



FOREST PROJECT PROTOCOL

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Forest Project Protocol

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Abbreviations and Acronyms

C	carbon
CARROT	Climate Action Registry Reporting Online Tool
CDF	California Department of Forestry and Fire Protection
CH ₄	methane
CO ₂	carbon dioxide
FPP	Forest Project Protocol
FSP	Forest Sector Protocol
FPA	California Z' Berg-Nejedly Forest Practices Act
GHGs	greenhouse gases
GRP	general reporting protocol
HFC	hydrofluorocarbon
lb	pound
N ₂ O	nitrous oxide
PFC	perfluorocarbon
Registry	The California Climate Action Registry
RPF	registered professional forester
SF ₆	sulfur hexafluoride
WRI	World Resources Institute

Forest Protocol Key Terms

Activity-shifting leakage: The displacement of activities from inside the project's physical boundaries to locations outside of the project's boundaries as a direct result of the project activity.

Additionality: Forest project practices that exceed the baseline characterization, including any applicable mandatory land use laws and regulations.

Allometric equation: An equation that utilizes the genotypical relationship among tree components to estimate characteristics of one tree component from another. Allometric equations allow the below ground root volume to be estimated using the above ground bole volume.

Biological emissions: For the purposes of the forest protocol, biological emissions are GHG emissions that are released directly from forest biomass, both live and dead, including forest soils. In the first three years of reporting the only biological emission type that is required to be reported for forest entities and projects is CO₂, as identified in the Quantification Section of the protocol. Biological emissions are deemed to occur when the reported tonnage of carbon stocks decline at the project or entity level in comparison to the reported tonnage of the previous year.

Biomass: The total mass of living organisms in a given area or volume; recently dead plant material is often included as dead biomass.¹

Bole: A trunk or main stem of a tree. For the purposes of the Protocol, any tree bole with a minimum diameter of three inches should be included in the inventory to estimate carbon stocks.

Carbon pool: A reservoir that has the ability to accumulate and store carbon or release carbon. In the case of forests, a carbon pool is the forest biomass, which can be subdivided into smaller pools. These pools may include aboveground or below-ground biomass or roots, litter, soil, bole, branches and leaves, among others.

Carbon stocks: The carbon contained in identified forest biomass categories (i.e., carbon pools), such as above and below ground biomass, at a specific point in time.

Certification: The process used to ensure that a given participant's greenhouse gas emissions or emissions reductions has met the minimum quality standard and complied with the Registry's procedures and protocols for calculating and reporting GHG emissions and emission reductions.

Conservation: Specific actions that prevent the conversion of native forest to a non-forest use, i.e., residential or commercial development or agriculture. This activity is also a type of project that may be registered in the Registry.

¹ Climate Change 2001, mitigation; Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change

Conservation-based forest management: The natural forest management of native forest where commercial and/or noncommercial harvest and regeneration are practiced. This activity is also a type of project that may be registered in the Registry.

Direct emissions: Greenhouse gas emissions from sources that are owned or controlled by the reporting entity.

Entity: The basic unit of participation in the Registry, which includes a corporation or other legally constituted body, and city or county, and each state government agency.

Entity non-biological baseline: Datum against which a forest entity can measure its non-biological GHG emissions.

Equity Share: Fractional percentage or share of an ownership interest.

Forest: Lands that support, or can support, at least 10 percent tree canopy cover and that allow for management of one or more forest resources, including timber, fish and wildlife, biodiversity, water quality, recreation, aesthetics and other public benefits.

Forest entity: An entity, as defined in this section, including a private individual that owns at least 100 acres of trees

Forest entity baseline qualitative characterization: A 100-year projection of the forest entity's management practices.

Forest management: The commercial or noncommercial harvest and regeneration of forest.

Forest project: A planned set of activities to remove, reduce or prevent carbon dioxide emissions in the atmosphere by conserving and/or increasing on-site forest carbon stocks.

Forest project baseline qualitative characterization: A long-term projection of the forest management practices (or absence thereof) that would have occurred within a project's boundaries in the absence of the project. Such baseline projections shall be based on the policy guidance, provided by project type, in the Forest Project Protocol and shall serve as the basis for quantifying the project's baseline.

Forest project greenhouse gas reduction: Removals or reductions of CO₂ and prevented CO₂ emissions resulting from Registry-approved forest projects. GHG reductions are calculated as gains in carbon stocks over time relative to the project baseline.

Greenhouse Gases: (GHG) For the purposes of the Registry, GHGs are the six gases identified in the Kyoto Protocol: Carbon Dioxide (CO₂), Nitrous Oxide(N₂O), Methane(CH₄), Hydroflourocarbons (HFCs), Perflourocarbons (PFCs), and Sulphur Hexafluoride(SF₆).

GHG reductions: see forest project GHG reductions

Lying dead biomass: Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses, on the ground in forest stands. The Registry requires the carbon in lying dead biomass with a minimum diameter of 6 inches to be measured.

Market Leakage: The creation of greenhouse gas emissions outside of a project's boundaries through substitution or replacement due to the project activity impacting an established market for goods.

Material Misstatement: When a forest entities calculated C stocks and emissions for its forest project differs from the certifiers calculations by more than 15%. Projects that contain material misstatements will not be certified.

Native: Forests classified in the 1988 edition, or its approved successor equivalent, of "A Guide to Wildlife Habitats of California," published by the California Department of Fish and Game, and forests that are composed of the forest types within those classifications.

Natural forest management: Forest management practices that promote and maintain native forests comprised of multiple ages and mixed native species in the overstory and understory.

Natural significant disturbance: Any natural impact on a project's or entity's selected carbon pools that results in a loss of at least 20% of total carbon stocks.

Non-biological emissions: Greenhouse gas emissions that are not directly released from biomass. For example, GHGs from fossil fuel combustion qualify as non-biological emissions.

Offset- Discrete GHG reductions used to compensate for (i.e. offset) GHG emissions elsewhere, for example to meet a voluntary or mandatory GHG target or cap. Offsets are calculated relative to a baseline that represents a hypothetical scenario for what emissions would have been in the absence of the mitigation project that generates the offsets. To avoid double counting the reduction giving rise to the offset must occur at sources or sinks not included in the target or cap for which it is used.²

Optional reporting: Greenhouse gas reporting results that are reported to, but not certified by, the Registry.

Project developer: An entity that undertakes a project activity, as identified in the Forest Project Protocol. A project developer may be an independent third party or the forest entity.

Reforestation: The establishment and subsequent maintenance of native tree cover on lands that were previously forested, but have had less than 10% tree canopy cover for a minimum time of ten years. This activity is also a type of project that can be registered in the Registry.

² World Resources Institute "The Greenhouse Gas Protocol: A corporate accounting and reporting standard (Revised edition)" (2004).

Sequestration: The process of increasing the carbon content of a carbon reservoir other than the atmosphere. Biological approaches to sequestration include direct removal of CO₂ from the atmosphere through land-use changes³ and changes in forest management.

Standing dead biomass: Standing dead tree or section thereof, regardless of species, with minimum diameter of three inches.

Tree: A woody perennial plant, typically large and with a well-defined stem or stems carrying a more or less definite crown with the capacity to attain a minimum diameter at breast height of 3 inches and a minimum height of 15 feet at maturity with no branches within 4.5 feet of the ground.

³ Climate Change 2001, mitigation; Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change

FOREST PROJECT PROTOCOL

PART I INTRODUCTION

Given the increasing awareness of the impacts of climate change, there is a growing interest among entities to publish their actions undertaken to address climate change. This information may be shared with their shareholders, stakeholders, or the public. Managing climate change has become a sound risk management strategy, and thus, there is a desire amongst entities to describe and report their greenhouse gas (GHG) emissions, reductions and emission offsets. The Forest Project Protocol is one of several protocols developed by the California Climate Action Registry (the Registry) to be used by entities that are interested in reporting their GHG information.

Specifically, the Forest Project Protocol (FPP) is the Registry's guide for the design, implementation and registration of forest projects. It complements the Forest Sector Protocol (FSP), which is an appendix to the Registry's General Reporting Protocol (GRP) and governs forest entity reporting. The FPP is written for forest project developers, i.e., those who wish to undertake a forest project⁴. Only those forest projects that comply with this protocol and the GRP may be reported to and certified by the Registry.

A separate, but related protocol, the Registry's Forest Certification Protocol (FCP), provides guidance to approved forest certifiers for conducting certification of biological stocks and emissions reported to the Registry. While the FPP and the GRP are the only documents that forest project developers must read, developers are encouraged to familiarize themselves with the FCP to better understand the certification process. In summary, we recommend that you first read thoroughly the Registry's GRP before reading this protocol and advise you to also review the FCP for the best understanding of the Registry reporting and certification processes.

This document is divided into 6 major parts: Part I introduces forest projects and discusses basic concepts and reporting criteria that are essential for understanding the subsequent sections of the protocol; Part II describes the forest project eligibility criteria; Part III outlines the project quantification requirements and process; Part IV provides instruction for reporting carbon (C) stocks, carbon dioxide (CO₂) emissions and greenhouse gas reductions to the Registry; Part V describes the process for certifying reported biological stocks and emissions; and Part VI provides annexes of references and worksheets.

A. About forests, carbon dioxide and climate change

Forests have the capacity to both emit and sequester carbon dioxide, a lead greenhouse gas (GHG) that contributes to climate change. Trees, through the process of photosynthesis, naturally absorb CO₂ from the atmosphere and store the gas as carbon in its biomass, i.e.,

⁴ Project developers can be the forest entity that is responsible for reporting project information to the Registry, but they may also be an independent third party.

trunk (bole), leaves, branches, and roots. Carbon is also stored in the soils that support the forest (i.e., forest soil), as well as the understory plants and litter on the forest floor.

When trees are disturbed, through events like fire, disease or harvest, they emit their stored carbon as CO₂ into the atmosphere. The quantity of CO₂ that is emitted over time may vary, depending on the particular circumstances of the disturbance. Thus, depending on how forests are treated, they may be a net source or a net reservoir of CO₂. In other words, they may have a net negative or net positive impact on the climate. Currently, forests are the second largest source of global anthropogenic CO₂ emissions, largely due to deforestation.⁵ However, through proper management and protection, forests can also play a positive and significant role to help address global climate change. The California Climate Action Registry's Forest Protocols are designed to address the forest sector's unique capacity to both store and emit CO₂ and to facilitate the positive role that forests can play in climate change.

B. Project vs. Entity Reporting

There are two levels of reporting GHG emissions to the Registry: entity and project-level reporting. Forest entities are private individuals or legally constituted bodies, including corporations, cities, counties and state agencies, that own at least 100 acres of trees. If a forest entity chooses to report a forest project to the Registry, it is also required to report at the entity level.

Entity-wide reporting is meaningful because it provides stakeholders with an overview of an entire organization's emissions⁶ and serves as a benchmark to evaluate future emission trends within the organization. In the case of forest entities, entity-wide reporting can provide an overview of its emissions, not only from their forests, but from their other operations as well, such as the use of harvest equipment and electricity or manufacturing.

Forest Projects

Compared to entity-wide reporting, project-level reporting is more focused. It concentrates on forest carbon stocks and biological CO₂ emissions. The reporting of all other GHGs, as identified by the Kyoto Protocol⁷, are optional for forest projects at this time. For the purposes of the FPP, a forest project is a planned set of activities to remove, reduce or prevent CO₂ emissions in the atmosphere by conserving and/or increasing on-site forest carbon stocks in a defined geographic area. Projects may either represent a geographic subset of a forest entity's total forestland area or occupy all of the entity forest area.

Forest projects that adhere to the FPP will qualify for certified GHG reductions in the Registry. The Registry believes that reporting forest projects in the manner described in this document will result in the transparent, credible, and consistent accounting of GHG reductions. The uses of such data (crediting, actual transfers, buying/selling, etc.) are beyond the scope of the Registry.

⁵ Dixon R.K., et al. "Carbon pools and flux of global forest ecosystems". Science 263: 185-190 (1994).

⁶ In the case of biological emissions of an entity, they will be expressed as net CO₂ emissions.

⁷ The six GHGs identified by the Kyoto Protocol are: carbon dioxide, nitrous oxide, methane, hydroflourocarbons, perflourocarbons, and sulphur hexafluoride.

Project level reporting, due to its focus, can allow for more investment to achieve greater certainty in net GHG emissions and reductions estimations. At the same time, reporting a project may result in only a partial picture of an entity's emissions footprint. Project level reporting alone can therefore be misleading, if only a piece of an entity is reported. As a consequence, the Registry will permit forest projects to be registered ONLY if the forest entity also reports its entity-wide GHG emissions. The requirement of both entity and project level reporting helps prevent the "cherry picking" of projects, or in other words, reporting only GHG reduction projects but not the emission generating activities.

Please note that while forest project reporting requires entity level reporting, entity level reporting does not require project reporting. A forest entity is not required to report forest projects. A forest entity may choose to report only its entity-wide emissions inventory. For further information on the differences between forest project (Forest Project Protocol) and entity (Forest Sector Protocol) reporting please see the comparison chart labeled Table E in Annex A, or refer to The Forest Sector Protocol, an annex of the General Reporting Protocol.

C. Biological vs. Non-biological Emissions

As you read through this document, you will notice that the Registry distinguishes biological emissions from non-biological emissions. Biological emissions are GHGs that are directly released from biomass, both live and dead. In the case of forests, biological emissions are those resulting from the forest carbon pools identified in Part III and are considered emissions if a project's total carbon stocks decline from one year to the next. Non-biological emissions are those GHG emissions that are not released directly from biomass and are covered in the GRP. Thus, these emissions may result from fossil fuels and their combustion. This distinction is helpful for analysis and the application of the protocol guidance.

While there may be other biological GHG emissions associated with forests, the Registry requires only the biological carbon stocks and emissions (i.e. CO₂) associated with forest projects to be estimated and reported. At the project level, project developers are required to identify the types of non-biological emissions that may be associated with the project, so that they may be monitored and reported in the entity level reporting. However, it is unlikely that a Registry approved forest project will result in sustained increases of non-biological emissions in the project area.

D. Reporting Forest Projects

Who Can Report A Forest Project:

Forest entities that implement forest projects within California in accordance with the Registry's forest project, sector and certification protocol criteria can report forest projects to the Registry. A project developer may also be an independent third party (i.e. not the forest entity), as a forest entity may have the design and/or implementation of a forest project carried out by a third party. While the third party project developer may design and

implement the forest project for the entity, the forest entity must be the party that reports the information to the Registry. Throughout this document, forest entities and third parties undertaking a forest project are called project developers.

In addition, please keep in mind that a forest entity must also own the trees within the project area to be eligible to report a project. If a forest entity does not own 100% of the trees (i.e. ownership is shared), the entity may choose to report by equity share or management control. However, under these circumstances, the Registry strongly urges reporting based on equity share. For consistency, the chosen reporting approach must also be consistent with the approach to the required entity level reporting.

Reporting Deadlines:

The Registry requires forest projects to follow the same annual reporting and certification deadlines as all other Registry activities. The reporting and certification deadlines are listed below:

- *Forest project reporting year:* January 1 – December 31
- *Forest project reporting deadline:* August 31 of the year following the reporting year
- *Forest project certification deadline:* December 31 of the year following the reporting year

Since project reporting requires entity-level reporting, the reporting and certification deadlines listed above are the same for entity level reporting. For example, if a forest entity was reporting its 2004 emissions, and also wanted to report a forest project that began in 2004, both the entity and project reporting must be submitted to the Registry by August 31, 2005, and certified by December 31, 2005.

Overview of the Process to Report Forest Projects:

The six basic procedural steps to report a forest project are listed below. The process to report forest projects is slightly different from the forest entity process. The key difference for forest projects is an added optional “pre-screening” step. This step is designed to help ensure that project developers design projects that meet the Registry’s accounting criteria BEFORE they implement the project activity⁸. An overview of the steps is as follows:

1. Design project
2. *Optional:* Complete the project pre-screening process (Submit a pre-screening summary to the Registry for pre-screening. Receive eligibility/pre-screening determination from the Registry.)
3. Implement project (if not already established)
4. Collect direct sampling information by the end of the first reporting year
5. Report project activity
6. Certify project activity

⁸ The exception to this requirement is projects with historical baselines. In this case the pre-screening will be applied retroactively.

After reporting a forest project for the first year, you will need to complete the following steps on an ongoing basis until the project is completed:

1. Maintain project activity
2. Certify non-biological emissions annually (at entity level)
3. Certify biological C stocks and CO₂ emissions for entity and project in years 1 and 5 of the certification cycle.
 - A. Submit annual entity and project monitoring reports to the Registry
 - B. Perform certification of C stocks at specified intervals

For a flow chart of the project reporting steps, please see Annex A. The remainder of this FPP explains the reporting steps in more detail.

On-line Reporting and Transparency

The Registry has an on-line reporting tool, California Action Registry's Reporting Online Tool (CARROT). Once you have compiled all information for reporting and certifying your project, you will use this on-line tool to report your information. All information reported to the Registry, including voluntary agreements that may impact forest carbon stocks in the project area, will be transparent to the public to support the credibility of forest projects. The "Public Report for Forest Entities" in Annex A shows a sample online reporting form.

E. General Information about the California Climate Action Registry

Questions?

The Registry's reporting and certification protocols are designed to be compatible with one another. Should you encounter a conflict between any of the documents, or if you have questions about carrying out the steps described herein, please contact the Registry at: 213-891-1444 or help@climateregistry.org.

Protocol Comments and Continual Program Improvement

The Registry values all feedback on how to improve and continue to develop its program. It is the Registry's policy to review and update its protocols as necessary, based on ongoing feedback, policy direction and scientific information. The Registry will notify all forest entities and approved forest certifiers when it updates the forest protocols.

The Registry welcomes and encourages Registry members, certifiers, TA's, and the public to comment on its protocols, program, quality, and usefulness of data at any time. If you have a comment or suggestion that you would like to formally submit to the Registry for consideration, please complete a Protocol Comment Form, available at www.climateregistry.org/Protocols and submit your comment for consideration. The Registry will post all comments on its website for public review and response.

The most current versions of all protocols pertaining to forest entities and projects will be available on the Registry's website: www.climateregistry.org/protocols/industry. If you have difficulty accessing any of the documents, please call 213-891-1444.

PART II FOREST PROJECT ELIGIBILITY CRITERIA

A forest project must meet a specific set of criteria to be eligible for reporting and certification in the Registry. Much of these criteria have been required specifically by the California legislature.⁹ In the following paragraphs, basic project eligibility requirements and their application are described. You will be required to submit a detailed Project Summary reflecting the information in this section at the time of certification (see Annex C for Summary Worksheet).

In addition, this Section also provides a project pre-screening option that is administered by the Registry. This pre-screening allows project developers to submit preliminary information about a project to determine if your project would be eligible for certification by the Registry. This pre-screening may also assist you to complete your Project Summary for certification. If you are interested in submitting your project for pre-screening, please use the Project Pre-screening Worksheet in Annex B.

A. Forest Project Types

At this time, the Registry will accept **ONLY** the following types of forest project activities to be reported and certified as forest project GHG reductions to the Registry:

Conservation-based Forest Management: Forest projects that are based on the commercial or noncommercial harvest and regeneration of native trees and employs natural forest management practices

Reforestation: Forest projects that are based on the restoration of native tree cover on lands that were previously forested, but have been out of tree cover for a minimum of ten years

Conservation: Forest projects that are based on specific actions to prevent the conversion of native forests to a non-forest use, such as agriculture or other commercial development

In the future, the Registry may consider additional project activities that may be reported to and certified by the Registry.

B. Location of projects

Pursuant to legislation, the Registry currently accepts only projects that are undertaken in California. Over time, the Registry will explore expansion of forest project registration outside of California.

⁹ California Senate Bill 812 provides specific legislative guidance for the registration of forest projects in the California Climate Action Registry.

C. Ownership Summary

To promote transparency, you must include an ownership summary. The purpose of this summary is to demonstrate who is eligible to report the project and to include transparent details regarding any intended external uses of the project (e.g., sale, trading, crediting, etc.). *Please note: in collecting this transparent information, the Registry is not providing credit or acting as a broker to trade any project GHG reductions.*

The ownership summary should include the following information:

1. Owner(s) of project's commercial/non-commercial trees; if more than one owner, please indicate and identify proportionate share (equity share) of ownership.
2. If different from number 1, please state owner(s) of fee title (i.e. title of the land) underlying project's trees and any proportional shares if more than one owner.
3. Please list any other external programs that will be (or are) registering the project's GHG reductions and respective ownership(s).
4. If all or part of the GHG reductions resulting from the project have been, or will be, sold or transferred to another party, identify the transferee and the amount transferred (or to be transferred).

D. Entity-Wide Inventory Reporting

As described earlier, to be eligible to report and certify a forest project in the Registry, your entity must also report its entity-wide forest carbon stocks and GHG emissions (biological and non-biological) for every year it chooses to report forest projects. Please see the Registry's GRP for more information regarding forest entity reporting.

E. Long Term Carbon Security and Environmental Integrity

Forest projects can create both long-term climate benefits, as well as local environmental co-benefits. For instance, by retaining additional carbon stocks over time, project activities can lead to greater biodiversity and improved water quality and species habitat. However, these climate and local co-benefits can be lost either temporarily or even permanently, if the forest is disturbed or removed entirely. To maximize the impacts of climate and environmental co-benefits of forest projects and minimize the risk of their loss, the California legislature requires forest projects in the Registry to meet the following set of criteria:

Perpetual Easement

All forest projects are required to be secured with an easement that dedicates permanently the project land area to forest use. Pursuant to Section 42823 of the California Public Health and Safety Code this easement shall be consistent with 1) the preservation of open space and 2) the protection of relatively natural habitat, as described in Section 170(h)(4)(A)(ii) and (iii) of Title 26 of the United States Code. The terms of the easement shall also do the following:

- Support the project activity, and
- Include a statement in the recitals indicating the easement is perpetual and conforms with Section 42823 of the California Public Health and Safety Code

The purpose of the easement requirement is twofold. The easement acts as a legal guarantee that a project’s existing and additional¹⁰ forest carbon stocks can remain protected in perpetuity by requiring forest practices that protect and encourage additional carbon stocks. If a natural disturbance resulted in the loss of forest carbon, the easement terms would facilitate the restoration of the forest and as a result, carbon stocks. The easement also facilitates environmental co-benefits, since it must be consistent with the open space and natural habitat terms of the Internal Revenue Code, as stated above. For more general information about easements, as well as sample easement terms, see Annex A.

Native forests

All forest projects are required to promote and maintain forest types that are native to the project area. This determination shall be based on the 1988 edition of the guide, “A Guide to Wildlife Habitats of California,” (or its equivalent successor) which is published by the California Department of Fish and Game. To be “native” the forests should be classified in this edition and be composed of the forest types within the classification. The rationale for this requirement is to promote GHG emission reductions while also promoting the maintenance and restoration of California’s native forests.

Natural Forest Management

In order for forest management projects to be eligible for the Registry, they must be based on natural forest management practices within the project area. In other words, these management practices must promote and maintain native forests that are comprised of multiple ages and mixed native species in the forest overstory and understory. Similar to the “native” requirement, this requirement is intended to create climate benefits that also promote healthy and diverse forests.

