a new area. Other practices that qualify as high density short duration rotational targeted grazing include, Intensive Rotational Grazing, High Stock Density Grazing, and Holistic Planned Grazing.

• Project Proponent - The Land Owner, Project Developer, or Earth Steward registering a project on Regen Registry, that holds responsibility for managing the project. This is also the individual contractually signing off on the Project Plan. Project Proponents include but are not limited to entities that can demonstrate Project ownership. For the avoidance of doubt where an individual executes this representation in their capacity as an authorized office holder of the organization who is the project proponent, this representation is made by the organization.

• Verifier - A third party individual or organization approved by the Project Proponent to provide validation and/or verification services for the project that is not the monitor contracted to execute the verification requirements stipulated in a given Credit Class.

3. Acknowledgements

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