F. Project Baseline Qualitative Characterization

As part of forest project initiation, there must be a qualitative characterization of the project’s baseline. The *project baseline qualitative characterization* is a long-term projection of the forest management practices or activities that would have occurred (or absence thereof) within a project’s physical boundaries in the absence of the project. The qualitative characterization will serve as the basis to *quantify* and *forecast* the project’s baseline as carbon stocks (see Part III for more information regarding quantification). As the length of a project is the discretion of the forest entity, the minimum timeframe over which a qualitative baseline characterization must be projected is the forest entity’s selected duration of the project¹¹.

Ultimately, the project activity will be assessed against this

About project baselines

Setting GHG accounting baselines for projects is a subjective process, as these baselines are counterfactual scenarios (i.e. what would have happened in the absence of the project). As a result, it should be noted that other programs may have approaches to forest project baselines that differ from those described in this section. The Registry believes its approach to setting forest baselines for the project types described in this section are appropriate for the California Climate Action Registry Program. Other programs seeking to use a similar approach, should consider this framework within their regional and political context.

¹⁰ For more information regarding additional forest carbon stocks, please see Section G.

¹¹ While the Registry does not prescribe a timeframe for baselines, other programs may have defined time periods or minimum timeframes for projects and their corresponding baselines.

baseline to determine the project's additionality (see next section) and relative gains and losses of carbon stocks. The following paragraphs provide the required framework for characterizing a project baseline, based on the project type.

Temporal context of your project baseline

To characterize a project baseline a project developer will first need to identify its temporal context. The date of initiation for a forest project and its corresponding baseline qualitative characterization may be any year that follows your entrance in the Registry, including the initial year you register. Until 2008, one may also choose a baseline initiation date as early as 1990¹², pursuant to the criteria listed below.

Choosing an historical initiation date for a baseline characterization:

The Registry will permit project developers to select an historical baseline initiation date for projects if all the necessary information can be provided to meet the requirements outlined in this Section, as well as the rest of the Protocol. Project baseline data for each consecutive year following the initial baseline characterization date must be reported to the Registry and certified. For the purposes of this Protocol, an historical date for a baseline characterization would be any year, as early as 1990 (but no earlier) that precedes the projects initial reporting year in the Registry.

There is no guarantee that external programs (e.g., market structures or regulatory programs) will assign a value to the information that result from the selection of an historical initiation date. However, there may be some value in this option, as the information could demonstrate that a certain amount of carbon stocks were consistently stored over time, thus demonstrating the duration or "permanence" of any calculated GHG reduction. In addition, it may provide data that demonstrates changes in practices over time, thus supporting a project's additionality. In any event, the information reported to the Registry will be transparent to allow for historical information to be distinguished from the more current information (see Part IV, C. for more information regarding transparency).

There are several limitations to the historical date option: 1) this option will only be available to Registry participants until 2008; 2) project baselines cannot date back earlier than 1990; and 3) baseline characterizations of forest management projects must account for state regulatory changes in 1993 and 1999 pursuant to the California Z'berg-Nejedly Forest Practice Act of 1973, which were years that changes in regulations had significant management impacts on forest carbon stocks. The application of the latter requirement is explained further in following paragraphs.

Project Baseline Characterization

Characterize baseline according to regulatory land use context, existing practices and/or land use change

¹² The option to select a project baseline initiation date as early as 1990 is consistent with the Registry's existing General Reporting Protocol and enacting legislation.

Once the temporal context of the forest project is established, the project baseline must be characterized, where applicable, by mandatory land use statutes and regulations, existing practices or activities on the land, and/or threats of land use change. The interpretation and application of these factors vary, depending on the project type. With the exception of the regulatory adjustments in 1993 and 1999 for forest management projects, forest projects are not required to update their baseline qualitative characterization once it has been established, though they may choose to do so. Please note that some external programs (e.g., crediting programs) may require baselines to be updated over time.

Conservation-based forest management:

The Registry's approach to this baseline characterization presumes that, unless otherwise required by law, a forest management baseline would reflect a management scenario that resulted in harvest and regeneration of trees to the extent permitted by mandatory forest management laws and regulations. Such mandatory laws include the California Z'berg-Nejedly Forest Practice Act of 1973 (FPA) and the corresponding Forest Practice Rules (FPR), specifically the "Option C" Rules¹³, of the California Board of Forestry and Fire Protection. These laws and regulations are highly prescriptive and measurable, as they include requirements such as minimum basal area retention, rotation ages, harvest adjacency restrictions, watercourse buffer widths and sustained yield requirements.¹⁴ In effect, the approach to this baseline characterization is a type of performance standard.¹⁵

Accordingly, the qualitative characterization of the baseline for this project type must be based on the following:

- 1) The California Z'berg-Nejedly Forest Practice Act of 1973 (FPA) and the corresponding Maximum Sustained Production "Option C rules" of the Forest Practice Rules (FPR) of the California Board of Forestry and Fire Protection, which include district, sub-district, and special treatment area rules;
- 2) Any other applicable special county-level mandatory forest management laws that would apply to the baseline management practices at the county level;
- 3) At the time of baseline initiation, mandatory land use statutes or regulations must not require the conservation-based forest management to be implemented as the project activity

¹³ Maximum Sustained Production "Option C" Rules of the California FPR can be found in Title 14, Chapter 4, of the California Code of Regulations, section c of 913.11, 933.11 and 953.11.

¹⁴ These requirements vary, depending on region, silvicultural techniques and acreage.

¹⁵ Since the CA Registry's forest protocols utilize a performance standard that is rooted in California's forest laws (primarily the Z'berg-Nejedly Forest Practice Act and the Forest Practice Rules), other states or regions that wish to consider modifying the forest protocols for use in their local areas should give consideration to setting a performance standard that encourages an equal, or otherwise appropriate level of forest practices for their local areas. To mimic the performance standard used for forest management projects in the CA Registry's forest protocols, other states and/or regions should, at a minimum, recommend a set of forest management guidelines with a goal of maximizing sustained production of high-quality timber products while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment. For more information on California's Z'berg-Nejedly Forest Practice Act, please refer to: <http://www.fire.ca.gov/ResourceManagement/pdf/2000RULE198254.pdf>

The baseline qualitative characterization shall describe the management scenario that would occur over time, relative to the applicable statutes/regulations identified above. It should include the assumption that the baseline characterization would represent a scenario of harvest and regeneration to the extent permitted by these identified laws and regulations.

The description of the baseline management shall identify how management within sensitive areas such as watercourse buffers, view-sheds, special habitat management areas, etc. is compliant with the applicable statutes and regulations. The area affected by any sensitive areas shall be presented in the form of maps and/or tables in the baseline management characterization. The baseline management characterization should also include a description of the various silviculture applications that will be applied to the project area and the logical decisions developed for their use.

In addition, a project developer must identify the specific statutes and regulations/rules used to characterize the baseline (*see Annex A for more information about the California Forest Practice Rules and general references to and descriptions of land use laws and regulations in California*). The identification must include the dates of the regulations (i.e., the year they were enacted and updated). In the case of historical dates used for the baseline initiation, the characterization must also include management adjustments to reflect the FPR changes in 1993 and 1999.

Example A: Conservation-based Forest Management Baseline Qualitative Characterization

The “Timber Company of Mendocino” (TCM) wants to initiate a forest management project on a 120- hectare site on its property in 2006.

As part of the baseline qualitative characterization, TCM would first identify the applicable mandatory forest management laws and regulations that apply to its project. It would identify the California Z’berg-Nejedly Forest Practice Act of 1973 (FPA) and corresponding Rules of the CA Board of Forestry and Fire Protection (FPR), which includes the district rules for Mendocino County (in this instance there are none). The Registry requires that the ‘Option C’ silviculture rules be applied to ensure consistency in characterizing and ultimately, quantifying project baselines. TCM would also review the FPR for any special sub-district and special treatment rules and would determine that there were none that applied to their project area. In addition, TCM would check with the county to ensure that no other mandatory management rules at the county level applied. Through its legal analysis, TCM would also verify that no mandatory statute or regulation requires TCM to undertake its intended project activity.

The characterization of TCM’s project baseline is then based on the applicable regulations cited above and the assumption that the project area would be harvested and regenerated to the extent permitted by these regulations. TCM’s baseline characterization would, therefore, strive to maximize its harvesting opportunities within the legal limitations imposed on even age and uneven age harvesting such as stand age, stand size, harvesting adjacency, and retention standards.

Reforestation:

To characterize a reforestation project baseline, it must be shown that the project area was forested previously but has been out of forest cover for at least ten years. For purposes of this protocol, out of forest cover means less than 10% tree canopy cover.

The presumption underlying the reforestation baseline approach is, absent any laws or regulations requiring reforestation, the project area would remain out of forest cover over time, given current and historical circumstances. If your project is a reforestation project, your baseline qualitative characterization must be based on the following:

- 1) The project area has been out of forest cover for a minimum of ten years at the time of project initiation
- 2) The project area was historically under forest cover
- 3) No mandatory statutes or regulations require reforestation of the project area at the time of baseline initiation
- 4) Describe the practices (or absence thereof) that would continue in the project area over time, based on the previous activities that have kept the area out of forest cover.

Similar to the other forest projects, an historical date for baseline initiation may be used for reforestation projects. However, the project developer will need to provide the information that is necessary to show: 1) the project area was previously forested, but had been out of forest cover for ten years prior to the baseline initiation date; and 2) no statutes or regulations requiring reforestation of the area existed at that time.

Example B: Reforestation Baseline Qualitative Characterization

Landowner Bob in Mendocino County wants to undertake a reforestation project on 1,000 hectares of his land in 2005 so he can register any carbon gains with the California Climate Action Registry. The area was formerly a Douglas-fir forest, but it was cleared in 1980 by a previous owner to be a vineyard, though the vineyard ultimately failed. With the exception of a few remaining vines, the project area is mainly grassland with no tree cover.

To characterize his baseline, Bob would need to provide supporting information to demonstrate that the project area has been out of forest cover since 1995, at least. In this case, the area has been out of forest cover since 1980, so the project satisfies this requirement. In addition, he would need to show that the area had a minimum of 10% tree canopy cover. Bob could demonstrate all of these circumstances with county and state land use records for the area. Finally, through a legal search Bob would demonstrate that no laws or regulations require him to reforest the project area. With this supporting information, Bob would be able to characterize his baseline as one that would have no active management over time, leaving the project area to remain in its present state with grass cover, a few vines and no forest cover.

Forest Conservation:

There are two approaches for characterizing a baseline for a conservation project. One approach is based on *local land use conversion trends*, and the other is based on a *site-specific immediate threat of conversion*. The presumption underlying the former baseline approach is that conversion of the forest area to a non-forest use would happen in accordance with the land use conversion trends identified by the county and state. The presumption in the latter scenario is the site-specific immediate threat would result in the conversion. You may choose either approach to characterize your baseline. In instances where land use conversion trends are not provided in Table F in Annex A, you must use the site-specific approach to characterize your baseline.

If the project baseline is characterized by *land use conversion trends*, the following information must be the basis for the baseline characterization:

- 1) The rate of conversion must be based on the land use conversion trend Table F in Annex A, which is organized on a county basis¹⁶
- 2) It must be demonstrated that no mandatory statutes or regulations requiring protection from conversion exist at the time the baseline is initiated
- 3) The type of conversion must be identified, and it must be demonstrated that the threatened conversion is permitted by local county zoning laws

If the chosen project baseline is an *immediate site-specific conversion*, it must be characterized with the following information:

- 1) Objective documentation that clearly *describes* the specific threat of conversion that would take place in the project area in the absence of the project
- 2) Objective information that indicates that the project area would have been converted *within five years* from the time of project initiation. One or more of the following documents must be provided:
 - Copy of a bid to purchase the land from a developer
 - Plans to subdivide the project area
 - Request for permission filed with the California Department of Forestry and Fire Protection (CDF) to convert the site from forest to non-forest use
 - Permit from CDF allowing site to be converted from forest to non-forest use
 - Request for rezoning of the site to allow conversion filed with the County

¹⁶ Please note that the Registry, in cooperation with the California Department of Forestry and Fire Protection, will update the local land use conversion tables regularly and as additional information becomes available.

- 3) Documentation that demonstrates the estimated rate of conversion from forest to the non-forest use is consistent with similar conversions that have occurred in the local region within the last five years
- 4) A demonstration that no mandatory statutes or regulations requiring protection from conversion exist at the time the project is initiated
- 5) A demonstration that the threatened conversion is permitted by local county zoning laws

Example C: Conservation Baseline Qualitative Characterization

In 2007, Conservation Group (CG) would like to undertake a 2,000 hectare forest conservation project in Tehama County in an area experiencing clearing of hardwood forested land for housing and commercial development. To characterize the project baseline, CG would identify the project area's conversion threat as residential housing and provide documentation (e.g. a general plan) that indicates the project area has been zoned to permit housing and commercial development, demonstrating that such conversion would be permissible in the project area. CG would also demonstrate through a search of applicable laws and regulations that they are not required to protect the project area from development. CG would like to use the default conversion values in the Protocol to determine the project area's conversion rate. Applying the conversion factor provided for hardwood species for Tehama County, CG determines that 4.5 acres (1.8 hectares) of the project area would be converted to residential housing annually. Thus, CG's baseline characterization is substantiated with zoning and land use trend documentation. Its stated characterization would reflect a rate of conversion of 4.5 acres (1.8 hectares) annually to residential development.

G. Project Additionality Requirement

All forest projects must demonstrate that the project activity is *additional to*, or exceeds your project baseline characterization. The purpose of this requirement is to facilitate project activities that create benefits for the climate that are quantifiable (i.e., greenhouse gas (GHG) reductions).

Like the project baseline, there are qualitative and quantitative components to additionality, whereby the qualitative description of your project activity serves as a basis for its quantification in carbon tons. This section addresses the qualitative additionality requirement, while Part III explains how to quantify your project activity as carbon tons, and ultimately, CO₂.

The project's additionality assessment has two phases:

- It will be assessed initially when your project is first reported to the Registry and
- It will be assessed throughout the life of the project in the monitoring process (i.e. the certifier will assess whether you are maintaining the additional project activity)

Project Developers are required to describe their project activity and explain how their project activity exceeds, or is additional to, the baseline qualitative characterization, including any mandatory statutes or regulations used to characterize the project baseline¹⁷. Please refer to the Project Summary Worksheet in Annex C to demonstrate your project's additionality.

Similar to your baseline characterization, the additionality assessment will depend on your project activity type. Examples of additional activities may include harvesting fewer trees than described in the baseline or protecting a forested area that would have been converted to commercial development with no trees. The same factors used to characterize your project baseline will serve as the basis for demonstrating that the project activity is additional.

Conservation-based Forest Management:

A forest management project must demonstrate that it is additional by showing that the planned project activities exceed the applicable mandatory forest management laws used to characterize the project baseline. Such additional activities may include watercourse buffer strips that are wider than legal requirements, greater basal area retention, or older rotation ages. A description, or qualitative characterization, of the project's additional activities that will be implemented over time must be included in the Project Summary worksheet in Annex C.

About project additionality

As additionality is dependent on project baselines, the measure of additionality, like the baseline characterization, is a subjective process. As a consequence, it should be noted that other programs may have additionality assessments that differ from those described in this section. The Registry believes its approach to additionality for the project types described in this section are appropriate for the California Climate Action Registry Program. Other programs seeking to use a similar approach, should consider this framework within their particular regional and political context.

¹⁷ This approach is known as regulatory additionality.

At project initiation, the plan to undertake project activities that exceed the identified laws and regulations in the baseline would be deemed additional. After project initiation, the third party certifier’s monitoring of the project would confirm that the additional project activities were being implemented and maintained.

Example D: Additionality Analysis for Conservation-based Forest Management Project

The “Timber Company of Mendocino” (TCM) performed its qualitative characterization of baseline according to the state FPA, its corresponding regulations and the applicable county forest management regulations (see Section F above). The baseline condition represents the maximum harvest allowed by regulatory statutes. TCM plans to manage their project area with stewardship goals focused on aesthetics and late seral ecology. The table below shows a comparison of management activities to be implemented by TCM to the state FPA for various stewardship themes. The difference between project activity and the baseline characterization is what is deemed additional. Ultimately, this additionality would be quantified as tons of carbon.

Comparison of Project Activity Description to Qualitative Baseline Characterization		
Stewardship Theme	Project Activity	Regulatory Statutes
Forest Structure	TCM will limit early seral stages to 20% of their project area	Forest Practice Rules allows large portions of land outside special concern areas to be in early seral stages provided the landowner can demonstrate
Silviculture	TCM will manage with two-aged silviculture, thereby maintaining forest cover throughout the forest.	Forest Practice Rules allows clear felling of mature forests.
Late Seral Forest Conditions	TCM will devote 10% of their holdings to develop late seral forest.	No such requirement exists in the Forest Practice Rules.

Reforestation:

After characterizing the baseline, a project developer undertaking a reforestation project must prove that its project activity, reforesting, would be additional. This would be done by demonstrating that the project area had been out of forest cover for at least ten years and that governing land use statutes and regulations do not require the project area to be reforested. A description of the project’s additional activities (i.e. restoration and maintenance of native forest cover) that will be implemented over time must be included in the Project Summary worksheet in Annex C. Any removal of trees that may occur at project initiation prior to reforestation must be included as part of the project activity description and ultimately quantified pursuant to Part III.

The act of reforestation would be deemed additional under the circumstances described above. Monitoring of the project area over the project life would occur to assess whether, in fact, reforestation has occurred and the additional activities were being maintained. If at any time during the course of the project the project activity changes to harvest and regeneration,

the reforestation project will be terminated, and the project developer will need to establish a new project based on the requirements for the conservation-based forest management project.

Example E: Additionality Analysis for Reforestation Project

Landowner Bob, whose reforestation baseline characterization is detailed in Section F above, would need to demonstrate that his act of reforesting the project area is additional. In part, he would satisfy this test through his baseline characterization since he has already demonstrated, through government documentation, that his project area is out of forest cover and has been out of forest cover for at least 10 years and through his legal search of land use statutes and regulations shows, he is not required to reforest the area. His commitment to reforest the project area would therefore be deemed additional. Through ongoing monitoring requirements, he would need to confirm his project additionality through evidence demonstrating that the project area has, in fact, been reforested and the area was being maintained as a forest.

Conservation:

A forest conservation project demonstrates its additionality initially by showing that, but for its act of protecting the project area, the project area would have been converted to a non-forest use. This requirement should be satisfied in the baseline characterization process. Upon demonstrating these requirements for the baseline characterization, the proposed project activity to conserve this project area would be considered additional. A description of the project's activities (i.e., conservation) that will be implemented over time must be included in the Project Summary worksheet in Annex C.

Through ongoing monitoring by the certifier to demonstrate that the project area has, in fact, been protected, the project developer would confirm that the project's additional activities were implemented and being maintained. *If, at any time during the course of the project the project activity changes to harvest and regeneration, the reforestation project will be terminated, and the project developer will need to establish a new project based on the requirements for the conservation-based forest management project.*

Example F: Additionality Analysis for a Conservation Project

Conservation Group (CG) must show that its conservation of the 2,000-hectare forestland parcel in Tehama County is additional. In the baseline characterization process, CG demonstrated that the project area would be converted to residential housing at a rate of 4.5 acres (1.8 hectares) annually. CG also demonstrated that it was not required to protect the project area by law and the project area was zoned to permit the conversion to residential housing. The project activity to protect the project area from conversion would be deemed additional based on the substantiated baseline characterization. Ongoing monitoring to demonstrate that the project area has, in fact been protected, would confirm the project's additionality.

H. Assessing Activity-shifting Leakage, Market Leakage and Other Effects

As a project developer, you must demonstrate that you have addressed activity-shifting leakage for your forest project pursuant to the guidance in this section. In general, leakage may occur when a project activity changes the availability or quantity of a product or service and as a result, causes changes in GHG emissions that are independent of the project’s intended GHG impacts. This leakage category can be subdivided into two types of leakage, activity-shifting leakage and market leakage¹⁸, which are explained in the preceding paragraphs.

At project initiation and throughout the life of your project, you are required to account for any activity-shifting leakage that may occur within your entity boundaries (i.e., on-site) and to assess this type of leakage outside of your entity boundaries (off-site). Any activity-shifting leakage that occurs on-site must be quantified and deducted from any calculations of GHG reductions. The assessment and quantification of market leakage, while strongly encouraged, is currently optional. Other types of similar effects (i.e., upstream and downstream effects) must be identified. Table A provides an overview of the reporting responsibilities associated with leakage and other effects. Annexes A and D provide worksheets for leakage analysis and assessment.

Table A Leakage Related Reporting Responsibilities

Leakage/Effects Category	Assessment	Quantification
Activity-shifting On-site	Required	Required
Activity-shifting Off-site	Required	Strongly encouraged
Market	Strongly encouraged	Strongly encouraged
Other effects (upstream/downstream effects)	Required to identify non-biological categories on-site and off-site	Encouraged (on-site effects quantified at entity level)

Please note that the Registry, over time, may require the quantification of off-site activity-shifting leakage and market leakage. In the meantime, the Registry will seek to collaborate with other stakeholders to explore the impacts of registered forest projects on these types of leakage and the methods and institutions to appropriately and effectively account for them.

Activity-shifting leakage:

Required: Assessment of activity-shifting leakage at project initiation and throughout project lifetime; quantification of on-site activity-shifting leakage

The Registry requires you to perform an activity-shifting leakage assessment at project initiation. Activity-shifting leakage is the displacement of activities from inside the project’s

¹⁸ Some programs may refer to both types of leakage as “market effects.”

physical boundaries to locations outside of the project's boundaries, as a direct result of the project activity, causing an increase in emissions outside of the project's physical boundaries. This type of leakage may occur on-site or off-site. For example, as part of a project, a forest landowner may change forest practices by harvesting less within the project boundaries. However, if the landowner compensates for the more limited harvest by shifting the harvest to another property area outside of the project boundaries but within entity boundaries, this action would be considered on-site activity-shifting leakage. An example of off-site activity-shifting leakage may entail a conservation project that prevents a residential development in the project area, but causes the development activity to shift to another area that is outside of entity boundaries.

The Registry's entity level reporting requirement will capture activity-shifting leakage that occurs on-site. If the entity has established an entity level baseline (which is strongly encouraged), any annual report of carbon stocks that differ from the baseline would indicate potential on-site leakage. However, entity level reporting would not necessarily capture any off-site activity-shifting leakage nor would it necessarily provide the context or explanation for the change in reported on-site carbon stocks. As a consequence, in conjunction with entity level reporting, the Registry requires additional steps at project initiation and during the monitoring process to account for activity-shifting leakage on-site. Off-site activity-shifting leakage must also be assessed at project initiation, though its quantification is not required at this time.

Perform initial activity-shifting leakage assessment at project initiation

At project initiation, you are required to perform an initial activity-shifting leakage assessment, which is included in Annex A. If this assessment demonstrates that activity-shifting leakage is possible, you are strongly encouraged to mitigate the potential for activity-shifting leakage in your project design to the extent possible. Suggestions to mitigate this type of leakage through your project design are included in Annex A.

Perform ongoing activity-shifting leakage assessment during project lifetime

As part of the ongoing monitoring process for your project, you are required to assess annually activity-shifting leakage both on-site and off-site. The annual leakage assessment questionnaire is included in Annex D. In addition, you must submit an annual written attestation indicating that activity-shifting leakage has or has not been detected during the annual monitoring process. If it has occurred you must indicate where it has occurred and if it has occurred off-site, you are encouraged to estimate any activity-shifting leakage that occurs off-site. Any on-site activity-shifting leakage must be quantified according to the methodology in Part III, Section G. This activity-shifting leakage will also be monitored and quantified by the third party certifier and applied against any calculated greenhouse gas reductions (see Part III G, for more information regarding quantification and calculation of reductions).

Assessment of Market leakage:

Optional: Market leakage assessment, though optional, is strongly encouraged

An assessment of market leakage in relation to your forest project is strongly advised, though it is optional. Market leakage occurs when the project activity affects an established market for goods, thus causing substitution or replacement elsewhere and causing GHG emissions that, in effect, offset or mitigate the project's GHG reductions. For example, a conservation-based forest management project may result in less timber delivered to the market. Due to this shortage and continued demand for timber, harvest of timber increases elsewhere to compensate for the reduction in timber, satisfying existing demand and causing GHG emissions that offset the GHG reductions associated with the project.

Market leakage can be a significant issue that can mitigate the intended GHG reductions of a project. However, the Registry recognizes that this type of leakage is difficult for an individual project developer to identify and assess at this point. The Registry intends to continue working with stakeholders to develop a feasible approach to address market leakage, with a view toward incorporating an approach within three years. Therefore, while the Registry does not require an assessment of market leakage at this time, you are encouraged to assess the potential market leakage of your project over time and to report this information as part of your optional reporting. For your information, references regarding market leakage are provided in Annex E and market leakage questions are included in the Annual Leakage Assessment Questionnaire in Annex D.

Other effects:

Identification Required: Identify categories of non-biological upstream and downstream effects that may occur due to the project

Assessment of non-biological downstream and upstream effects:

There are other effects that can occur either upstream or downstream of your project that may mitigate or improve the GHG benefits of your project. These upstream and downstream effects are directly linked to the project activity, but are separate from your project's intended GHG reduction. They may occur on-site or off-site. An example of an on-site upstream effect may be the non-biological GHG emissions from equipment used to prepare a forest project site for reforestation. An on-site downstream effect may be the reduction in GHG emissions from the decreased use of harvesting equipment due to less harvest in the project area. A downstream off-site effect could be the non-biological GHG emissions that result from the milling of wood that was harvested from the project area. While you are not required to quantify these effects, you are required to identify the types or categories of non-biological upstream and downstream effects that are affiliated with your project.

Any project related upstream and downstream effects that occur on-site would likely be quantified in entity level reporting. As these effects are likely to be minimal, the forest entity is not required to separately quantify these effects, although an external program may wish to attribute any changes in entity level reporting of non-biological emissions to the project. Those upstream and downstream effects that occur outside of the forest entity physical boundaries, or off-site, may not be captured in entity level reporting. While you are not

required to quantify these effects, you may wish to do so in the event an external program requires such an accounting.

I. Optional project pre-screening process

Project developers may submit a preliminary project eligibility sheet to the Registry for pre-screening. The pre-screening process is designed to help ensure that proposed forest projects will meet the Registry's eligibility criteria before the project is implemented and reported. It is based on the project eligibility criteria outlined in the previous subsections. Please use the Pre-screening Worksheet in Annex B to develop a project summary for pre-screening.

When you have completed the pre-screening worksheet, you must submit the worksheet to the Registry for pre-screening. The Registry's forest team (TBD) will review your project information and issue a statement of project eligibility risk (low, medium, or high). Low risk indicates that the project will very likely meet the Registry's reporting requirements. Medium risk indicates that the project will probably meet the Registry's reporting requirements. High risk indicates that the project will likely not meet the Registry's reporting requirements. This statement will encourage the project developer to make modifications to the project accordingly.

Once you receive your pre-screening statement that the risk is low or medium, you should implement your project (if it does not already exist). Your project must continue to follow the project protocol guidance to implement, calculate and measure your project GHG reductions or emissions.

PART III. QUANTIFICATION OF BASELINE, PROJECT ACTIVITY AND GHG REDUCTIONS

Introduction

This section provides guidance for quantifying your project's existing carbon stocks, your project baseline and GHG reductions. The Registry's quantification approach, outlined in this section, is considered a stock change approach. It explains and identifies the required and optional forest carbon pools to measure, as well as the steps necessary for calculating the existing carbon stocks in the selected pools within your project area. This information will serve as the basis for estimating the carbon in a project's baseline, as well as the anticipated changes in carbon stocks due to the project activity, which may qualify as GHG reductions or emissions.

The first section of this Part explains the essential components to complete your forest project carbon inventory. It then provides guidance regarding the quantification of all your required and optional direct carbon pools. Please refer to the Worksheet for Summarizing Carbon Pools and Calculating Total Carbon Weight in section E of this part, which should be used as you quantify each of these pools. Following the guidance for quantification of each pool, additional instruction is provided on the use of models, as well as the Registry's ongoing monitoring requirements. Finally, the last section provides an explanation regarding how your project's GHG reductions and biological CO₂ emissions are calculated.

A. Quantifying carbon and carbon dioxide versus other greenhouse gases

As discussed earlier in this document, the Registry requires projects to estimate and report carbon stocks and associated CO₂ emissions for forest projects. As a consequence, the focus of this section is the quantification of forest carbon stocks and CO₂ emissions. The registration of all other greenhouse gases for the project area is optional. As such, you may calculate and report your project's greenhouse gas emissions other than C/CO₂. However, guidance is currently not provided by the Registry for their quantification. If you choose to undertake this effort, the Registry encourages you to provide or make available the methodologies and calculations used to calculate and report these results.

B. Provide Background Information on Forest Area

To begin the quantification process, you must supply a general description of the activities and land use patterns that influence your project forest carbon stocks and biological emissions. This information should help inform the initial design of your forest inventory, as well as your estimations of forest carbon stock and emissions. This information will be reviewed in the certification process.

When you are ready to quantify your forest carbon stocks, you should refer to the Project Summary Worksheet in Annex C to provide the following information:

- Forest entity and project boundaries
- Acreage of entity forest area
- Latitude/longitude or Public Land Survey
- Existing land cover and land use
- Topography
- Forest Vegetation
- Site Classes
- Wildlife Habitat Relationship (WHR) Classes
- Watercourses in area
- Land pressures and climate regime

This information must also be presented in a map during certification.

C. Measure carbon pools in the project area

The measurements to determine carbon stocks and CO₂ emissions for your project are broadly grouped into the following categories:

1. Above-ground living biomass
2. Below-ground living biomass
3. Dead biomass
4. Soil

While a project may include the measurement and reporting of all the categories listed above, only certain ones are required and therefore certified by the Registry. The main purpose of these required categories is to ensure that any significant declining carbon pools are accounted for, while maintaining some flexible options for counting steady or increasing carbon pools. Optional categories will not be certified by the Registry. As a general rule, any category that is chosen for your project must be counted in both the baseline and project activity reporting for the life of the project at both the project level and the entity level.

Some of these values will be determined through direct sampling. Table B summarizes the categories with their associated pools and identifies which pools will be required versus those that are optional for all projects. It also shows how the value for the pool is determined.

Table B: Registry requirements of carbon pool categories and determination of value for pool

Category	Carbon Pool	Step	Required?	Determination of Value
Living biomass	Above-ground living Biomass	2	Yes	Sampled in Project
	Below-ground living biomass	2	Yes	Calculation based on above ground sampling
	Shrubs and Herbaceous Understory	6	No	Sampled in Project
On-site Dead biomass	Standing Dead Biomass	3	Yes	Sampled in Project
	Lying Dead Wood	4	Yes	Sampled in Project
	Litter	7	No	Sampled in Project
Soil	Soil	8	No	Sampled in project
Off-site dead biomass	Wood Products	5	No	Decay calculation from volume of harvested wood

Please note: The value of tree removals for biomass energy is not considered in the FPP. Rather, it is considered in the Registry industry-specific protocol for the power sector. Registry members reporting under the power protocol are required to disclose owned and/or purchased sources of biogenic emissions, including emissions from wood waste for the generation of biomass energy.

D. About Forest Inventories

To develop estimates of carbon stocks in the carbon pools identified in Table A, a forest inventory must first be conducted. Standard forest inventories require the establishment of sample plots and provide inventory estimates in terms of cubic or board foot volume. These measurements are based on the trunk, or bole diameter, form, and height of the tree. The current equations provided by the Registry facilitate biomass and carbon mass estimations using the bole diameter alone for live trees and sound standing dead trees. Estimates of lying dead and standing dead tree (for non-sound trees) biomass can be computed in terms of cubic volume and subsequently converted to biomass/carbon mass estimates. Certifiers may grant approval to use different allometric equations than those provided by the Registry. For more information on the use of models to forecast the carbon stocks of baselines and project activities, please see Section E of this part.

For projects that have reportable carbon values, the Registry requires a complete inventory for the estimates of carbon stocks to be certified. An example of a project with little or no carbon values is the early phases of a reforestation project. For all other projects, a complete inventory must be executed by the time you report your annual carbon stock estimate to the Registry. This complete inventory must be maintained throughout the time the project is reported to the Registry. A complete inventory includes an estimate of carbon stocks from the required pools within the entity that meets or exceeds the minimum confidence standard described in this section.

A complete inventory will include a sampling methodology, a set of inventory plots, and analytical methods to translate field measurements into volume and/or biomass estimates. The plot data used for deriving the estimates must have been sampled within the last 12 years. It is expected that project developers may have different approaches to conducting an inventory, that is, some may implement a rolling inventory while others may undertake more periodic comprehensive inventories. Either approach is acceptable so long as an inventory of the entire project area (its required carbon pools and corresponding sample plots) is completed within ten-year intervals.

The steps that follow provide more detailed guidance to establish and maintain a complete inventory and estimate carbon stocks. The required carbon pools are addressed in Steps 2 through 4 and optional pools are listed in Steps 5 through 8. Please use the worksheet in Section E to organize your results.

Example F: Quantification Example (Part I - Introduction)

The following example is intended to demonstrate how a carbon estimate is derived for a forest management project. The example is spread throughout this section in order to portray the scenario simultaneously with the steps in this section. Both the data shown and any assumed sampling methodologies are hypothetical. Only required reporting carbon pools (tree, standing dead, and lying dead biomass) are shown in the example. The example is intended to specifically demonstrate the following:

- The use of allometric equations to determine biomass from diameter measurements.
- How individual measurements are expanded to an area estimate.
- A methodology for calculating biomass in standing dead biomass and lying dead biomass using hypothetical coefficients to convert volume estimates to biomass estimates.
- How biomass estimates are converted to carbon ton estimates.
- How plots are summed to compute an average carbon estimate for each stratum and overall for a hypothetical project area.
- How confidence is determined for the carbon ton estimate and how confidence deductions are applied.

The measurement example has application to all types of projects (conservation, conservation-based forestry, and reforestation). The presentation of the example, however, will expand on the conservation-based forestry scenario initiated in Section F and Section G with the fictitious Timber Company of Mendocino (TCM).

TCM is a landowner with 20,000 hectares of forestland in the redwood region. The landowner has determined that he/she will create a forest project area that is 120 hectares.

Step 1 – Develop Inventory Methodology and Sample Plots

Required

As your initial inventory step, you must develop and describe a methodology to sample for biomass or volume in the required carbon pools. Annex E contains recommended references for developing sampling methodologies. Sampling methodologies for any optional carbon pools, where a determination of the biomass or volume is derived from sampling, is also required for those pools you wish to include in your project.

Your sampling methodology and measurement standards should be consistent throughout the time you report to the Registry. All sampling methodologies and measurement standards must be statistically sound and reviewed by certifiers. While stratification is not a requirement, it should be noted that it does have the potential to simplify certification and possibly lower the costs of certification for reporters. Regardless of whether a stratification system is employed in your inventory, all sample plots shall be monumented for auditing and monitoring purposes. While plots need not be permanent, reporters must monument plots in a way that allows them to be located and revisited for a period of 12 years. If, at the time you first report and certify data, your inventory plots are not monumented in this fashion, you will have until the second certification (i.e. 6 years) to install appropriately monumented plots. Plot centers should be referenced on maps, preferably from GPS coordinates. The methodologies utilized shall be documented and made available for certification and public review. Annex E provides a list of references of possible sampling methodologies.

The design of your sampling methodology and measurement standards must include the requirements stated below. Table 1.1 presents these requirements by carbon pool:

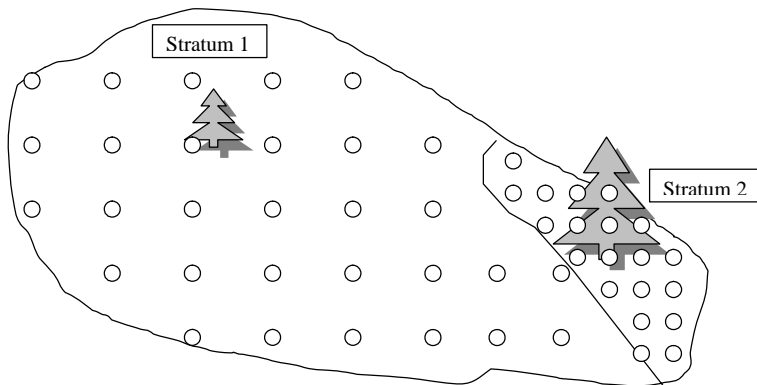
Table 1.1 Minimum Required Sampling Criteria for Estimated Pools

Carbon Pool	Required Pool?	Name of Requirement	Description of Requirement
Above-ground Living Biomass	Yes	Diameter (breast height) Measurements	Stated minimum diameter in methodology not to be greater than 3”.
		Measurement Tools	Description of tools used for height measurement, diameter measurement, and plot measurement.
		Measurement Standards	The methodology shall include a set of standards for height and diameter measurements.
		Plot Layout	A description of plot layout.
		Merchantability of Trees	The methodology shall include all trees regardless of current merchantability to be included in the sampling design.
		Allometric Equation used for Estimating Biomass	The methodology will include a description of the allometric equation used to estimate the whole tree biomass (bole, branches, leaves, and roots) from bole diameter measurements. Any diversion from the provided equation will need to be approved by the Registry.
Below-ground Living Biomass	Yes	Plot-level Allometric Equation used for Estimating Biomass	Apply model (Cairns et al. 1997) to estimate below-ground biomass density. This model equation is based on above-ground biomass density in tons per hectare. Any diversion from the provided equation will need to be approved by the Registry prior to use.
Herbaceous Understory	No	Sampling Methodology	The Registry recommends the sampling methodology prepared by Brown et. al (2004). This methodology is referenced in Annex E. Alternative methodologies will need to be reviewed and approved by the Registry.
Standing Dead Biomass	Yes	Diameter (breast height) and top Diameter Measurements	Stated minimum breast height diameter in methodology not to be greater than 3”. Description of how top diameter is derived.
		Measurement Tools	Description of tools used for height measurement, diameter measurement, and plot measurement.
		Measurement Standards	The methodology shall include a set of standards for height and diameter measurements.
		Plot Layout	A description of plot layout (May be the same layout for Tree Biomass).
		Merchantability of Trees	The methodology shall include all trees regardless of current merchantability to be including in the sampling design.
Litter and Duff	No	Sampling Methodology	The Registry recommends the litter and duff methodology prepared by Brown et. al (2004). This methodology is referenced in Annex E. Alternative methodologies will need to be reviewed and approved by the Registry.
Lying Dead Biomass	Yes	Diameter	Stated minimum average diameter in methodology not to be greater than 6” for pieces of dead wood at least 10’ in length. If the average diameter is greater than 16”, the minimum length for reporting not to be greater than 6’. Anything not meeting the measurement criteria for lying dead wood will be considered litter, an optional category.
		Measurement Tools	Description of tools used for length measurement, diameter measurement, and plot measurement.
		Measurement Standards	The methodology shall include a set of standards for height and length measurements.
		Plot Layout	A description of plot layout (May be the same as the layout for Tree Biomass).
		Merchantability of Trees	The methodology shall include all trees regardless of current merchantability to be including in the sampling design.
		Density by Decay Class	Description of methodology used to derive density estimates for each species (group) by density class

Example G: Quantification Example (Part II – Stratification and Plots)

The forest project area selected by TCM consists of two distinct vegetation types. The project area has been stratified using the vegetation characteristics. Stratum 1 is 100 hectares. It is a young growth forest that has been selectively harvested over the past 40 years. Stratum 2 is 20 hectares. It was initially harvested in 1900 and no harvesting has occurred since, hence it includes larger second growth trees.

The diagram below portrays the scenario. Plots have been laid out in a grid in each of the two strata. Stratum 1 has 30 plots, stratum 2 has 20 plots.



The protocols require estimates of carbon tons be derived for trees (above- and below-ground living biomass), standing dead biomass, and lying dead biomass. The methodology in this hypothetical example will obtain measurements for each of these carbon pools at each point (plot) identified in the drawing above.

Step 2 - Estimate Carbon in Trees from Sample Plots

Required

Tree (above- and below-ground) biomass estimates are required for all projects. You are responsible for determining appropriate methodologies for sampling to determine tree biomass. These estimates should be computed on a per hectare basis. The estimate of tree biomass will be combined with the estimates of standing dead biomass and lying dead biomass for determination of a mean estimate of the required pools derived from sampling, along with the a statistical summary that describes the statistical confidence of the estimate.

The following equations are provided for common California species for estimating tree biomass (kilograms per tree) from diameter (DBH) measurements*. This list does not contain all species that you may encounter in your projects. The Registry will accept the

application of equations for species that are close surrogates in terms of tree form until a more comprehensive list can be developed. Diameter measurements should be in centimeters.

Table 2.1 Equations for Tree Species Biomass Estimates

Species	Biomass (kg) Equation	Limitations
Coast Redwood	Exp(-2.0336 + 2.2592 * ln DBH)	Max DBH = 250 cm
Giant Sequoia		
Incense Cedar		
Douglas-fir	Exp(-2.2304 + 2.4435 * ln DBH)	Max DBH = 210 cm
Pinus sp.	Exp(-2.5356 + 2.4349 * ln DBH)	Max DBH = 180 cm
Abies sp.	Exp(-2.5384 + 2.4814 * ln DBH)	Max DBH = 230 cm
Quercus sp.	Exp(-2.0127 + 2.4342 * ln DBH)	Max DBH = 73 cm
Tanoak	Exp(-2.4800 + 2.4835 * ln DBH)	Max DBH = 56 cm
*Equations from Draft Sampling Methodology by Winrock, International. The reference is in Annex E.		

The derived estimate of biomass shall be multiplied by 0.5 to calculate the mass(kg) in carbon. This product shall be multiplied by 0.001 to convert the mass to metric carbon tons.

Because of the difficulties associated with measuring below ground carbon component of trees, the Registry allows for the estimation of this component of tree carbon through the use of a regression equation (Cairns et al., 1997). This equation provides a practical and cost-effective approach that estimates below ground biomass based on the sampling based calculation of above ground biomass only:

$$BBD = \exp(-0.7747 + 0.8836 \times \ln ABD)$$

Where BBD = belowground biomass density in tons per hectare

ABD = aboveground biomass density in tons per hectare

It is important to note that this equation must be applied at the plot level, after estimates of aboveground biomass have been calculated as described above.

Example H: Quantification Example (Part III – Tree Biomass)

The chart below displays summary data for tree biomass for the first plot in Strata 1.

Tree Biomass								
1	2	3	4	5	6	7	8	9
Plot	Tree Number	Species	DBH (cm)	Total Height (mt)	Status	Biomass (kg)	Weight (Expansion per Hectare)	Total Biomass per Hectare
1	1	Redwood	65	32	L	1,631	21	33,845
1	2	Douglas-fir	65	29	L	2,892	21	60,000
1	3	Tanoak	28	14	L	329	112	36,764
1	4	Redwood	68	30	L	1,806	19	34,243
1	5	Redwood	76	27	L	2,322	15	35,245
1	6	Douglas-fir	65	34	L	2,892	21	60,000
1	7	Tanoak	42	17	L	900	50	44,726
1	8	Tanoak	46	18	L	1,128	41	46,737
					Sum			351,561

The plot in this example was measured using a 30 square foot basal area factor prism. The plot number is entered in column 1. All ‘in’ trees are measured and input consecutively starting at North and proceeding clockwise. Each tree is numbered (column 2), the species documented (column 3), the DBH measurements entered as centimeters in column 4, and the total height entered as meters in column 5.

The status of the tree goes in column 6. The status codes are shown below.

Status Codes	Description
L	Live
D1	Dead, with large and small branches and twigs
D2	Dead, with large and small branches and no twigs
D3	Dead, with large branches only
D4	Dead, with no branches

Only live trees are input into the Tree Biomass worksheet. The biomass for each tree is determined (column 7) using the allometric equations provided in Step 2 in the Forest Project Protocols. The basal area factor and each tree’s diameter (breast height) are used to determine the expansion factor, or weight, of each tree (column 8). The expansion factor is multiplied by each tree’s biomass to portray the biomass estimate of each tree on a per hectare basis (column 9). Each tree’s expanded biomass is summed to calculate the estimate total biomass in trees on plot 1. Plot 1’s estimate of aboveground tree biomass in Strata 1 is calculated to be 351,561 kilograms per hectare. Based on this estimate, an estimate of below ground biomass on a per hectare basis can be calculated using the equation above. The estimate of belowground biomass is 81,844 kilograms per hectare. The combined estimate of biomass in Plot 1 is 433,405 kilograms.

Step 3 – Estimate Carbon Standing Dead Biomass from Sample Plots *Required*

The carbon stocks in standing dead biomass, including stumps, must be included in the project inventory report. While this category may not be an initial pool for forest projects in certain cases, it may become one over time. Therefore, it must be considered in the monitoring process and any projections of project stocks. References for developing sampling methodologies, which are referenced in Annex E, include Brown (1974), Harmon and Sexton (1996), and Brown et. al (2004).

The sampling methodology and protocols for deriving biomass estimates will be developed as part of an overall sampling strategy (discussed in Step 1). The estimate of standing dead biomass for highly decayed trees (broken tops, missing branches, etc.), must be calculated first volumetrically and subsequently converted to biomass and carbon tons. Sound dead trees can be computed using the equations provided for live trees in Step 2. The equations used in Step 2 provide an estimate of biomass in kilograms. The estimate must be converted to metric carbon tons by multiplying the result by .001

For those trees where volume is computed, the volume will need to be converted to biomass density by applying conversion factors based on a sub-sample of material that represents the species groups and decomposition classes. The methodology developed for both lying dead wood and standing dead biomass must include a description of the calculation techniques used to determine biomass density by decomposition classes and species (groups). The estimate of biomass density must be computed in terms of metric carbon tons on a per hectare basis. A description of a methodology to generate the density factors can be found in the Brown et. al (2004) document mentioned above.

Example I: Quantification Example (Part IV – Standing Dead Biomass)

Standing dead biomass (snags) is measured on every plot. The chart below displays summary data for standing dead biomass for the first plot in Strata 1.

Strata 1											
Standing Dead Biomass											
1	2	3	4	5	6	7	8	9	10	11	12
Plot	Tree Number	Species	DBH (cm)	Top Diameter (cm) (For Status Code D4)	Total Height (mt)	Status	Density	Volume (cubic meters) for Status Code D4 only	Biomass (kg)	Weight (per Hectare)	Total Biomass per Hectare
1	1	Douglas-fir	30	0	20	D1	Sound	na	284.4	97.4	27,699
1	2	Redwood	61	46	20	D4	Intermediate	5.60	1008.0	23.6	23,745
								Sum			51,444

The entries in columns 1 through 4 are the same as the entries described for the tree biomass. Column 5 allows the input of a top diameter for dead trees with the status code ‘D4’. The status codes are the same as those used for trees in the tree example. The status code D4 is for trees that generally have broken tops. The volume of these trees must first be determined before converting to biomass. Biomass for all other dead trees is determined using the same allometric equations used for the live trees. Total height for all dead trees is entered in column 6. The status code is entered in column 7 for each tree.

The density of the dead tree is entered in column 8. The density entry is used to determine biomass for dead trees with a ‘D4’ status code. The coefficients used to determine biomass are developed by sampling the density of the species in the forest in the various classes of decomposition. The process is described in “Methods for Measuring and Monitoring Forestry Carbon Projects in California” by Brown et. al (2004) that is referenced in Annex E. The table below contains hypothetical coefficients used for determining biomass for both dead trees (standing dead biomass) and down logs (lying dead biomass).

Density Subsamples (kg/cubic meter)			
Species	Sound	Intermediate	Rotten
Redwood		360	180
Douglas-fir		400	210
Tanoak		480	235

Volume is calculated (column 9) for dead trees with ‘D4’ status codes and multiplied by the appropriate density coefficient to determine the biomass estimate in column 10. The biomass for dead trees with status codes D1, D2, and D3 is calculated the same way as live trees, using the allometric equations provided in Step 2 in the Forest Project Protocols and input into column 10. The expansion factor, or weight (column 11), of each tree is determined using the same techniques used for live trees and is described in the Tree Biomass section above. The weight of each dead tree is multiplied by its biomass estimate to portray the estimate on a per hectare basis (column 12). This is summed to determine the total biomass in standing dead biomass on Plot 1.

Step 4– Estimate Carbon in Lying Dead Wood

Required

The carbon content of lying dead wood, that is wood biomass that is not standing, must also be estimated in all entity inventories. As with standing dead wood, this category may not be present initially. However, it may become one over time and should therefore be considered in the monitoring process and any projections of entity carbon stocks. References for developing sampling methodologies, which are referenced in Annex E, include Brown (1974), Harmon and Sexton (1996), and Brown et. al (2004).

Field measurements of lying dead wood enable calculation of volume to be easily computed. The computed volume will need to be converted to biomass density by applying conversion factors based on a sub-sample of material that represents the species groups and decomposition classes. The methodology developed for lying dead wood must include a description of the calculation techniques used to determine biomass density by decomposition classes and species (groups). The estimate of biomass density must be computed in terms of carbon tons on a per hectare basis. The carbon tons estimate is inserted into the worksheet in Section 10. A description of a methodology to generate the density factors can be found in the Brown et. al (2004) document mentioned above.

The estimate of carbon tons for the lying dead pool and the standing dead pool are summed with the tree pool for each sampled plot. This will provide the basis for determining the overall carbon ton estimate and descriptive statistics for the required pools. The overall carbon ton (per hectare) estimate of the required pools and the descriptive statistics are input into the worksheet in Step 10.

Example J: Quantification Example (Part V – Lying Dead Wood)

Lying dead wood is sampled on every plot. The chart below displays summary data for lying dead biomass for the first plot in Strata 1.

Strata 1										
Lying Dead Wood										
1	2	3	4	5	6	7	8	9	10	11
Plot	Log Number	Species	Large end Diameter	Small end Diameter	Total Length on plot (mt)	Density	Volume (cubic meters)	Biomass (kg)	Weight (per Hectare)	Total Biomass per Hectare
1	1	Tanoak	30	15	3.6	Rotten	0.6	24.0	25	600
1	2	Redwood	109	96	2.3	Sound	1.9	684.0	25	17,100
						Sum				17,700

The sampling method used in this example is a fixed area plot. The area sampled is a 1/25th hectare plot. The entries in the columns are similar to those already discussed for trees and standing dead trees. The volume in lying dead wood is calculated first and subsequently converted to biomass using the coefficients developed from the density sub-samples.

The sum of the per hectare biomass estimates from the tree, standing dead, and lying dead biomass are summed to determine the combined biomass estimate on Plot 1. The result of

summing this example is shown below.

Plot 1		
Carbon Pool	Biomass Sum per Hectare (kg)	Carbon Metric Tons per Hectare
Trees	433,405	217
Standing Dead	51,444	26
Lying Dead	17,700	9
Total Biomass	420,705	252

The biomass sums are multiplied by .5 to convert to carbon biomass and subsequently by 0.001 to convert to metric carbon tons, as described in Step 2 in the forest project protocols. This process is completed for all plots in Strata 1 and Strata 2. The sample results from Plot 1 indicate that there is 252 carbon tons per hectare.

Optional Pools

The carbon pools described in Steps 5 through 8 are not required by the Registry. As a consequence, they will not be certified. However, you may wish to report these carbon pool values in your annual Registry report and maintain your own accounting records and verification documents. The Registry may certify these pools in the future as the policies, science, and/or efficient measurement strategies are developed.

Step 5 - Estimate Carbon in Wood Products

Optional

The wood product pool is an optional pool for all forest projects. This pool applies only to projects that anticipate the removal of trees for conversion to a wood product. The recording of the wood products pool by the project developer does not imply ownership. It does establish a record of a carbon estimate that persists in wood products and is depleted over time through decay. Ownership of the carbon associated with wood products is considered a matter beyond the scope of the Registry.

The accounting of wood products should include only those trees harvested within the project boundaries. Trees harvested outside of your forest entity's physical boundaries shall not be counted as part of your wood product pool. Additionally, if your entity includes a manufacturing facility, the non-biological emissions of wood harvesting and processing must be recorded as part of entity emissions under the general reporting protocols and must be flagged as upstream and downstream effects associated with the project activity. If your entity does not include a manufacturing facility, you must provide a good faith estimate of the non-biological emissions associated with the manufacturing of the wood products carbon that you are reporting.

A harvest that leads to the production of wood products within your entity must occur for the wood products pool to have value. The carbon from harvested trees is transferred to the wood products pool in the year that it was harvested and must be accounted for in this manner. The timing of this is important to keep in mind for reporting clarity and proper

accounting. This initial carbon value is then reported with each subsequent annual report at a declining scale to account for the product’s decay until the value has been discounted to zero. Each year a harvest occurs, the amount harvested is added and then discounted at the appropriate decay rate as shown in the wood products worksheet below.

Process 1. Determine amount of carbon harvested and transferred to Wood Products Pool

This process applies to projects that have removed forest stocks for conversion to wood products in the reporting year. If you have no removals reported in the reporting year, you will go to process 3 to update removals from previous years. Your annual estimate for your wood products pool must be based on the current or most recent harvest volume reported to the Board of Equalization (BOE). The BOE reports will include a summary of harvested volume (board feet or cubic feet) by species delivered to the point of sale. This volume is multiplied by the pounds per thousand board feet (or cubic foot) values for each species shown in Table 5.1 below. An additional reference can be found in “Forestry Handbook, Second Edition, Wegner” (Table 4, page 582). This will enable you to obtain the total pounds of wood by species. Sum the weights for each species to get a total weight for all harvested wood. Multiply this total value by 0.5 pounds of carbon/ pound of wood to compute the total carbon weight, and then convert to tons of carbon (1 metric ton = 2,240 pounds). This value goes in Box 1 in the Worksheet below.

Table 5.1 Tree Species Weights @ 12 % Moisture Content

Species	Specific Gvty. MC 12%	Wt. / CuFt MC 12%	Wt./ MBF MC 12%
Alder, Red	0.41	28 lbs.	2330 lbs.
Aspen	0.38	26 lbs.	2170 lbs.
Cottonwood	0.35	24 lbs.	2000 lbs.
Maple	0.47	33 lbs.	2750 lbs.
Oak, Red	0.63	44 lbs.	3670 lbs.
Oak, White	0.68	48 lbs.	3920 lbs.
Walnut, Black	0.55	38 lbs.	3170 lbs.
Cedar, West.Red	0.32	23 lbs.	1320 lbs.
Cedar, Port Orford	0.43	29 lbs.	2420 lbs.
Cedar, Incense	0.37	---	---
Douglas fir	0.48	34 lbs.	2830 lbs.
Fir, White	0.39	27 lbs.	2250 lbs.
Hemlock, W.	0.45	28 lbs.	3000 lbs.
Pine, Lodgepole	0.41	28 lbs.	2330 lbs.
Pine, Ponderosa	0.40	28 lbs.	2330 lbs.
Pine, Sugar	0.36	25 lbs.	2080 lbs.
Pine, Western White	0.35	27 lbs.	2250 lbs.
Redwood, O.G.	0.40	28 lbs.	2330 lbs.
Spruce, Sitka	0.40	28 lbs.	2330 lbs.

Process 2. Accounting for mill inefficiencies

The conversion of logs to wood products has been estimated to be approximately 60% efficient. That is, approximately 60% of the delivered log volume is converted into wood product volume. The remainder is considered to be immediately decayed. Therefore, the worksheet below includes the weight deduction for mill efficiency. The calculation for mill efficiency is accomplished by multiplying the carbon tons from Process 2 by 0.60.

Process 3. Allocation of wood products to product class

This process applies to projects that have reported wood products values in previous years. In order to account for the decomposition of harvested wood over time, a decay rate is applied to wood products based on the half-life of carbon as determined by the wood product class. A single half-life (discount factor) must be used to calculate reportable wood products carbon value. The applicant can check with the mill where the logs are sold to determine the end use of the dimension lumber they sell (i.e., single family residence, furniture etc.) and placed in the appropriate row and column of the worksheet below. The annual reporting for a removal shall continue to the last year of the decay rate shown on the worksheet or if the project developer decides to discontinue the project. In the latter instance, the pool will be deemed to no longer contain any value.

Wood Products Decay Worksheet

This worksheet includes two different calculations regarding wood products and wood product decay. The first calculation allocates your carbon weight by wood product class. The second calculation determines the amount of carbon remaining from the previous year's wood product carbon classes after deducting a portion of the weight to account for wood decay and adds this value to the current year's product class values. Decay factors are based on the work of Row & Phelps (1996) and Skog & Nicholson (1998). The process of calculating and recording a wood products carbon provided in these protocols is strongly recommended. However, there are other existing methodologies developed and available to account for carbon in wood products. Several of these are listed in Annex E.

Table 5.2: Wood Products Decay Worksheet Part 1 (Current Year)

Metric Carbon Tons in Current Year's Wood Products from Process 1 above.										(1)
Accounting for mill inefficiencies from Process 2.above. Multiply the value in Box 1 by 0.60.										(2)
Allocate the end use of the total wood products by assigning a percentage for each class (A – K). Multiply value from (2) by percentages assigned below in order to separate wood products carbon into product classes. Insert values into boxes (3 A-K) below each corresponding product class. Values in (3A-K) are carbon (metric tons) in each product class for the current year and are added to total project carbon stores using a calculation below.										
A	B	C	D	E	F	G	H	I	J	K
Single-family houses (pre- 1980)	Single-family houses (post- 1980)	Multifamily houses	Mobile homes	Residential maintenance and repair	Nonresidential construction	Manufacturing	Shipping	Furniture	Railroad ties	Other solid wood use
(X%)	(X%)	(X%)	(X%)	(X%)	(X%)	(X%)	(X%)	(X%)	(X%)	(X%)
(3A)	(3B)	(3C)	(3D)	(3E)	(3F)	(3G)	(3H)	(3I)	(3J)	(3K)

Table 5.2 Wood Products Decay Worksheet Part 2 (Previous Year(s))

Insert previous year's wood product carbon pool values (e.g. values (4A-K for the year after a harvest event was first reported) in the appropriate boxes below.

Single-family houses (pre-1980)	Single-family houses (post-1980)	Multifamily houses	Mobile homes	Residential maintenance and repair	Nonresidential construction	Manufacturing	Shipping	Furniture	Railroad ties	Other solid wood use
(4A)	(4B)	(4C)	(4D)	(4E)	(4F)	(4G)	(4H)	(4I)	(4J)	(4K)

Apply the following formula to each of the wood product pool classes (A-K) to determine the carbon stores remaining in each wood product carbon pool. Use the values of the variables shown in the boxes below to complete the calculation. Place results in boxes (5A-K). These are the remaining wood product carbon stores that should be reported as a portion of the total project carbon stores.

For each wood product class (A – K):

$$\text{Total wood products carbon (tons)} = (X + Y) + [(X + Y) * \ln(0.5) / Z]$$

X = 3A Y = 4A Z = 80	X = 3B Y = 4B Z = 100	X = 3C Y = 4C Z = 70	X=3D Y=4D Z=20	X = 3E Y = 4E Z = 30	X = 3F Y = 4F Z = 67	X = 3G Y = 4G Z = 12	X = 3H Y = 4H Z = 6	X = 3I Y = 4I Z = 30	X = 3J Y = 4J Z = 30	X=3K Y=4K Z=30
(5A)	(5B)	(5C)	(5D)	(5E)	(5F)	(5G)	(5H)	(5I)	(5J)	(5K)

Sum of wood product classes 5A – 5K:

Step 6 – Estimate Carbon in Shrubs and Herbaceous Understory from Sample Plots

Optional

This pool is optional. Any methodology developed for measuring carbon in shrubs will need to be reviewed by certifiers. Annex E provides a reference that can be used for predict aboveground biomass of plant species in early successional forests of the western Cascade Ranges.

The estimate will be computed in terms of metric carbon tons. The mean metric carbon ton estimate for this pool will be adjusted based on its statistical confidence using Table 9.1. Both the mean estimate and the deduction is input into the Herbaceous Understory Section in the worksheet in Section E on a per hectare basis.

Step 7 – Estimate of Carbon in Litter and Duff

Optional

Litter is an optional pool. Litter is the dead plant material that can still be defined as leaves, grasses, and small branches. The largest material that can be considered litter is the minimum diameter stated in the methodology for lying dead wood. The duff layer is the organic material layer at the soil surface under the litter layer. The duff layer consists of dead plant materials that cannot be defined as leaves, grasses, and small branches.

The estimate will be computed in terms of metric carbon tons. The mean carbon ton estimate for this pool will be adjusted based on its statistical confidence using Table 9.1. Both the mean estimate and the deduction is input into the Litter and Duff Section in the worksheet in Step 9 on a per hectare basis. The Registry recommends the litter and duff sampling methodology prepared by Brown et. al (2004) that can be found in Annex E.

Step 8 – Estimate of Carbon Tons in Soil

Optional

Soil Carbon is an optional category. However, your project should include a discussion of anticipated effects of your project on soil carbon. As an option, you may still choose to account for this pool if you expect a significant increase in this category during the life of your project. However, it is good to keep in mind that changes in total soil carbon are a challenge to measure over short timeframes as this pool changes slowly and is usually dependent on the rate of biomass input relative to soil decomposition. The sampling methodology and protocols for deriving carbon estimates in soil will be developed as part of an overall sampling strategy (discussed in Step 2). The Registry recommends the soil sampling methodology prepared by Brown et. al (2004) that can be found in Annex E.

The estimate will be computed in terms of metric carbon tons. The mean metric carbon ton estimate for this pool will be adjusted based on its statistical confidence using Table 9.1. Both the mean estimate and the deduction is input into the Soil Section in the worksheet in Section E on a per hectare basis.

Step 9 – Account for Confidence of Estimates

Required

The Registry prefers all estimates of reported carbon pools, required or not, to have a high level of statistical confidence. Standards have been developed by the Registry for these pools. The standards are designed to reward project developers with stocks for carbon tons provided that they meet rigorous statistical protocols and confidence levels established by the Registry. Discounted stocks for reported carbon tons will be assigned to project developers whose statistical confidence levels are less than the desired standards. Minimum standards have also been set, which establish the baseline statistical confidence for a project to be considered.

All carbon estimates derived from sampling can be measured statistically in terms of the size of the Standard Error relative to the Estimate of the Mean. This establishes the Confidence Limits and can be expressed as a percentage of the Mean. Project level estimates will be evaluated at 90% Confidence Limits (1 Standard Error* 1.645 (t value for infinite degrees of freedom). Larger Confidence Intervals indicate that there is less confidence in the Mean Estimate than smaller Confidence Intervals. Table B displays the level of deductions assigned based on Confidence Intervals. The adjusted biomass estimate is determined by subtracting the deduction from the mean estimate.

Confidence levels will be determined for the combined estimate of the required pools (tree biomass, lying dead biomass, and standing dead biomass) derived from sampling and any of the optional carbon pools reported where the biomass estimate is derived from sampling. The mean estimate of all reported pools and the confidence deduction is input into the worksheet in Step 10.

Table 9.1: Biomass deductions based on level of confidence in the combined required pools (tree biomass, lying dead biomass, and standing dead biomass) derived from field sampling estimate.

Sampling Error no Greater than X% (Percentages Below) on Either Side of the Mean Estimate at the 90% Confidence Level (1 Standard Error *1.645)	Deductions to Required Pools (tree biomass, lying dead biomass, and standing dead biomass) derived from field sampling
0 to 5%	0%
5.1 to 10%	10%
10.1 to 15%	20%
15.1 to 20%*	30%
> 20%	100%
*Minimum Confidence Interval at 90% confidence limits accepted at the project level.	

Example K: Quantification Example (Part VI – Summing Plots, Determining Sampling Error, and Assigning Uncertainty Deduction.)

The same process is conducted for every plot in both vegetation types. The table below shows the summary results for each plot in each stratum. It also shows the average carbon ton estimate on a per hectare basis, the 90% confidence level, and the 90% confidence interval.

Stratum 1					
Plot #	Carbon Tons per Hectare	Plot #	Carbon Tons per Hectare	Plot #	Carbon Tons per Hectare
1	252	11	75	21	245
2	300	12	235	22	235
3	350	13	215	23	250
4	225	14	265	24	265
5	165	15	145	25	270
6	140	16	195	26	315
7	135	17	205	27	330
8	380	18	305	28	310
9	275	19	165	29	295
10	125	20	160	30	205
Average Carbon Tons					234
Sampling Error (90% Confidence Level)					22
Confidence Interval as a Percent of the Mean (90%)					9.4%
Stratum 2					
Plot #	Carbon Tons per Hectare	Plot #	Carbon Tons per Hectare	Plot #	Carbon Tons per Hectare
1	337	8	367	15	342
2	296	9	260	16	366
3	308	10	260	17	355
4	271	11	322	18	423
5	289	12	323	19	437
6	228	13	439	20	156
7	144	14	309		
Average Carbon Tons per Hectare					312
Sampling Error (90% Confidence Level)					31
Confidence Interval as a Percent of the Mean (90%)					10%

The weighted mean for the entire project area is 246 tons per hectare. The combined sampling error (90% confidence) is 19.4 tons per hectare, which is 7.9% of the mean. The estimate of total carbon stocks in the project area is 29,520 tons. This number must be adjusted for uncertainty prior to reporting it to the Registry. The deductions for uncertainty are shown in Table 9B of the Quantification Section of the Project Protocols. Since the 90% confidence limit for this estimate is 7.9% of the mean estimate, a 10% deduction is applied to the mean estimate. Hence, the reported total carbon tons for the project is 29,520 * 90%, or 26,568 tons.

Step 10 – Sum Carbon Pools

Table 10.1: Worksheet for Summarizing Carbon Pools and Calculating Total Carbon Weight

Carbon Pool	Required Pool?	Gross Carbon Tons per Acre	Confidence Deduction	Adjusted Carbon Tons per Acre	Adjusted Carbon Tons per Project
Steps 2 – 4 Trees, Standing Dead Trees, and Lying Dead Wood	Yes	From sampling results of trees, standing dead biomass, and lying dead biomass.	From Table 9.1	Gross Carbon Tons per Acre * (1-Confidence Deduction)	Gross Carbon Tons per Acre * (1-Confidence Deduction) * Acres in Project
Step 5 Wood Products	No	From Board of Equalization Reports and calculations explained in Step 5.	No deduction since it is not a sampling process	Estimate is on a per project basis	Same as value at left
Step 6 Shrubs and Herbaceous Understory	No	From sampling results of shrubs and herbaceous understory.	From Table 9.1	Gross Carbon Tons per Acre * (1-Confidence Deduction)	Gross Carbon Tons per Acre * (1-Confidence Deduction) * Acres in Project
Step 7 Litter and Duff	No	From sampling results of litter and duff.	From Table 9.1	Gross Carbon Tons per Acre * (1-Confidence Deduction)	Gross Carbon Tons per Acre * (1-Confidence Deduction) * Acres in Project
Step 8 Soil	No	From sampling results of soil.	From Table 9.1	Gross Carbon Tons per Acre * (1-Confidence Deduction)	Gross Carbon Tons per Acre * (1-Confidence Deduction) * Acres in Project
Sum of Adjusted Biomass from Optional Pools					
Total Carbon Tons/Project					

Example L: Quantification Example (Part VII – Summation of Carbon Pools)

Since only required pools were demonstrated in this example, there is only one record to complete.

Carbon Pool	Required Pool?	Gross Carbon Tons per Acre	Confidence Deduction	Adjusted Carbon Tons per Hectare	Adjusted Carbon Tons per Project
Steps 2 – 4 Trees, Standing Dead Trees, and Lying Dead Wood	Yes	246	10%	221.40	26,568
Sum of Adjusted Biomass from Optional Pools					0
Total Carbon Tons/Project					26,568

E. Use of models to estimate and forecast carbon stocks for project baseline and project activity

The Registry uses and permits the use of certain empirical-based models to estimate the carbon stocks of selected carbon pools within an entity's geographical area. They may also be used to forecast gains and/or losses in carbon stocks in your project forest area over time. These forecasts are necessary to estimate and report your project's baseline, which is based on your initial complete carbon inventory and project baseline characterization established in the preceding sections. While you are required to report the carbon from your project activity annually, the use of models may be used to forecast carbon stocks that would result from your project activity over time. The use of model projections in the latter scenario would complement your estimates derived from the required direct sampling of carbon stocks.

About models and their eligibility for use in the Registry:

Empirical-based models are used for estimating existing values where direct sampling is not possible or cost-effective. They are also used to forecast the estimations derived from direct sampling into the future. Field measurements provide the basis for inferring value through the use of these models.

Models used for producing estimates of carbon values provide two basic functions. First, they determine values for existing tree volume and correlated carbon stocks. These include equations that infer tree biomass from diameter measurements.

The equations provided in the preceding sections are pre-approved for use in the Registry. If project developers or forest entities would like to use equations that are different from those provided in this Protocol, such equations must be equivalent to or more accurate than those provided. This equivalency or greater accuracy must be demonstrated to the Certifier during the certification process. Also, the assumptions applied in the model must be transparent and made available to the Certifier.

The second function of models is the projected results of direct sampling through simulated forest management activity. These models, often referred to as growth simulation models, may project information regarding tree growth and mortality over time – values that must ultimately be converted into carbon in an additional step. Other models may combine steps and estimate tree growth and mortality, as well as changes in other carbon pools and conversions to carbon, to create estimated projections of carbon stocks over time.

These models must either be pre-approved by the Registry or meet certain criteria to be eligible for use in the Registry. Models that have been accepted by the California Department of Fire and Forestry Protection (CDF) through the approval of a long-term management plan are automatically considered pre-approved by the Registry. Such models include, but are not limited to:

- CACTOS: California Conifer Timber Output Simulator
- CRYPTOS: California Conifer Timber Output Simulator
- FVS: Forest Vegetation Simulator

- SPS: Stand Projection System
- VFP: Visual Forester Professional
- FREIGHTS: Forest Resource Inventory, Growth, and Harvest Tracking System
- CRYPTOS Emulator

Models that have not been pre-approved by the Registry may also be used, but entities must demonstrate to the Certifier that such models meet the following criteria:

- They have been peer reviewed in a process that: 1) primarily involved reviewers with necessary technical expertise (e.g. modeling specialists and relevant fields of biology, forestry, ecology etc.) and 2) was open and rigorous
- They must be parameterized for the specific conditions of the project and/or entity land area
- Their use has been limited to the scope for which the model was developed and evaluated
- They must be clearly documented to include the scope of the model, assumptions, known limitations, embedded hypotheses, assessment of uncertainties and sources for equations, data sets, factors or parameters, etc.
- They undergo a sensitivity analysis to assess model behavior for the range of parameters for which the model is applied
- They are periodically reviewed¹⁹

Use of models to forecast carbon stocks of project baseline and carbon stocks of project activity

The use of simulation models is necessary for quantifying the carbon stocks in your project's baseline and those that are expected to result from your project activity over time. Your project baseline should be the product of your project baseline characterization and complete carbon stock inventory accomplished in the preceding sections. This information should be incorporated into the simulation models so that you can create your project baseline as a projection of carbon stocks over time to complement the required direct sampling that is required in the monitoring process. The similar process should be executed to project carbon stocks over time for the project activity. If your model has the ability to convert biomass to carbon, it should include all the Registry required carbon pools. However, the carbon stocks for the wood products carbon pool should be forecasted separately, as this information is required to be reported separately by the Registry.

Your project baseline and activity carbon stocks should be portrayed in a graph depicting time in the x axis and carbon tons in the y-axis. Your project baseline and activity should have a common starting point (i.e., carbon stock total) at project initiation. The graph should be supported with written characterizations that explain any changes in carbon stocks in the project baseline and project activity from one year to the next. These characterizations should be consistent or supported by the baseline qualitative characterization and project additionality description that you performed in Part II.

¹⁹ Prisley, S.P., and M.J. Mortimer. General guidelines for forest carbon accounting models: a synthesis of literature on evaluation of models for policy applications.(In Press)

The projections from simulation models also support your annual reporting results. The Registry requires you to report your entity's forest carbon stocks and calculate any CO₂ emissions on an annual basis (see Section H for more information regarding the calculation of emissions). If you are not conducting direct sampling of all of your plots on an annual basis, you may use your reported baseline or simulated projections to report your annual carbon stocks, so long as it is supported by your annual monitoring reports (see section H) and any sampling that your entity has conducted for that year.

As discussed in Step 9, annual carbon stock estimates are discounted according to the level of confidence in the estimate. Where the *confidence deduction* in a particular reporting year results in the current year's estimates falling below the project baseline, reported stocks should be the same as the baseline. This condition should also be reported and explained to the Certifier. The forest entity will realize additional carbon stocks at the point the project activity stocks, less the deduction for confidence, exceeds the project baseline.

Please note that in instances where annual stocks estimates fall below the baseline for reasons other than the confidence deduction, the data should be reported accurately below the baseline.

F. Calculation of GHG Reductions or Emissions for Project

You must calculate your forest project's total GHG reductions or net CO₂ emissions (i.e., biological emissions) on an annual basis. All the forest projects reported pursuant to the FPP are eligible to report GHG reductions. The Registry defines GHG reductions broadly to include CO₂ removals and reductions, as well as prevented biological emissions. If, in fact, there were no reductions in a given year, but net biological emissions or no net change occurred between reporting years, this should also be calculated and reported. Please note that annually reported information is not officially considered an emission or GHG reduction until it is certified by a third party.

There are different ways that the Registry's forest projects can produce GHG reductions. Forest management and reforestation projects in the Registry produce GHG reductions by removing CO₂ from the atmosphere. On the ground, these removals would be reflected by a surplus of carbon stocks (as a result of the project), relative to the project baseline. This means that the required carbon pools that were selected and measured for the baseline and project scenarios upon project initiation would be the basis of the total GHG reductions calculated over time. Conversely, they may also indicate that net emissions or no reductions have occurred (e.g. if reported project activity shows no carbon gains or a decline in carbon gains over time).

Conservation projects in the Registry will produce GHG reductions by preventing the CO₂ emissions that would have occurred due to conversion to a non-forest use in the absence of the project. Similar to forest management and reforestation projects, GHG reductions for this type of project will be based on the difference between total carbon stocks of the project (i.e. the conserved forest) and the baseline (the converted use).

While the Registry's on-line reporting tool will calculate your project's GHG reductions and emissions once you report your project's carbon stocks, the following are the manual steps that may be taken to calculate project GHG reductions and emissions.

Steps to Calculate GHG reductions and biological emissions

As a general rule, GHG reductions and biological emissions are determined by the annual increase or decrease in your project's reported total carbon stocks (i.e., stock change accounting). The basic assumption underlying this approach is that both the project activity and project baseline start with the same amount of carbon stocks in the first reporting year based on the initial inventory.

On-site GHG reductions and Biological Emissions

The following are the steps to be taken to calculate your project's annual GHG reductions and emissions for your project's carbon pools that are on-site within your project's physical boundaries. At time zero of your reporting year, you need only to perform step 1. Starting in your second reporting year and each year thereafter, you would follow steps 1 through 3 to calculate your project's GHG reductions or emissions for that reporting year. If you wish to calculate your projects total GHG reductions for a given reporting year, you may also use the formula in Step 1.

1) Calculate your project's annual carbon stocks

Your project's carbon stock (PC) is calculated by subtracting the project's baseline carbon (BC) reported for that year from the project's activity carbon (AC) for the same year. At time zero of your first reporting year, PC should equal zero, since your project baseline and activity have a common starting point, or inventory. Over time, your project's PC should be a positive number to reflect that your project is accruing carbon stocks that can be calculated as GHG reductions.

$$AC - BC = PC$$

Example:

Your project was initiated in January of 2005 (time zero). At this point, your inventory of the project area indicates that you have a total of 500 tons of carbon. Both your AC and BC are equal to 500 tons of carbon because your project baseline and activity have a common inventory and starting point. As a consequence your project carbon (PC) at time zero is 0. In subsequent project reporting years, your AC could have a value of 700 tons of carbon. At this point, your PC would be equivalent to 200 tons of carbon.

2) Subtract your project's annual carbon stock total of the previous year from your project's annual carbon stocks reported of the current year

The difference in project carbon stocks between the current and previous reporting year will determine if your project has created any emissions (E) or GHG reductions (R) in that reporting year. If the difference is a positive number, your project has

produced GHG reductions over the past year. If the difference is a negative number, your project has produced emissions in the past year.

$$PC_2 - PC_1 = E \text{ or } R$$

Where 1 = PC from previous year and 2 = PC from current year

Example:

Your project's annual carbon stocks for 2006 is 75 tons. Its annual carbon stocks reported for 2005 were 50 tons. Your project has achieved 25 tons of GHG reductions for the 2006 reporting year.

If your reported project carbon stocks for 2006 were 25 tons, the difference would be a negative number, -25. In other words, your project caused 25 tons of emissions for the 2006 reporting year.

If you have had emissions in a particular reporting year, this does not necessarily mean that you have no GHG reductions to date. So long as your project's annual carbon stock (PC) calculation remains a positive number (after making any deductions from step 3), your project still has that amount of reductions for that particular year (please see next section for discussion on duration of reductions).

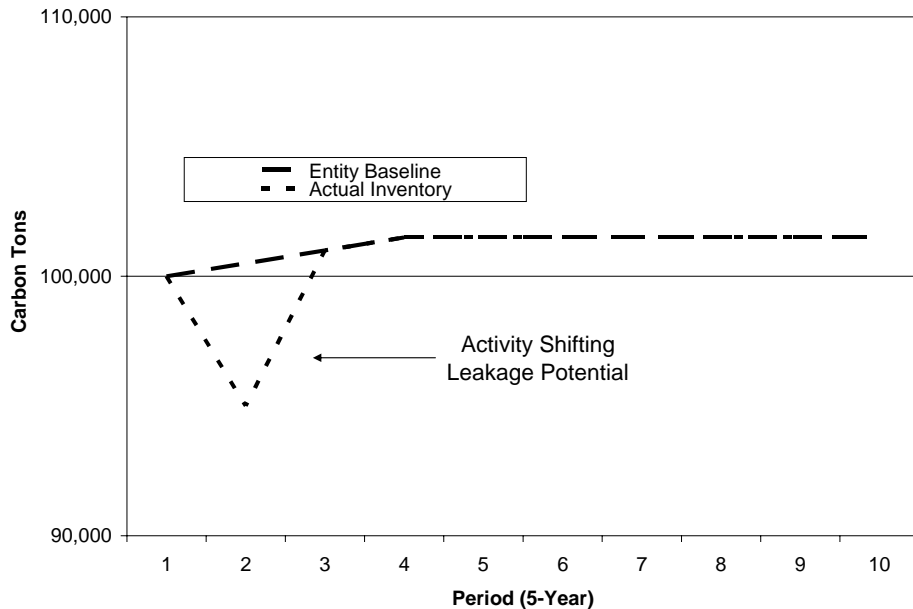
3) Subtract any on-site activity-shifting leakage

As discussed earlier in Part II, Section H, project developers are required to account for any activity-shifting leakage (AL) that occurs on-site (i.e., within entity boundaries), as the occurrence of leakage mitigates the value of GHG reductions. If your entity level annual report indicates a decline in carbon stocks relative to your entity baseline (if established) or the entity annual report of the previous year, you must calculate your activity-shifting leakage, unless one of the exceptions described below is applicable.

Your entity level annual reporting and entity baseline (if established) will serve as the basis for detecting and quantifying on-site activity-shifting leakage (see Chart 1). The establishment of an entity baseline, which you are strongly encouraged to do, will serve as the reference scenario against which annual reports of carbon stocks will be assessed. Any removals or reported declines in reported carbon stocks that deviate negatively from the baseline will be considered activity-shifting leakage unless you are able to demonstrate to the certifier that one of the exceptions listed below is applicable. The amount of leakage will be quantified as the difference between the carbon stocks reported for the baseline and the annual reported stocks. If you have not established an entity baseline, any reported annual carbon stocks at the entity level that show a decline from the previous year will be examined by the certifier to determine whether activity-shifting leakage has occurred. For more information regarding the establishment of an entity baseline, please refer to the Forest Entity Reporting Protocol (an appendix to the General Reporting Protocol).

Chart 1. Example of a comparison of an entity baseline (from projections of carbon stocks) to annually reported carbon stocks. The negative deviation of the annual

reported stocks from the projected entity baseline may be on-site activity-shifting leakage. Regardless of whether the negative deviation can be identified as activity shifting leakage or not, the deviation warrants further investigation to implement corrective actions.



Potential Exceptions to Presumption of Activity-shifting Leakage

There are several valid cases where negative deviations between annual entity reporting and the entity baseline may not be the result of activity-shifting leakage. The elements in these cases include inaccurate growth assumptions, inventory updates, and unforeseen natural disturbances. A negative deviation may also be the result of an overall management plan, in instances where an entity baseline is not established to show normal fluctuations due to planned management activity. The deviations may be the result of one of the above mentioned elements, or a combination of more than one element. The certifier will review the following exceptions with the project developer prior to making a leakage determination and quantifying activity-shifting leakage:

Inaccurate growth assumptions

Projections of carbon stocks in the entity baseline and project activity are based on growth models. Annual reported carbon stocks may reflect the carbon stock estimates of projections and, simultaneously, annual reported carbon stocks may exceed or fall below the projected carbon stocks if growth estimates used in the projections are overestimated or underestimated. Inaccurate estimates of growth may be due to an overstatement of site quality, a need to calibrate the model to local conditions, or to an inappropriate application of the growth model. Overestimated growth projections should be suspected if, within the same time period, the project developer did not exceed the projections of carbon removal (harvest) while estimates of carbon stocks decline below projections.

Inventory Updates

The forest protocols allow the use of plot data from sampling activities to be used if the sampling activity was performed within the last ten years. Sampling activities are likely to be an ongoing activity for most forest landowners. Sampling activities may take place to replace retired plot data or to increase or decrease the confidence in the inventory estimate. Adding plots may alter the original inventory estimate used in creating the entity baseline, even after adjusting the original estimate for growth. The degree of change will depend on the level of confidence that existed in the original inventory estimate. Additional plot data will have less of an effect with an inventory that has a high level of confidence than one that has a low level of confidence.

Natural Disturbances:

Fires, disease, and pests are examples of agents that reduce forest carbon stocks and are often beyond the control of humans. While not the result of activity-shifting leakage, the occurrence of such instances may play a role in reducing actual carbon stocks below predicted carbon stocks.

Overall Management Plan (applies only if an entity baseline is not established):

A decline in carbon stocks can also result from a harvest or removal that was intended as part of an entity's overall management plan and unrelated to a project activity. This exception will apply only in instances where an entity has not established an entity baseline. In this case, the project developer must provide to the certifier a management plan that has been filed with the state or other substantial evidence to indicate that a decline in entity carbon stocks is not a result of the project activity.

Assessment and quantification of on-site activity-shifting leakage shall be made annually. However, the certification of any occurrences of this activity-shifting leakage will correspond with the certification intervals, which occur at a minimum of interval of every six years.

If activity-shifting leakage on-site has occurred, use the following formula to calculate your annual emissions reductions or emissions:

$$PC_2 - PC_1 - AL = E \text{ or } R$$

Where AL = on-site activity-shifting leakage

Please note:

While the Registry does not require you to estimate off-site activity-shifting leakage, market leakage or other effects that may be associated with your project at this time, their occurrence could impact the integrity of your GHG reductions. External parties or other GHG frameworks may require that these types of leakage, if they occur, be deducted from any calculated GHG reductions.

4) Express your annual GHG reductions or emissions as carbon dioxide

As a last step, your reported annual change in carbon tons, whether they are emissions or reductions, should be expressed as tons of CO₂. To create the CO₂ equivalent for carbon, you must multiply the tons of carbon calculated in Step 2 or 3 (if applicable) by 3.666. For example, your 25 tons of reductions that were calculated in step 2 would be multiplied by 3.666 to produce 91.65 tons of CO₂ GHG reductions.

Duration or “permanence” of GHG reductions:

The GHG reduction formula, described above, calculates reductions that may have occurred over a given reporting year, relative to the previous reporting year. It does not, therefore, indicate the duration, or permanence²⁰, of those reductions. To reflect the duration of your project reductions you will need to demonstrate, through annual reporting, that your project is maintaining a consistent amount of additional carbon stocks over time. In other words, to demonstrate a consistent amount of reductions, your annual PC calculation should be consistent or demonstrate that a certain threshold of carbon stocks is being maintained by the project. For example, if you report your annual PC in 2005, 2006, 2007 and 2008 as 100 tons of C for each of those years, you are demonstrating that your 100 tons of reductions (366 tons of CO₂) have been reductions for 4 years. If your project were to maintain and report this amount as your PC for 100 years, your 100 tons of reductions would be considered reductions for 100 years.

In an alternative scenario, if you report your project’s annual PC in 2005, 2006, 2007, and 2008 as 100 tons, 150 tons, 200 tons and 250 tons respectively, the duration of your 100 ton reduction in 2005 would be 4 years. The additional 50 tons of reductions that were gained in 2006 would have a duration of three years and the additional 50 tons in 2007 would be two years. Finally the last 50 tons of reductions would have a duration of one year.

If a year of reporting to the Registry is missed, any existing reported GHG reductions will be deemed invalid.

²⁰ The protocols do not make a determination of what may be considered a “permanent” reduction. This decision may be made by external programs or processes.

Reduction adjustment

Your total GHG reductions must be adjusted upon the occurrence of certain events. If, following your project's direct sampling intervals, the results reveal that the project has not accumulated as much carbon as projected, your calculations of total emission reductions must be adjusted to reflect this lower number. Similarly, if third party certification reveals that your previous estimations undervalued the accumulation of net carbon stocks, you may want to adjust your total emissions reductions to include the increased amount. Similarly, if a catastrophic event or significant natural disturbance has impacted your project's forest carbon stocks, you will need to adjust your calculated emissions reductions and any projected results of your project activity (i.e. not the project baseline).

G. Monitor project annually to assess carbon stocks, project activity and activity-shifting leakage

As part of an ongoing assessment and reporting of a project's carbon stocks and project activities, you are obligated to monitor your project and entity area, if the entity area is larger than the project area. The purpose of the monitoring process is to assess the project's carbon stocks and any changes therein, confirm compliance with proposed project activity and assess any occurrences of activity-shifting leakage. This information is captured and assessed through the following processes: 1) submission of annual monitoring reports by the project developer to the Registry and 2) third party certification of the project over 5-year intervals, which is mentioned briefly in this section and described thoroughly in Part IV.

Direct Sampling:

As mentioned in earlier sections, direct sampling of your project's required carbon pools is required as part of the ongoing monitoring process. The use of projection models, discussed in the previous section, should be used as a complement to the direct sampling process. In general, direct sampling throughout the time the project is reported to the Registry may be conducted by the project developer on a rolling basis (e.g. approximately 8% annually) or on a periodic basis (e.g. 100% every 12 years), so long as all required carbon pools and their corresponding sample plots are sampled within twelve-year intervals, at least. *Please note that this direct sampling interval differs from the certification intervals (explained in next section).*

Direct Sampling upon Occurrence of Natural Significant Disturbance:

There are two exceptions to the standard direct sampling interval of ten years. If a significant natural disturbance or unplanned harvest/removal occurs within the project area, the affected area must be directly sampled within 3 years of the date of the disturbance or the next planned sampling of the affected area, whichever would occur first. A significant natural disturbance is any impact on the selected project carbon pools, including a catastrophic event, which results in an estimated loss of at least 20% of a project's total carbon stocks.

Your ongoing direct sampling should support the annual monitoring reports that you are required to submit to the Registry. The following information provides additional background regarding the required components of project monitoring.

Annual Monitoring Report:

On an annual basis, a project monitoring report must be submitted to the Registry (see Annex D). The purpose of this report is to report your estimated annual carbon stocks, attest that you are carrying out the intended project activities, and confirm that your project's carbon stocks are increasing or decreasing in accordance with initial projections.

Specifically, your annual monitoring report must include the following:

- *Carbon stock estimate:* Provide estimate of total carbon stocks in project area for the year being reported, including anticipated or unanticipated changes in the stocks due to disturbances. Depending on your inventory methodology and direct sampling intervals, these estimates may be based on direct sampling and/or modeled results.
- *Project compliance:* You are required to submit an annual written assurance that the project activities are being carried out, as described in the project description and the Project Protocol is being followed.
- *Disturbances:* The written report should list any disturbances (tree removals, natural significant disturbances etc.) that have occurred, the date of the disturbance(s), the extent of the disturbance, including whether it is a natural significant disturbance, and whether it was originally anticipated as part of the project activity. If direct sampling does not occur in the year of the disturbance, a good faith estimate of the loss in carbon stocks should be made and subtracted from the carbon stock estimate.
- *Leakage:* The report should include a declaration of whether any on-site activity-shifting leakage has occurred, a description of the type and scope of analysis that was performed to assess this leakage, as well as the quantification of any activity-shifting leakage that has occurred on-site. A good faith assessment of any off-site activity-shifting leakage must also be included (though not quantified).

Ultimately, the information gathered through this monitoring process should support any calculation of GHG reductions or emissions for the project. Annex D provides a template for the annual monitoring reports, the results of which you must enter into the Registry's online reporting tool, known as CARROT.

It is important to note that the annual monitoring reports will NOT be certified by your certifier. However, your certifier will review the information contained in the annual monitoring reports annually.

PART IV: REPORTING AND CERTIFYING YOUR PROJECT RESULTS AND GHG REDUCTIONS

Introduction

You must certify your forest project results regularly and submit your certified results to the Registry. Certification is mandatory for all required greenhouse gas (GHG) emission data (including forest carbon stocks) reported to the Registry. It is necessary to assess project performance and changes in carbon stocks over time and to test any earlier estimations made regarding increases or decreases in carbon stocks due to the project activity.

In addition to certifying your forest project every six years, you must also certify your entity level carbon stocks and biological emissions every six years. Your non-biological GHG emissions must be certified annually. *Please refer to the General Reporting Protocol for information on certifying your non-biological GHG emissions.*

A. Certification References

In addition to the information provided in this section, the key principles of certification and the complete certification process are described in the General Reporting Protocol. You should familiarize yourself with this chapter and the provisions therein. In addition, Annex A of the Registry's Certification Protocol contains guidance for how certifiers must conduct the certification activities for forest entities. You may find it helpful to familiarize yourself with this Annex as well to fully understand the certification activities related to the forest sector.

B. Rationale for Certification

The Registry's certification process requires you to hire an approved 3rd party certifier (listed on the Registry's website: www.climateregistry.org) to review and assess your reported required data to confirm that you have adhered to the Registry's reporting protocols and have compiled your GHG inventories accurately each year. This process is an integral component of the Registry's program. It helps to ensure the consistency and credibility of the GHG data reported across organizations, which, in turn enables the State of California to consider your certified GHG data if it is affected by regulation in the future. In addition, the certification process provides confidence to the public that the GHG information you report is accurate.

C. Transparency

The Registry requires complete GHG data transparency for all forest projects, since the carbon stock, GHG emissions, and certified emission reduction data will likely be of interest to and potentially used by a variety of stakeholders after it is reported to the Registry. To uphold this principle, forest entities must disclose all forest activities that may impact their C stocks (voluntary agreements/commitments, etc.) beyond the specific GHG data required by the Registry. Such transparency will help to ensure the environmental integrity of the data and assist stakeholders to better understand and interpret the GHG data resulting from the Registry's program. Please refer to the "Public Report for Forest Entities" in Annex A to see a sample of forest project data.

D. Contextual Overview of Certification in Project-level Reporting Process

The Registry's project-level process differs slightly from the entity level, as it includes an additional optional step – project prescreening. As mentioned earlier, you are advised to read through the GRP prior to reading the project protocol and this section. The following list provides an overview of the reporting process as context for the certification process for a forest project.

1. Design project
2. Assess if project meets reporting requirements (determine if it is eligible to be a Registry certified project)
3. Complete a project summary that describes the project
4. Submit project summary or eligibility worksheet to the Registry for pre-screening (optional)
5. If Registry OKs project, then proceed to next step, if not, then revise project to meet eligibility criteria
6. Initiate the project
7. Conduct direct sampling of the project activity
8. Report biological data to the Registry via CARROT
9. *Certify the project*
10. *Submit certification paperwork to the Registry*

E. The Certification Cycle and Direct Sampling

Direct sampling is a required component of the certification process. As described in the Part III, the project developer will undertake direct sampling in the monitoring process. As a part of the certification process, the certifier will also undertake direct sampling of a sub-sample of carbon inventory plots. This direct sampling by the certifier will represent all the carbon pools selected and measured for the initial inventory. The following paragraphs and table describe the certification cycle, as it relates to direct sampling and monitoring.

Certification cycle:

The standard required time intervals for a certifier's direct sampling of representative project sample plots is a minimum of every six years. If you wish to certify your GHG emission reductions from your forest projects on a more frequent basis (more than every 6 years), you are able to do so. Table C below outlines the time intervals for certification and the annual monitoring reports. While the Table reflects a twelve-year period, these intervals would extend throughout the life of the project.

Table C. Certification Cycle and Review of Monitoring Reports by Certifier

Year	Biological Emissions & C Stocks	Non-Biological Emissions
Year 1	Conduct assessment of C stocks and stock change resulting in emissions reductions	Annually conduct certification activities to assess non-biological GHG Emission Report. (See the GCP for guidance on the certification process for non-biological GHGs.)
Years 2 – 5	Review Annual Monitoring Report	
Year 6	Conduct assessment of C stocks and stock change resulting in emissions reductions	
Year 7 (Repeat Year 1)	Conduct assessment of C stocks and stock change resulting in emissions reductions	
Years 8 – 11 (Repeat Years 2-5)	Review Annual Monitoring Report	
Year 12 (Repeat Year 6)	Conduct assessment of C stocks and stock change resulting in emissions reductions	

Exceptions to standard certification sampling intervals:

There are two exceptions to the minimum project certification intervals outlined in the Table. The occurrence of a natural significant disturbance or an unplanned harvest/removal will trigger the need for certification at times other than the interval described. If a natural significant disturbance or an unplanned harvest/removal in the project area occurs within your project area, direct sampling of the affected area by the project developer and certifier is required to occur within 3 years of the date the disturbance or at the next scheduled certification, whichever would occur first.

The results of the certification of your project carbon pools will serve as a validation of any projected estimates of carbon stocks that have been reported to the Registry. Accordingly, if certification reveals that former estimations were inaccurate, the estimations should be adjusted to reflect the more accurate results. Moreover, any GHG reduction or emission calculations must be adjusted to reflect the more accurate values. Any models used for the projections should also be calibrated to create more accurate projections.

CERTIFICATION OF GHG EMISSION REDUCTIONS WILL ONLY RESULT IN A YEAR WHEN A FULL CERTIFICATION CYCLE OF YOUR PROJECT ACTIVITY IS COMPLETED.

F. Project Developer Certification Responsibilities

Overview of Responsibilities:

To implement and complete the certification process for your forest project, you must conduct the following five steps:

1. Review certification checklist and compile/organize information (see table below)
2. Review and finalize GHG data entered into CARROT
3. Hire certifier
4. Answer questions and supply requested information to your certifier as they review your monitoring report and/or conduct direct sampling certification activities
5. Discuss and understand the certification documentation that the certifier prepares for you

Review certification checklist and compile/organize data:

After you have entered your forest project information into CARROT, you can access a certification checklist online. This checklist will provide a list of documents you will want to have ready for your certifier, as they will likely request the information from you when they are conducting the certification activities. Reviewing this checklist in advance of meeting with your certifier will save you time and money, as you will be prepared to answer your certifier's questions when they arrive. A sample checklist is shown in Table D.

Table D. Sample Checklist: Documents to be Reviewed for Certification of a Forest Project

Identification of Emissions Sources	Documents
Emission Source/Carbon Pool Inventory	Map of forest entity that includes: Entity boundaries Acreage Latitude/longitude Existing land cover & land use Topography Forest vegetation Site classes Summary of applicable land use laws Project summary
Understanding Management Systems and Methodologies	
Responsibilities for Implementing Forest Management Plan	Organizational chart and Forest Management Plan or functional equivalent.
Training	Training or Policy Manual, Procedures Manual
Methodologies	All Protocols and/or calculation methodologies used (in addition to the Registry's General Reporting Protocol) Explanation of sampling plan (including stratification system if used) Documentation of any customized sampling or calculation methodology Documentation of baseline assumptions and calculations/projections, if appropriate
Verifying C Stocks and Emission Estimates	
Direct sampling	Forest entity's direct sampling results from sample plots
Annual monitoring reports	Copies of annual monitoring reports and supporting documentation
Model assessment	Predictions from models/stand plots Documentation on who ran the model, description of model, and source of model

Review and finalize GHG data entered into CARROT

Review the GHG data that you entered into the CARROT for the reporting year for both completeness and accuracy. Submit your data as “certification ready.” This will “freeze” your data, so that you cannot make any changes to the data without creating a new data revision. Once the data is “certification-ready,” it will be visible to your chosen certifier in CARROT.

Hire certifier

If you have not done so already, you should hire an approved certifier. Remember that your certifier must be approved as a “forest sector certifier.” You can enter into a multiple year contract with a certifier for up to 6 years, as stipulated in the General Reporting Protocol. However, given the structure of the certification cycle for biological emissions, the Registry strongly recommends entering into a 6-year contract with your certifier.

The State of California and the Registry will “approve” certifiers that are qualified to review your project on an annual basis. A forest sector certifier is a certification firm that has been approved by the State and the Registry as a “general certifier” that has also demonstrated its ability to assess your biological stocks and emissions and non-biological emissions. Consequently, you will only need to hire one certifier to review both your biological and non-biological information.

Approved certifiers and their contact information are listed on the Registry’s website (www.climateregistry.org). Please refer to the Certification Protocol if you need additional guidance in selecting a certifier.

Answer questions and supply requested information to your certifier as they review your monitoring report and/or conduct direct sampling certification activities

As your certifier conducts the certification activities, they will ask you questions and may require additional information from you.

Discuss and understand the certification documentation that the certifier prepares for you

If you are certifying your forest project, your certifier will prepare the following certification documentation for you:

- Certification Log—Specific Forest Project*
- Certification Log--Non-biological Inventory
- Certification Report
 - A certifier’s Certification Report to an organization may combine the certifier’s assessment of both the organizations biological stocks and emissions (biological inventory) and non-biological emissions. The Certification Report issued by the certifier will be a publicly available document for forest projects. However, it will remain a confidential document between the certifier and the reporting entity, with respect to entity-level reporting.
- Certification Opinion—Forest Project*
- Certification Opinion—Non-biological Inventory

You should discuss the certification documentation and the outcome of the certification activities with your certifier.

If the certifier finds material misstatements in your forest project, you may correct the sampling or calculation error, if possible, and re-certify your data. If it is not possible to correct the material misstatement in your forest project, then you must establish a new base year using the next year in which you have certifiable data.

Remember that your certifier cannot act as a consultant (as this is a conflict of interest), and therefore may not suggest how to correct any material misstatements. Your certifier can only identify areas that are not certifiable, and explain why.

Once your data is deemed certifiable by your certifier, you are ready to complete the reporting process.

PART V. COMPLETING THE REPORTING PROCESS

You are now ready to complete the Registry's reporting process. At this point you should have:

- Reported your forest project for the reporting year into CARROT
- Successfully completed the forest project certification activities
- Obtained Certification Logs, Certification Report, and Certification Opinions for your biological and non-biological inventories as well as for your forest project
- Obtained Confirmation from your certifier that they have completed your certification form in CARROT

You must do two final things to complete the annual reporting process:

1. Submit your GHG data for this reporting year to the Registry via the CARROT
2. Mail a hard copy of your Certification Log(s), Certification Report, Monitoring Report and Certification Opinions to the Registry

Once the Registry receives your submission and documentation, it will review your annual report. Upon acceptance of your annual report, the Registry will send you an email confirmation and mail you a certification certificate.

At this point, your aggregated GHG data for this reporting year will become available to the public via the CARROT.

Congratulations! You have successfully completed the annual reporting process!

PART VI: ANNEXES

ANNEX A Project References

Project Reporting Flow Chart
Project – Entity Reporting Comparison
Conservation Easement References
Conservation Easement Elements
Leakage Assessment
Leakage Mitigation
Selected Relevant Land Use Statutes and Regulations
Land Use Conversion Tables
Sample Public Report for Forest Entities

Project Reporting Flow Chart

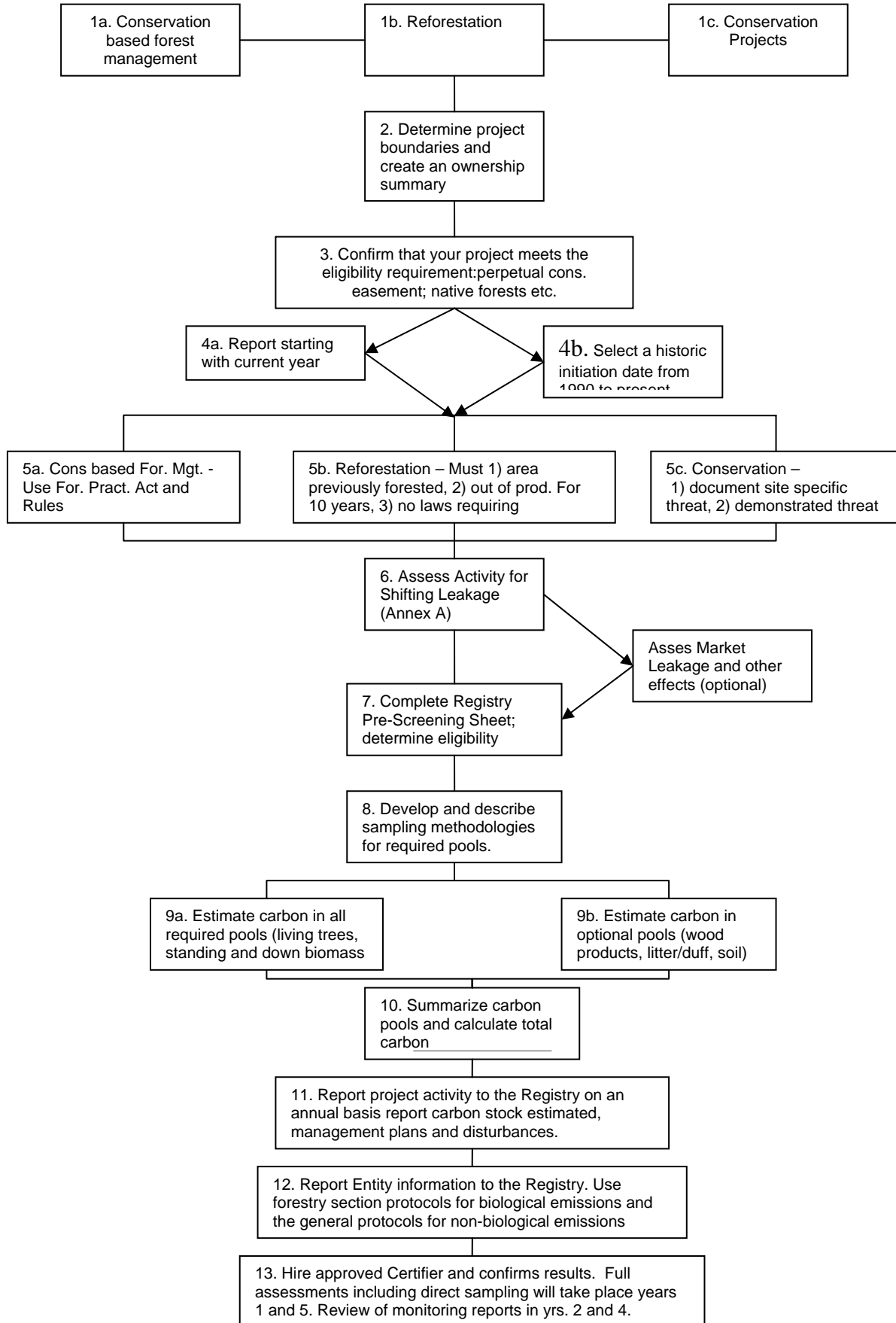


Table E. A Comparison of Entity and Project Reporting

Section	Entity Level Reporting (Forest Sector Protocol)	Project Level Reporting (Forest Project Protocol)
Definition	Forest entities are individuals or legally constituted bodies that own at least 100 acres of trees. Entity level reporting requires the forest entity to report all GHG emissions that the entity is responsible for, both biological and non-biological. Entity-wide reporting provides an overview of an organization’s emissions from all of its operations.	Forest projects are planned sets of activities that occur on portion or all of an entity’s forest area and are intended to achieve GHG reductions. A forest project should remove, reduce or prevent carbon dioxide emissions in the atmosphere by conserving and /or increasing onsite forest carbon stocks.
Geographic Area	Entities may report nationwide or California only. Non-biological emissions will be certified at both levels. Biological stocks/emissions can be reported at both levels, but are certified for CA only.	Projects can be reported and certified for CA only.
Baseline Requirements	At the entity level a baseline is optional but strongly encouraged. An entity may either create a baseline and track its carbon stocks against it or simply report carbon stocks on an annual basis.	At the project level a baseline is required and entities must track changes in carbon stocks (i.e. project activity) against that baseline.
Baseline Qualitative Characterization	At the entity level the baseline characterization is a long-term projection of an entities forest carbon stocks over one hundred years that is based on an entities forecasted management practices and goals.	At the project level the baseline characterization is a long-term projection of the forest management practices or activities that would have occurred (or absence thereof) within a in a defined area in the absence of the project. The baselines for vary by project type and are characterized by mandatory land use statutes and regulations, existing practices and/or threats of land use change as identified in the FPP.
Land Management and Environmental Co-Benefits	Forest entity reporting does not require that any specific land management objectives be met.	At the project level a forest entity is required to secure their project with a perpetual conservation easement and permanently dedicate the land to forest use. All forest projects are required to promote and maintain forest types that are native to the project area. In addition, forest management projects must use natural forest management practices.

Leakage	Analyzing the effects of leakage is not required at the entity level.	Activity-shifting leakage on-site that may have been created in the entity due to the project must be assessed. Reporting market leakage is strongly encouraged.
Certified GHG Reductions and Emissions	Changes in carbon stocks from year to year do not count as certified emissions reductions at the entity level. Emissions are measured over time as decreases in overall carbon stocks.	Emissions reductions can only occur at the project level through the removal or reduction of CO ₂ and prevented CO ₂ . GHG reductions are gains in carbon stocks over time measured as the difference between the project activity and the project baseline. GHG emissions are measured as any decreases in carbon stocks over time in the project activity.
Quantifications Section Statistical Confidence Intervals	For estimates of reported carbon pools, the standard error of the mean must be within 20% of the estimate of the mean for the estimate to be accepted by the Registry.	For estimates of the reported carbon pools, the sampling error at the 90% confidence interval must be less than 20% of the estimate of the mean for the estimate to be accepted by the Registry. Deductions apply to mean estimates of the carbon pools if the sampling error at the 90% confidence interval is 5% of the mean estimate or greater. A higher level of confidence is required at the project level because the carbon storage reported can be certified as GHG emissions reductions.
Quantifications Section Confidence Level Deductions	Deductions are not taken from volume estimates at the entity level.	At the project level, deductions based on the level of confidence of carbon inventory estimates. Project reporting requires more precision because carbon reported will qualify for certified GHG emissions reductions.

Conservation Easement References

The following web-sites and publications provide detailed information about conservation easements.

Easement Legislation

California Civil Code Sections 815 and 816- California legal requirements for conservation easements.

(<http://www.leginfo.ca.gov/cgi-bin/displaycode?section=civ&group=00001-01000&file=815-816>)

Federal Internal Revenue Code Title 26 USC 170(h) qualified conservation contribution- Federal tax law that permits conservation easements.

(<http://www.charitablesystems.com/C/C2-a011.html>)

Publications

Barret, Thomas S. and Stefan Nagel Model Conservation Easement and Historic Preservation Easement Land Trust Alliance, Washington D.C. 1996.

Land Trust Alliance, Conservation Options A Landowners Guide. Washington D.C., 1999.

Lind, Brenda, Working Forest Conservation Easements. The Land Trust Alliance, Washington D.C.

Gustanski, Julie Ann, H. Roderick Squires, Roderick H. Squires and Jean Hocker. Eds.

Protecting the Land: Conservation Easements Past, Present and Future. Island Press, 2000.

Web-sites:

California Forest Stewardship Program

<http://ceres.ca.gov/foreststeward/html/landowners.html#Anchor-Conservation-55669>

Provides information on private forest stewardship in California lands. The section titled Information for Landowners provides information on easements as well as other management topics.

Land Trust Alliance

<http://www.lta.org/consERVE/options.htm#easement>

Provides general information to landowners, as well as links to specific articles about conservation easements and publications created by the LTA for landowners.

The Nature Conservancy

<http://nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/>

Provides several different pages about conservation easements including information on how they evolved, myths about them, statistical facts about easements in the United States and example easements.

The Pacific Forest Trust

<http://www.pacificforest.org/services/easements.html>

Provides general descriptions of conservation easements, as well as real life examples of forest property owners in California, Oregon and Washington who have protected their lands through conservation easements.

Private Landowner Network

<http://www.privatelandownernetwork.org/plnpro/wfce.asp>

Provides articles and information on working forest conservation easements, as well as other private land issues.

Elements of a Conservation Easement
(Not for Execution)

The outline below provides some sample elements of a conservation easement. The elements listed below do not represent an exclusive list. The purpose of this outline is informational only. This outline should not be used to execute an easement. Those wishing to execute an easement are advised to seek professional assistance.

When recorded Mail To:

XXXXXX

DEED OF CONSERVATION EASEMENT

THIS GRANT DEED OF CONSERVATION EASEMENT is made this __ day of _____, 200__, by _____, having an address at _____ ("Grantor"), in favor of XXX, [a qualified entity], ("Grantee").

RECITALS:

Recitals create the basis/support for the easement, reflect public conservation values of the property and purposes of the easement

Example elements -

- A [Affirmation that both Grantor and Grantee are able to grant easement and hold easements respectively]
- B. *Required:* [Intent of the Grantor to grant easement that conforms with Section 42823 of the California Public Health and Safety Code]
- C. [Specific conservation values of property: natural, climate, ecological, cultural, educational, scenic, forested and open space, and public recreational values] *Note, these can be explained separately*
- D. [Conservation values officially recognized by the state and/or federal government].
- E. [Intent of Grantor to protect values by limiting certain activities/land uses]
- F. *Required:* [Intent of Grantor to sell or donate easement in perpetuity]

AGREEMENT

[This section includes the enforceable terms of the easement]

Grantor and Grantee ("the parties") mutually agree as follows:

1. Grant of Easement [Language whereby Grantor conveys easement to Grantee]
2. Acceptance of Easement. [Language indicating Grantees acceptance and commitment to carry out easement duties in perpetuity]
3. Purpose. It is the purpose of this Easement to: [list purposes consistent with conservation values as recited above, e.g. enhance forest's ability to store atmospheric carbon, protect habitat, etc.:]
Such purposes are consistent with and in accordance with the U.S. Internal Revenue Code, Section 170(h).
4. Rights of Grantee. [Language specifying certain rights granted to grantee in perpetuity to accomplish purpose of easement]
5. Prohibited or Restricted Uses. [Language may include general prohibition of uses that are inconsistent with easement purposes; Exhibit C can itemize specific prohibited uses]
6. Reserved Rights. [Language reserving certain use rights for Grantor, which may include forest management, among other things]
7. Mediation. [Language regarding how disputes between Grantor and Grantee may be resolved] *Note, other forms of dispute resolution, beside mediation, may be inserted.*
9. Grantee's Remedies. [Language regarding remedies that may be available to the Grantee in the event of an easement violation – e.g. injunctive relief, damages, emergency enforcement, scope of relief etc.]
10. Venue; Consent to Suit. [Language regarding choice of legal venue for addressing disputes]
11. Access. [Language may specific whether or not public access will be provided in the easement]
13. Costs, Legal Requirements and Liabilities. [Language regarding Grantor's responsibility to bear costs and liabilities associated with ownership of property. These responsibilities would include taxes and environmental matters, among other things].
14. Extinguishment. [Language regarding legal court process for extinguishing easement, in part or in whole, and costs associated with doing so]

15. Valuation. [Language regarding formula for determining market value of easement].
16. Condemnation. [Language regarding proportionate compensation to Grantor and Grantee in event of condemnation of easement property].
17. Amendment. [Language governing process and scope of any amendments to easement].
18. Assignment. [Language regarding ability to assign easement to another qualified entity].
19. Executory Limitation. [Language regarding back-up grantee in event Grantee ceases to exist].
20. Subsequent Transfers. [Language regarding Grantor's responsibility to incorporate terms of easement in subsequent transfers of interests in easement property].
21. General Provisions. [General language regarding interpretation of easement agreement, e.g., controlling law, liberal construction, severability, access to counsel, joint obligation etc.]

TO HAVE AND TO HOLD unto the Grantee, its successors and assigns forever.

WITNESS the following signatures:

DATED: _____ GRANTOR: _____
[Name]

DATED: _____ GRANTEE: _____
[Name]

BY: _____

Schedule of Exhibits:

A. Legal Description of Property

B. Index to the Baseline Report

[Specific language of property conditions and conservation values]

C. Restrictions

[This section may include specific use restrictions of the easement]

Standardized Questions for Initial Leakage Assessment at Project Initiation

For each forest project, please answer the following questions:

Activity-Shifting Leakage (Required)

1. Do you expect your organization's biological forest carbon stocks outside of the forest project boundary, but inside your forest entity boundaries, to change as a direct result of the forest project? If yes, please explain.
2. Is it possible that the forest project may cause another entity to change its operations or business activities in a manner that results in increases or decreases in carbon stocks or CO₂ emissions? If so, please explain how and to what extent, if possible.
3. If the answer to #2 is yes, will these potential stock and/or emissions be monitored? If yes, how?

Market Leakage (Optional)

1. Will the project activity result in an increase or decrease in the production of commercial products? If yes, please estimate the amount of the increase or decrease in production.
2. Will this project result in an increase or decrease in the availability of land (e.g. for development of agriculture or other commercial use)? If yes, please explain the extent.
3. If the answer to either question 1 or 2 is yes, will this change likely result in a change in the market? Please describe the potential market impacts.
4. Please state the volume of timber foregone due to the project (designate green or dry):
5. What type of timber will be foregone?
Softwood _____
Hardwood _____
6. What is the current market price per ton of wood types?
7. What would the likely wood product categorization of the total timber foregone have been (as a %) ?
Pulp and Paper _____ %
Sawtimber (speciality) _____ %
Sawtimber (generic) _____ %
8. What is the relative carbon density of the stand (tons/ha or tons/acre)?

Leakage Mitigation through Project Design

Conservation-based Forest Management

A project that creates carbon benefits by harvesting less timber may decrease timber supply. There are two types of leakage that may result:

1. Activity shifting if companies use project income to increase harvests elsewhere; and
2. Market leakage if decreased harvests are replaced by increased harvests on other lands.

The California Registry requires entity-wide reporting, which should be able to capture whether harvests are being increased outside the project boundary. The forest entity should provide, in the leakage assessment, an explanation of how this will be prevented. Although it can be difficult to offset market leakage, lost timber output can be replaced by developing alternative timber sources such as plantations on marginal land or by introducing sustainable harvest in buffer areas.

Reduced impact logging, enhanced timber management – A project which creates carbon benefits by reduced impact logging and enhanced timber management may not decrease timber supplies. Therefore, there is little risk for negative leakage. If practices are adopted outside the project boundary, there could be positive leakage. If possible, the project should be designed to encourage the adoption of sustainable technologies and practices outside the project boundary.

Reforestation

A project which plants trees on land may displace activity that was occurring on the land prior to the initiation of the project. The project should identify the previous land use (e.g., ranching, agriculture, abandoned clear-cut lands) to assess leakage potential.

Reforestation projects should focus on marginal lands, where there is low, or no significant production of commercial goods occurring on the land. This way, taking the land out of production will not cause large market impacts.

If relevant, the project could include sustainable agricultural production or ranching within the boundaries of the project to offset loss in production

Where the forest entity initiates reforestation on land it already owns, the entity-wide emissions reporting should capture displacement of prior activity that occurs within California. In the case where the forest entity has purchased land to reforest, the project could create contracts or pledges with the previous landowner not to use project income to increase emissions elsewhere.

Conservation

A project, which prevents deforestation, from occurring may displace activity that was projected to occur on the land. The project should identify the land use that was likely to occur in the absence of the project (e.g., ranching, agriculture, harvesting) to assess leakage potential.

If land is abundant and demand is high, leakage may be difficult to prevent. If land is scarce, it will be more difficult to completely displace activities to other areas of land.

The project could provide some education and outreach to local communities and government on smart growth and sustainable development.

Leakage from preventing development is somewhat difficult to address on a project-by-project basis. It is far more effective to address leakage at the state level, through improved land use regulations and smart growth initiatives.

Selected Relevant State and County Land Use Regulations

This annex is a reference for the development of forest project baselines. It provides brief descriptions and web-site links, where available, to state and county level land use statutes and regulations that may support a baseline characterization as well as additionality analyses. The following information is only an overview of selected information and is not comprehensive. Therefore, additional research and information is likely needed to completely develop an accurate baseline.

I. California State Regulations

A. Z'Berg-Nejedly Forest Practices Act

http://ceres.ca.gov/env_law/fpa/stat/

Article 5. Resource Conservation Standards

4561. Stocking standards; management; exemption. It is the purpose of this section to set forth resource conservation standards for timber operations, and to insure that a cover of trees of commercial species, sufficient to utilize adequately the suitable and available growing space, is maintained or established after timber operations.

To that end, the following resource conservation standards define minimum acceptable stocking, and an area covered by a timber-harvesting plan shall be classified as acceptably stocked if either of the following conditions exist within five years after completion of timber operations:

- (a) The area contains an average point count of 300 per acre, except that in areas which the registered professional forester who prepares the timber-harvesting plan has determined are site IV classification or lower, the minimum average point count shall be 150 per acre. Point count shall be computed as follows:
 - (1) Each countable tree which is not more than four inches in diameter at breast height to count as one.
 - (2) Each countable tree over four inches and not more than 12 inches in diameter at breast height to count as three.
 - (3) Each countable tree over 12 inches in diameter at breast height to count as six.
- (b) The average residual basal area, measured in stems one inch or larger in diameter is at least 85 square feet per acre, except that in areas which the registered professional forester who prepares the timber harvesting plan has determined are site II classification or lower, the minimum average residual basal area shall be 50 square feet per acre.

The board, on a finding that it is in furtherance of the purposes of this chapter, may encourage selection, shelterwood, or other types of management of timber where consistent with the biological requirements of the tree species and may regulate the size and shape of areas in which even-age management of timber is utilized.

Timberland harvested between January 1, 1974, and the adoption of stocking standards pursuant to this chapter shall be classified as adequately stocked if, as a result of stocking which has taken place subsequent to such harvest, the minimum standards specified in this section are met.

Rock outcroppings and other areas not normally bearing timber shall not be considered as requiring stocking and are exempt from such provisions.

4561.3. Acceptably stocked area classification. Notwithstanding the provisions of Section 4561, on any commercial timberlands which the department has determined do not meet the minimum acceptable stocking standards prior to any timber harvest activities which may take place on such lands between the effective date of this chapter and the adoption of permanent stocking standards pursuant to Section 4561.5, an area shall be classified as acceptably stocked if, as a result of restocking which has taken place subsequent to such harvest, it contains at least five countable trees for each tree which has been harvested.

4561.6. Stocking standards applicable to operations damaged by disaster; adoption; extension of stocking time; considerations. Notwithstanding the provisions of Sections 4561 to 4561.5, inclusive, the board shall adopt rules prior to January 1, 1976, which specify standards of stocking to be maintained or established after timber operations on timberlands which have been substantially damaged by fire, insects, disease, wind, flood, or other substantial damage caused by an act of God, and may provide for an extended period of time during which stocking must be properly completed on such timberlands. In developing such standards the board shall consider circumstances that affect the feasibility of restoring the productivity of such timberlands.

4562. Fire protection zone rules. In order to reduce the incidence and spread of fire on timberlands, the board shall adopt rules in the fire protection zone as such zone is defined by the board, including, but not limited to, land along either side of the rights-of-way along public roads in widths to be determined by rule by the board in various areas, and in such other areas as the board deems necessary, to govern the disposal of solid non-forest wastes and slash created by timber operations.

B. California Forest Practice Rules, District Regulations

<http://www.fire.ca.gov/ResourceManagement/pdf/FPR200201.pdf>, Article 13

Within the State of California there are three forestry districts, the Coast Forest District, Northern Forest District and Southern Forest District, that provide special forest practice rules for their regions. Listed below are the District regulations listed by county.

1. Coast District County Rules

925 Santa Clara County

925.8 Public Road Buffer Zone- There shall be a buffer zone of 200 ft. from public roadways. All logging roads, tractor roads, and landings shall be shielded from view to the extent feasible by leaving trees and vegetation undisturbed

926 Santa Cruz County

926.8 Fuelwood Operations: Concerning the harvest of fuelwood on more than three acres this provision defines minimum impact. Among other requirements minimum impact is defined as no timber operations on slopes of 60% or more, in special treatment areas, within watercourse or lake protection zones, on unstable soils, within 500 feet of active nesting sites of rare or endangered bird species or in areas of high or extreme erosion.

926.25 Special Harvesting Methods- Modifies the harvesting limitation, re-entry period and leave tree standards of 14 CCR 913.8 subsection (a)

- Provides specific requirements for re-entry period depending on harvest percentages and dbh of trees harvested

927 Marin County

927.6 Public Roads Buffer Zone- Requires that all logging roads, tractor roads and landings located within 200 feet of a public road be screened from direct public view to the extent feasible by leaving trees and vegetation between disturbed areas and public roads.

927.9 Silvicultural Methods and Treatments- Sets standards for commercial thinning intermediate treatment or the selection method. Sets percentages of trees based on dbh that must be left after harvesting is completed.

927.10 Stocking Standards Marin County- Stocking standards for understocked timberland and substantially damaged timberlands as provided by 14 CCR 1080 through 1081.1 and 1085 through 1085.6. Sets basal area and point count standards

927.13 Buffer Zones within the Marin County Recreation Corridor- Requires that buffer zones adjacent to designated coastal highways will be at least 200 ft., but no more than 350 ft. A buffer zone of 200 ft. shall also run adjacent to all national, state, regional, county and municipal parks.

2. Northern District County Rules

945 Lake County

945.3 Timber Harvest Prescriptions- Sets criteria for areas within Scenic Combing Zones. Prohibits group selection method harvesting and sets requirements for stocking levels based on dbh and % of trees to be retained.

3. Southern District County Rules

965 Monterey County

965.6 Big Sur Coast- sets limitations on Timber Harvest Plans that lie within the area of the Big Sur Coast Land Use Plan

II. County Level Regulations and Zoning Codes

County Code- county level regulations covering a wide array of topics

County Zoning Code- specific land zoning regulations required by the county

Zoning Districts- a list of the established zones in the county

County Provisions from the California Forest Practice Rules- several counties have additional forestry requirements that go beyond State regulations, which are listed in the California Forest Practice Rules

Alameda – County Zoning Code

http://www.co.alameda.ca.us/admin/admincode/Alameda_County_General_Ordinance_Code/Title_17/index.html)

Zoning Districts

http://www.co.alameda.ca.us/admin/admincode/Alameda_County_General_Ordinance_Code/Title_17/02/060.html)

No zoning districts referred to forestlands or timber and the primary zoning districts are residential.

Alpine – County Zoning Code

(http://elib.cs.berkeley.edu/cgi-bin/doc_home?elib_id=2058)

Zoning Districts: chapter 18.12

- 18.16 Agricultural Zone- permits agricultural uses, does not refer to trees or timber
- 18.20 LP Land Preserve Zone- permitted uses include agriculture, and private undeveloped open space dedicated to remain undeveloped
 - o applied to lands that have used up density and intensity allowances specified in the general plan (see Sec 18.04.020)
- 18.24 Timber Preserve Zone- permitted uses include the growing and harvesting of forest products, operations for appropriate management of fish and wildlife, and grazing
 - o Requires compliance with state laws and a ten-year commitment to use the land for timber.
- 18.28 PD Planned Development Zone- provides for development and open space
 - o Requires that planned development be clustered in the least sensitive portion of the land parcel. The undeveloped parcel containing scenic, wildlife or other values shall be retained as open space by deed restriction, parcel or subdivision map notation and by land preserve or timber preserve zoning. (Ord. 453 § 9.01, 1985)
- 18.60 Design Review/ Scenic Highway Combined Zone- any use will be allowed as long as it will still protect and preserve the scenic and aesthetic characteristics of the parcel.

Amador – County Code

(<http://municipalcodes.lexisnexis.com/codes/amadorco/>), **Title 19-Zoning**

Zoning Districts

(http://municipalcodes.lexisnexis.com/codes/amadorco/ DATA/TITLE19/Chapter_19_12 DESIGNATION OF DISTR/ 19_12_010 Established .html)

- 19.24.035 Timberland Preserve Zone TPZ Districts- permits the growing and harvesting of timber, management for watersheds, and management for fish and wildlife habitat for hunting and fishing
 - o Requires compliance with state laws and a ten-year commitment to use the land for timber.
 - o Requires that the parcel be no less than 40 acres and the land be classified as Class 1-V for pine, and mixed conifer regions
- 19.24.036 Exclusive Agriculture AG Zones- permits the growing and harvesting of timber without a use permit

Butte – Butte County Resource Conservation District Long Range Plan and Annual Plan (<http://www.buttecounty.net/rcd/policies.htm>)

Zoning Regulations (<http://www.buttecounty.net/dds/planning/archive/zoning.htm>)

Zoning Districts (<http://www.buttecounty.net/dds/planning/archive/zoning.htm - article3>)

- Section 24-90 Agricultural Zones- permitted uses include the growing and harvesting of forest products

- Section 24-110 Foothill Recreation Areas- permitted uses include the raising and harvesting of trees and agricultural and forestry experimental areas
- Sec 24-185 Commercial Forestry Zone- permitted uses include management of the land and forest for the growth, harvest and production of trees
- Sec 24-190 Timber Mountain Zone- allows the management, raising, harvesting and removal of trees
- Sec 24-195 Timber Preserve Zone- Permits the growing and harvesting of timber and requires compliance with state laws.
- Sec 24-220 R-C Resource Conservation Zone- permits agricultural uses, natural wilderness and study areas and preserves for native fish, birds and wildlife
 - o Use requiring a use permit includes preserves for non-native species
- Sec 24-235 WP Watershed Protection Overlay Zone- protects the county's watershed as a public resource.
 - o Lists restrictions on lot and parcel sizes and zoning distinctions in the Firhaven Creek Watershed, Magalia Reservoir, and Paradise Reservoir

Calaveras – County Code:

[\(http://ordlink.com/codes/calaveras/\)](http://ordlink.com/codes/calaveras/)

Zoning Code- Title 17

[\(http://ordlink.com/codes/calaveras/_DATA/TITLE17/index.html\)](http://ordlink.com/codes/calaveras/_DATA/TITLE17/index.html)

Zoning District:

[\(http://ordlink.com/codes/calaveras/_DATA/TITLE17/Chapter_17_08_ZONES_ESTABLISHED_/17_08_020_Base_zoning_distric.html\)](http://ordlink.com/codes/calaveras/_DATA/TITLE17/Chapter_17_08_ZONES_ESTABLISHED_/17_08_020_Base_zoning_distric.html)

- Sec. 17.12 General Forest (GF) Zone- performance standards requirements of the Southern District Forest Practices Act shall apply to all timber harvests
- Sec. 17.14 Timber Production Zone- timber operations are subject to the provisions of the Southern District Forest Practices Act and must meet state regulations.
- Sec 17.16 General Agriculture (A1 Zone)- permitted uses includes accepted timber practices
- Sec 17.18 Agricultural Preserve (AP Zone)- permitted uses include accepted timber practices
- Sec 17.20 Residential Agriculture (RA Zone)- permitted uses include accepted timber practices
- Sec 17.58 Environmental Protection (EP) Combining Zone- If there is significant botanical habitat on the land, no ground disturbance around rare or sensitive plants is allowed without an approved conservation plan. In significant wildlife habitats, grazing, ranching, farming, and accepted timber practices are allowed. (Ord. 2345 §3 Exh. A(part), 1993)
 - o 17.58.060 Performance Standards- In both significant wildlife areas and significant botanical areas, an open space easement, as required in the Williamson Act, or other actions to preserve habitat are encouraged.

Colusa – County Code

<http://www.colusacountyclerk.com/pdf/index.html>

Zoning Code

http://www.colusacountyclerk.com/pdf/Chapter_98/1.html

None of the zones refer to forestlands or timber and the zones are a mixture of residential, commercial and agricultural.

Contra Costa – County Code:

(<http://www.ordlink.com/codes/ccosta/>)

Zoning Ordinance:

(<http://www.ordlink.com/codes/ccosta/ DATA/TITLE08/index.html>)

- 84-38, 84-40, 84-42, 84-80: A-1 Light Agricultural, A-2 General Agricultural, A-3 Heavy Agricultural, Agricultural Preserve and Exclusive Agricultural- all permit agricultural uses that include forestry
- 816 TOV Tree Obstruction of Views Combining District
- 816-4 Heritage Tree Preservation District- any tree of 72 inches or more in circumference or any tree that is determined to have a historical or ecological significance cannot be destroyed or removed
- 816-6 Tree Protection and Preservation- prohibits the removal or destruction of protected trees
 - o 816-6.6004 provides description of tree species and other requirements for protection

Del Norte – County Code

(http://elib.cs.berkeley.edu/cgi-bin/doc_home?elib_id=2327)

Zoning districts: Chapter 21.06

- 21.08,21.09,21.10- AE Agricultural Exclusive District, A Agriculture General District, and A1 Agricultural Industrial District- allow all agricultural uses including crop and tree farming
- 21.11 RCA1 General Resource Conservation Area District- includes environmentally sensitive habitat areas including wetlands, farmed wetlands, riparian vegetation, estuary and coastal sand dunes
 - o Permits fish and wildlife management, nature study and fishing and hunting.
 - o 21.11.040- Uses permitted with a use permit includes wetlands restoration per Sec. 21.11A.070
- 21.11A CA2 Designated Resource Conservation Area District- includes areas such as wetlands, farmed wetlands, riparian vegetation, estuary, coastal sand dunes and wetlands buffer areas
 - o All areas listed above permit nature study, fish and wildlife management, hunting and fishing.
 - o Wetlands buffer areas permit commercial timber harvesting pursuant to the California Department of Forestry timber harvest requirements.
 - o Riparian areas permit commercial timber harvest of conifers pursuant of the California Department Forest Practice Rules for special treatment areas and stream protection zones where:
 - a) heavy equipment is not used and
 - b) at least 50 percent of the coniferous tree canopy and all of the hardwood tree canopy is retained
- 21.13 TPZ Timberland Preserve Zone District- permits the growing and harvesting of timber. Land must be used for this purpose for a minimum of ten years

- 21.13.035 Uses within resource conservation areas- If part of the parcel is designated as a resource conservation area, the extent and type of environmentally sensitive habitat shall be determined prior to development. No re-zoning is required.
 - Uses within such environmentally sensitive habitat areas shall be as set forth in sections 21.11A.030 and 21.11A.
- 21.13.040- The accessory uses of management for watershed and management for fish and wildlife habitat are deemed compatible with the growing and harvesting of timber, provided they do not significantly detract from the use of the property for harvesting timber
- 21.14 CT Coastal Timber Zone District- protects forested lands within the California Coastal Zone which have not been designated as TPZ zones but which are considered to be of commercial value. Areas must be forested areas of Class III or better timber in a parcel of 20 acres or more
 - Permitted uses include the growing and harvesting of timber. Accessory uses include the management of watersheds and the management of fish and wildlife habitat.

El Dorado- County Code:

<http://66.113.195.234/CA/El%20Dorado%20County/index.htm>

Zoning Code: Title 17

- Sec. 17.28 – Residential Districts – R1, R1A, R2, RM and RT allow public parks as a land use; RE-5 and R3A allow tree crops. The same applies to Tahoe Residential Districts (TR1, TR1A, etc.), except public parks not allowed in TRM or TRT)
- Sec. 17.30 – Residential Agricultural Districts – RA-20, -40, -60, -80 and -160 allow tree crops.
- Sec. 17.32 – Commercial Districts – C, CP and CG allow public parks as a land use (also allowed in TCG districts).
- Sec. 17.34 – Industrial District – Allows public parks as a land use. (TI allows tree crops.)
- Sec. 17.36 – Agricultural Districts – A, AE, PA and SA-10 allow tree crops. AE allows timber production, as well as uses compatible w/ Land Conservation Act of 1965. (TA allows tree crops; TAE allows tree crops and timber production.)
- Sec. 17.42 – Transportation Corridor District – Timber production allowed w/ special use permit.
- Sec. 17.44 – Timberland Preserve Zone District – Timber production, watershed management, and fish and wildlife habitat management allowed. Further management plan and stocking specifications listed in Sec. 17.44.070.
- Sec. 17.46 – Mineral Resource District – Tree crops allowed.
- Sec. 17.48 – Recreational Facilities District – Tree crops allowed.
- Sec. 17.50 – Planned Development Districts – Any use allowed pursuant to approval of development plan.
- Sec. 17.68 – Open Space District – Allows timber production and tree crops.
- Sec. 17.70 Conservation Districts – Purpose is to provide for resource conservation needs of the county, including w.r.t. water, habitat, and fiber production. Timber operations allowed.
- Sec. 17.71 Ecological Preserves

- Sec. 17.72 Environmental Impact Reports – Addendum to state EIR process as required by CEQA.

Fresno – Zoning Code

(http://elib.cs.berkeley.edu/cgi-bin/doc_home?elib_id=2517)

- Sec. 813 – Resource Conservation District – Permits timber harvests, management for watershed, fish and wildlife habitat and wildlife preserves.
- Sec. 814 – Timberland Preserve Zone District –Permits timber harvest, management for watershed, fish and wildlife habitat and wildlife preserves.
 - o Refers to the state standards and requires a ten year commitment to growing and harvesting timber.
- Sec. 815 – Open Conservation District – Permits agriculture, wildlife preserves, forest preserves.
- Sec. 816, 817, 819, 839 & 847 – Exclusive Agricultural District, Limited Agricultural District, General Agricultural District & Agricultural Commercial Center District, Agricultural District – Permit tree and other plant crops and horticulture (as a secondary occupation).
- Sec. 820, 821, 822, 823, 840, 842, 843, 844, 845, 849 – Rural Residential District, Single Family Residential-Agricultural District, Single Family Residential Districts, Single Family Residential Estate Districts, Rural Commercial Center District, Commercial and Light Manufacturing District, Light Manufacturing District, General Manufacturing District, Heavy Manufacturing District, Rural Settlement District - Permits agricultural uses
- Sec. 848 – Recreational District – Permits forest and lookout stations, parks and agricultural uses

Glenn – County Code

(<http://www.countyofglenn.net/common/countycode.asp>)

Zoning Code: Title 19 of County Code

Zoning Districts: 19.26.040

- 19.29 TPZ Timberland Preserve Zone- permits management for watershed, management for fish and wildlife habitat or hunting and fishing,
 - o To be zoned as TPZ must meet “List A” as defined in Sec. 51110 of the Government Code, meet “List B” as defined in Sec. 51110.1 of the Government Code or meet the criteria to be listed as timberland in Sec. 51113
 - o Any rezoning, immediate rezoning or removal from a zone of any parcels zoned timberland preserve zone shall conform to the requirements of Articles 3 - 5, inclusive, (commencing with Section 51121) of Chapter 6.7, Part 1 of Division 1 of Title 5 of the Government Code.
- 19.30 RZ Recreation Zone- in mountainous and hilly areas, recreation is the predominant use with agriculture and forestry as secondary uses. Permits crop and tree farming.
- 19.32 Foothill Agricultural Forestry Zone- permits the growing and harvesting of forestry products, logging and sawmill operations, and the growing and harvesting of agricultural crops
- 19.34 AP Agricultural Preserve Zone and 19.35 FS Farmland Security Zone both allow the growing and harvesting of fruit and nut trees

- 19.36 AE Exclusive Agricultural Zone, 19.37 AT Agricultural Transition Zone, 19.38 RE Rural Residential Estate Zone, 19.50 C-M Commercial-Industrial Reserve Zone - permit the growing and harvesting of any agricultural product
- 19.39 RE-NW Rural Residential Estate Zone-North Willow – permits crop and tree farming, and nurseries and greenhouses for the propagation of plants
- 19.60 PDR Planned Development Residential District- permits crop and tree farming
 - o Open Space Provisions- Requires at least 35% of the land area to be open space
- 19.61 PDC Planned Development Commercial District- permits crop and tree farming
 - o Open Space Provisions- The county may require public/common space in a planned commercial development at the time of approval of a general plan of development

Humboldt: Zoning Code:

(<http://www.co.humboldt.ca.us/planning/zoning/Zoning/>)

Within the Coastal Zone

- Sec. 313-61.2.6.2.4 – Specifications for re-vegetation of surface mining sites as a part of mandatory reclamation efforts post-operations.
- Sec. 313-64.1 – Major Vegetation Removal Permit – allowable in all zones and generally defined by the removal of certain size classes, areas, trees in proximity to sensitive areas, and removal which would result in significant environmental impact. Any such removals require a permit. Timber operations are exempt since they are governed under other zoned timber use areas.
- Sec 313-3.2, 313-3.3 Light Industrial (GA), Industrial General (GA),- permit general agriculture
- Sec 313.5.1, 313-5.3, 313-5.4 PR Public Recreation, CRD Coastal Dependent Commercial Recreation and NR Natural Resources- permits fish and wildlife habitat management, and watershed management
- 313.5.2, 313-6.1, 313-6.2, 313-6.3, 313-7.3 CR Commercial Recreation, RS Residential Single Family, RM Residential Multi-Family,R2 Mixed Residential, and TPZ Timber Production Zones - permit timber production, fish and wildlife management and watershed management
- 313-6.4, 313-7.1, 313-7.2 RA Rural Residential Agriculture, AE Agricultural Exclusive, and CT Commercial Timber- permit general agriculture, timber production, fish and wildlife management and watershed management
- Sec. 313-110.1 Parkland Dedication (McKinleyville Coastal Planning Area) – requires public parkland dedication by new subdivisions w/ 51 or more parcels.
- Land Use specifications for special areas:
 - o Sec. 313-122 Natural Drainage Courses – Natural vegetation along channels shall be maintained...
 - o Sec. 313-125 Wetland Buffer Areas – Specifies buffer standards for wetland areas. Likely applies to conservation and possibly forest management projects.

Outside of Coastal Zone:

- 314-3.3 MH Heavy Industrial- Permits with a use permit all uses except general agriculture, manufactured homes and boarding of more than two people.

- 314-4.1, 314-5.1, 314-5.2, 314-7.1, 314-7.2, 314-7.3, 314-8.1 AV Airport, DF Designated Floodway Zone, FP Flood Plain, AE Agricultural Exclusive, AG General Agriculture, FR Forest Recreation Zone and U Unclassified- permit any agricultural use which includes timber production
- 314-6.6 RA Rural Residential Agricultural- permits general agriculture, timber production, fish and wildlife management, and watershed management
- 314-7.4 TPZ Timberland Production Zone- permits the growing and harvesting of timber, management of watersheds and management of fish and wildlife
- Sec. 314-22.2 - Greenway and Open Space Combining Zone (applies only to lands within Eureka Community Planning Area) seeks to preserve gulches, including natural vegetation. But timber operations are allowed with a permit and approved THP.
- Sec 314-62.2- Timber Production- Timber production as defined in this code and not regulated by a California Department of Forestry and Fire Protection Timber Harvest Plan shall be allowed with a special permit in RS, R-1, R-2, R-3 and R-4 zones

Imperial – County General Plan:

(http://www.co.imperial.ca.us/planning/planning_div/land_use_ordinance.htm)

The Imperial County Code and Zoning Code are not available online, please contact county officials to locate a copy of the code.

Inyo – Zoning Code:

(<http://www.sdsc.edu/Inyo/zonord.html>)

Zoning Districts:

(<http://www.sdsc.edu/Inyo/icc1803.html> - 18.03.060)

- No zones refer to forestlands or timber and the majority of county lands are publicly managed.
- 18.12 OS Open Space Districts- permits farms and ranches for orchards and vineyards, wildlife refuges, fishing and hunting preserves, wilderness areas and wilderness uses
- 18.21 RR Rural Residential Zone- permits orchards, vegetable and field crops

Kern – Zoning Code:

(http://ordlink.com/codes/kerncoun/_DATA/TITLE19/index.html)

Zoning Districts:

(http://ordlink.com/codes/kerncoun/_DATA/TITLE19/Chapter_19_10_ZONING_DISTRICTS_EST/index.html)

- 19.12, 19.14 Exclusive Agriculture (A) and Limited Agriculture (A-1) – permit the growing and harvesting of crops, Christmas trees, fruit and nut trees and timber
- 19.42 Recreation Forestry (RF) District- permits wildlife and nature preserves and the growing and harvesting of crops including timber.
- 19.44 Open Space (OS) District- permits wildlife and nature preserves, recreation and agricultural uses
- 19.46 Natural Resource District (NRD) - permits timber, nut and fruit trees, Christmas trees, and wildlife and nature preserves
- 19.50 Floodplain Primary District (FPP)- permits the growing and harvesting of crops

- 19.72 Floodplain Secondary (FPS) Combining District- prohibits tree farming unless it is shown that the tree spacing will not affect the water-carrying capacity of the stream

Kings – County Code:

(<http://livepublish.municode.com/21/lpext.dll?f=templates&fn=main-j.htm&vid=12257>), Appendix A

Zoning Code: Appendix A, Article 2, Section 201

- Sec 402, 403 AG General Agriculture and AX Exclusive Agriculture allow raising of field crops and timber
- Sec 404 AL Light Agriculture District- permits agricultural operations including raising of field crops, fruit and nut trees, Christmas trees and timber
- Sec 702, 703 Rural Residential Agricultural and Rural Residential Estate Districts both allow for the raising of fruit and nut trees

Lake – Zoning Code

(<http://www.co.lake.ca.us/countygovernment/communitydevelopment/zoningord/zoning.html>)

Zoning Districts

(<http://www.co.lake.ca.us/countygovernment/communitydevelopment/zoningord/article3.pdf>) (PDF)

- Articles 4,5,7- APZ, A, RL – all allow agricultural uses including crop and tree farming
 - o Article 6- Timber Production Zone (TPZ) – permits the growing and harvesting of timber, and requires compliance with state law.
- Article 24- Open Space District
 - o 24.4 Uses permitted
 - a) agricultural uses including crop and tree farming
 - b) Management of lands and forest for the use of commercial production and harvest of trees, including the removal of timber
 - o 24.6 Uses permitted subject to First obtaining a Major use permit
 - b) the removal of vegetation or natural materials or grading for purposes other than agriculture or forest management permitted under section 24.4(a) or (b) that could defeat the purpose of this district

Lassen – Zoning Code

The Lassen County Code and Zoning Code are not available online, please contact county officials to locate a copy of the code.

Los Angeles – Zoning code

(http://planning.co.la.ca.us/drp_sum.html) or

(<http://municipalcodes.lexisnexis.com/codes/lacounty/>)

Zoning Districts: Chapter 22.12.010

- 22.24 Agricultural Zones
 - o Part 2 A-1 Light Agricultural Zone- permits crops including field, tree, bush, berry and row farming
 - o Part 3, Part 4 A-2 Heavy Agricultural Zones and A-2-H Heavy Agricultural Zones including Hog Ranches permit crops including field, tree bush, berry and row farming, and permit logging operations involving

the actual controlled cutting and removal of trees with no sawmill operations

- 22.40 Special Purpose and Combining Zones
 - o Part 5 R-R Resort and Recreation permits crop, field, tree, bush berry and row farming
 - o Part 9 0-S Open Space Zone permits field, crop, tree, bush, berry and row farming, wildlife, nature forest and marine preserves and sanctuaries

Madera – County Code:

(<http://www.madera-county.com/countycode/index.htm>)

- 18.16-18.20, 18.50, 18.54, 18.56, 18.585, 18.60, 18.62, 18.64, 18.66 Residential Rural Single Family (RRS-2, 21/2, 3, RRS-5, RRS-10), OS Open Space, AR-5 Agricultural Rural(5 acre), ARE-20 Agricultural Exclusive (20 acre), ARE Agricultural Rural Exclusive, ARV-20 Agricultural Rural Valley, ARF Agricultural Rural Foothills, and RM Rural Mountain- all permit agricultural uses
- 18.22, 18.52, RMS Residential Mountain Single Family and POS Public Open Space- both permit forestry, agriculture and natural resource conservation
- 18.75 TPZ Timber Preserve Zone- permits forestry and agriculture
- 18.85.070 – Standards for Surface Mining Reclamation- generally refers to state codified standards

Marin- County Code:

(<http://www.ordlink.com/codes/marinco/>)- Title 22 Zoning

- 21.10 Agricultural and Conservation Districts (A)- permits crop, vine and tree farming
- 21.12 Limited Agricultural District (A-2)- permits all agricultural uses
- 21.57 Specific Regulations for Coastal Districts
 - o 22.57.020 C-ARP Coastal Agricultural Planned District- permits tree farming
 - o 22.57.030 C-APZ Coastal Agricultural Production Zone- permits agricultural uses, field, fruit, nut and vegetable crops, planting, raising or harvesting of trees for timber, fuel or Christmas tree production, game and nature preserves or refuges.
 - o 22.57.130 C-OA Coastal Open Area District- permits forest preserves, wildlife reserves.
 - 22.57.134 Prohibits commercial wood cutting or logging
- 22.60 O-A Open Area District- permits crop farming, forest preserves and wildlife preserves
 - o 22.60.030 Prohibits commercial wood cutting or logging
- 22.75 Native Tree Preservation and Protection- limits native tree removal in the non-agricultural unincorporated areas of Marin County Prohibits the removal of “protected trees” which are defined as any of the following:
 - o (1) Trees on an unimproved parcel. Any individual native tree which has a DBH as specified in Attachment 1 (outlines all native trees in the county and required DBH)
 - o (2) Trees on an Improved Parcel. More than a total of five trees of any native species each of which having a DBH as specified in Attachment 1 where the removal of such trees occurs within any twelve month period on an improved parcel.

- (3) Trees Required as Condition of Approval. Any tree required to be planted or preserved as a condition of approval of a county discretionary permit application where such tree does not meet one or more of the exemption criteria described in Section 22.75.050 (Exemptions). (Ord. 3342 Exh. A (part), 2002; Ord. 3291 § 2 (Exh. A (part)), 1999)
 - Exceptions to the prohibition of removal are provided
- 23.04 Timber Harvesting Regulations
 - 23.04.100 Logging Practice Standards and Requirements
 - Refers to state and local laws including the State Forest Practices Act, State Fish and Game code, Regional Water Quality Control Board, and federal laws that must be followed
 - Part 19 sets standards for trees that must be left untouched based on dbh and other criteria for old growth stands, prior cut stands, small stands, and hardwood stands
 - Timber harvesting of any timber shall be limited to only one operation in any ten-year period of time; provided that, following the ten-year period, minimum stocking has been obtained.

Mariposa- County Zoning Code:

(http://www.mariposacounty.org/planning/Land_Development_Code/Index_%20Title_17_Home.htm)

- 17.32 General Forest Zone- permits sustained yield timber management
- 17.44 Timber Exclusive Zone- permits the growing and harvesting of timber and other compatible uses. Refers to state law and requires that the land maintain forestry uses for a ten year minimum.
- 17.60 Open Watershed Overlay Zone- permits agriculture and the managed production and harvesting of timber

Mendocino - County Zoning Code:

(<http://www.co.mendocino.ca.us/planning/ZOIndex.htm>)

- 20.044-20.146 All Zoning Districts except for A-H Airport height, AZ Airport Zone Combining, Flood Plain Combining, and AV Airport permit agricultural use types that includes forest production and processing
- 22.16.090 D Surface Mining and Reclamation: Reclamation standards mandate that permanently exposed lands denuded by mining operations be re-vegetated. Thus, reforestation projects on mining sites may not be additional.

Merced- County Zoning Code

(<http://www.co.merced.ca.us/planning/zoningord.html>)

- No zones within the county refer to forestry or timber. The primary zones are agricultural, commercial and residential.

Modoc: The Modoc County Code and Zoning Code are not available online, please contact county officials to locate a copy of the code.

Mono- County Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2500/2520/HYPEROCR/hyperocr.html>)

- There are no zones that specifically refer to forestry or timber. Most of the county is publicly owned.
- 19.05 A District Agriculture- permits all agricultural uses
- 19.18 OA District, Open Area- permits crop and tree farming and wildlife preserves. Uses generally include stream environment zones, greenbelts, and floodplains.

Monterey- County Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2000/2051/HYPEROCR/hyperocr.html>)

Zoning Code- 21.08.010

- 21.24 Agricultural Industrial District AI- permits the cultivation, cutting and removal of Christmas trees
- 21.30, 21.32, 21.34, 21.38, 21.40, 21.48- Land B Zoning District, Rural Grazing Zoning District, Permanent Grazing Zoning District, Open Space Zoning District, Public/Quasi Public Zoning District and Limited Agriculture Zoning District- permit agricultural uses including crop and tree farming
- 21.36 Resource Conservation Zoning District- permits the cultivation, cutting, and removal of Christmas trees and on lots with ten or more acres permits crop and tree farming

Napa- County Code

(http://www.co.napa.ca.us/search/Code_Search.asp?LID=495)

County Zoning Code

(<http://www.co.napa.ca.us/Code2000/ DATA/TITLE18/index.html>)

Zoning Districts- Chapter 18.12.010

- 18.17, 18.20, 18.50, AP Agricultural Preserve District, AW Agricultural Watershed District and PL Public Lands District all permit agriculture
- 18.68 TP Timber Preserve District- permits the growing of timber. A use permit allows the harvesting of timber, management of watersheds, management of fish and wildlife habitat, hunting and fishing
- 18.108 Conservation Regulations- apply to all zoning districts within Napa County, and all uses that involve earth moving. Regulations attempt to minimized earthmoving and grading, minimize soil erosion, maintain and improve water quality, preserve riparian areas, and preserve existing vegetation
 - o 18.108.027 Sensitive Domestic Water Supply Drainages-Vegetation Clearing. A minimum of sixty percent of the tree canopy cover on the parcel existing on June 16, 1993 along with any understory vegetation, or when vegetation consists of shrub and brush without tree canopy, a minimum of forty percent of the shrub, brush and associated annual and perennial herbaceous vegetation shall be maintained as part of any use involving earth-disturbing activity
 - Exemptions are permitted for cases where there is a state timber harvesting permit, and other cases
 - o 18.108.060 Slope Regulations- no construction, improvement, grading, earthmoving activity or vegetation removal associated with the development or use of land shall take place on those parcels or portions thereof having a slope of thirty percent or greater unless exempt under Section 18.108.050 or 18.108.055 or unless an exception through the use permit process is granted pursuant to Section 18.108.040.

- 18.108.070 Erosion Hazard Areas- No otherwise permitted earthmoving activity, grading, improvement, or construction of a structure (except new road construction projects) for non-agricultural activity on erosion hazard areas with slopes of fifteen percent or less shall commence until standard erosion control measures have been incorporated into the project which comply with the requirements of Section 18.108.075.
 - 18.108.100 Vegetation Preservation and Replacement- details vegetation conditions that must be maintained if a project within an erosion hazard area requires issuance of a discretionary permit. Requires specific tree and vegetation retention.

Nevada- County Code:

<http://docs.co.nevada.ca.us/dscgi/ds.py/View/Collection-387>)

County Zoning Code

<http://docs.co.nevada.ca.us/dscgi/ds.py/View/Collection-3589>)

- Sec L-II 2.3 Rural Districts
 - FR Forest– permits the production and management of timber, permits agricultural uses, crop and tree farming and woodyards
 - TPZ Timberland Production Zone-Permits the growing and harvesting of timber. Requires Compliance with state laws and a ten year use restriction on
- Sec L-II 2.6 Special Purpose Districts
 - "OS" (Open Space)- dedicated to recreation, resource and habitat preservation and protection of environmental resources.
- Sec. L-II 2.7.7 "SC" Scenic Corridor Combining District- protects scenic resources in areas adjacent to highways and roads
 - Scenic Corridor Analysis –requirement with the Planning Board
- Sec L-II 3.25 Tree Removal Near Nevada City- “no person, firm or corporation shall remove or cause to be removed any tree located outside a Timberland Preserve Zone(TPZ) and within the Nevada City Sphere of Influence as adopted by the Local Agency Formation Commission
 - Code provides exceptions to tree removal
- Sec. L-II 3.3 Agricultural Uses- In any district, the use of land for crop and tree farming shall be allowed. Within those districts not intended for agriculture as a primary or secondary use, crop and tree farming shall be considered an interim use.
- Sec L-II 4.3.14 Timber Resources, Important- parcels that are 40 acres or larger, that have ideal soil characteristics for timber production,
 - Development is prohibited on these lands unless a management plan is developed
- Sec L-II 4.3.15 Trees- encourages the protection of trees to provide suitable habitat for native wildlife, protects landmark and heritage groves
 - Requires on-site vegetation inventories, mandatory clustering to protect landmark trees and groves
 - C8 requires that if the development is taking place in the area of environmentally sensitive resources, developers are required to fund a native plant restoration program, to return the site to a naturally functioning habitat

Orange- County Zoning Code

http://pdsd.oc.ca.gov/docs/zoning_code_01.pdf)

- No zoning districts referred to forestlands or timber.

Placer- County Code

(<http://ordlink.com/codes/placer/index.htm>)

- All projects subject to Environmental Review pursuant to Ch. 18 of Placer County Code
- Sec. 17.06.050 provides a table with each zone district type and the land uses allowed in each.
- 17.08,17.10,17.14,17.34, 17.44, 17.46 AE Agricultural Exclusive, F Farm, O Open Space, RES Resort District, RA Residential Agricultural, RF Residential Forest,- all permit forestry, crop production and fisheries and game preserves
- 17.12 FOR Forestry- permits forestry and fisheries and game preserves
- 17.16 TPZ Timberland Production District- permits forestry, crop production, and fisheries and game preserves
 - o Requires compliance with state laws and restricts land use to forestry uses for ten years.
- 17.20, 17.22, 17.24,17.26 17.30, 17.32, 17.36, 17.38 CPD Commercial Planned Development, C2 General Commercial District, C3 Heavy Commercial District, HAS Highway Services, C1 Neighborhood Commercial, OP Office and Professional District, AP Airport Park, BP Business Park,- permit forestry and crop production
- 17.40, 17.42 IN Industrial District and INP Industrial Park District- permit crop production
- 17.50 RS Residential Single Family – permits fisheries and game preserves

Plumas- County Code

(<http://www.countyofplumas.com/codes/index.htm>)

- Sec. 9-2.418 - Timber harvesting permitted in all zones except the Open Space Zone, subject to the requirements of the Forest Practices Act and any relevant county ordinance.
- Sec. 9-2.32 Timber Production Zone specifications
 - o (3202) Uses include: timber growth/harvesting; watershed management; fish and wildlife management
 - o (3203) Inclusion requires state approved forest management plan; meeting timber stocking standards of FPA and FPR; area is in one ownership of at least 40 acres; average timber site is III or higher according to site rating system of the State Board of Forestry.
- Sec. 9-2.33 General Forest Zone Specifications
 - o (3302) Uses include: timber management; wildlife management; agriculture
- Sec. 9-2.34 Mining Specifications
 - o (3402) Uses include: Mining, agriculture, timber management

Riverside- County Code

(<http://municipalcodes.lexisnexis.com/codes/riversideco/>)

County Zoning Code- Title 17

Zoning Districts

(<http://www.tlma.co.riverside.ca.us/planning/zoningdesc.html>)

- Sec. 17.16, 17.32, 17.120,17.128, 17.129, 17.132, 17.160 RR Rural Residential, R-A Residential Agriculture, A-1 Light Agriculture, A-2 Heavy Agriculture, A-P Light Agriculture with Poultry, A-D Agricultural Dairy, and W-1 Watercourse, Watershed Conservation Area Zones all permit light agriculture including orchards and tree crops
- Sec 17.152 N-A Natural Assets- permit field and tree crops

Sacramento- County Zoning Code

(<http://www.co.sacramento.ca.us/planning/zc/index2.html>)

- Article 3- O Recreation Land Use Zone- permits forestry with a conditional use permit
- The majority of zones are agricultural and residential.

San Benito- County Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2600/2606/HYPEROCR/hyperocr.html>)

- Section 5, Section 6 Agricultural Rangeland (AR) District and Agricultural Production (AP)- permit grazing and agriculture
- Section 7 Rural District- permits agriculture
- Section 8 and Section 9, Rural Transitional District and Rural Residential (RR) Districts permit agricultural uses including forestry
- Section 13 Mineral Resource Area- permitted uses includes agricultural and silvicultural uses
- Section 15 Scenic Highway District- permits all agricultural uses
- Section 17 Open Space District- Includes lands designated as Mineral Resource Areas, Scenic Highways, BLM lands, federal state or county parks, hillsides with slopes greater than 30%, wildlife preserves, landslide areas and wildlife habitat areas.
 - o Permitted uses include tree farming, agricultural uses, native wildlife sanctuaries, and botanical conservatories
 - o Tree removal is permitted upon approval of the planning commission on Scenic Highway areas, areas of federal, state or county parks, hillsides of slopes greater than 30% and landslide areas

San Bernardino-County Code

<http://www.co.san-bernardino.ca.us/landuseservices/DevCode/800a-Table%20of%20Contents.pdf>

County Zoning- Chapter 3 Land Use Districts

- 84.0305 Resource Conservation (RC Districts), 84.0320 Rural Living (RL) Districts, 84.0342 Rural Commercial Districts, 84.0375 Regional Industrial (RI) Districts and 84.085 Floodway (FW) districts all allow: row, field, tree and nursery crop cultivation
- Resource Preservation
 - o Article 1 Agricultural Preserve (AP) Overlay Districts are only permitted on RC, AG, RL, FW land. AP districts must conform with the California Land Conservation Act (Williamson Act) of 1965
 - o Article 2 Biotic Resource Overlay District (BR) exist to protect and conserve beneficial rare and endangered plant and animal resources

- Article 6 Scenic Resource Overlay District provides for the development of standards to protect, preserve and enhance the aesthetic resources of county
 - Section h) requires that timber harvests within or adjacent to the right of way shall be limited to that which is necessary to maintain and enhance the quality of the forest

San Diego- County Zoning Code

(<http://www.co.san-diego.ca.us/cnty/cntydepts/landuse/planning/zoning/>)

- No zoning districts referred to forestlands or timber.
- S80- 2800 Open Space- only permits uses which have a minimal impact on the natural environment
- S81- 2810 Ecological Resource- recognizes and preserves coastal wetlands as a significant biological habitat area. Protects lagoons, tributary streams, and adjacent uplands in the California Coastal Zone

San Francisco- County Zoning Code

([http://www.amlegal.com/nxt/gateway.dll/?f=templates\\$tt=altmain-nf.htm&fn=altmain-nf-contents.htm\\$cp=California%2FSan%20Francisco%2FZoning\\$vid=alp%3Asf_zoning](http://www.amlegal.com/nxt/gateway.dll/?f=templates$tt=altmain-nf.htm&fn=altmain-nf-contents.htm$cp=California%2FSan%20Francisco%2FZoning$vid=alp%3Asf_zoning))

- No zoning districts referred to forestlands or timber and San Francisco County is dominated by residential and commercial zones.

San Joaquin- County Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2000/2048/HYPEROCR/hyperocr.html>)

- Division 15 Natural Resources Regulations
 - 9-15.05.3 Trees- Removal of a native oak tree, heritage oak tree or historical tree requires an approved Improvement Plan application. This section provides additional information on removal and replacement procedures
 - 9-15.10.5 Riparian Habitat, Natural Bank Buffer- Requires open space for riparian habitat on either side of waterways. Buffer area shall be no less than 100 feet measured from the mean high water level of the natural bank or 50 feet back from existing riparian habitat, whichever is greater

San Luis Obispo – County Code

(<http://municipalcodes.lexisnexis.com/codes/sanluiso/>)

Zoning- See Title 22 Land Use and Title 23 Coastal Zone Land Use

- 22.06 Allowable Land Uses and Permit Requirements
 - AG Agriculture, RL Rural Lands, RS, REC Recreation, and RR Rural Residential districts forestry is permitted subject to a land use permit. Forestry means the establishments primarily engaged in operations of timber tracts, tree farms, forest nurseries and related activities such as reforestation services
 - OS Open Space Districts permit forestry with a site plan review.

- 22.56.020 Tree Removal- no person can remove any tree located with urban or village reserve lines or other specific areas identified in the planning area standards (Article 9)

San Mateo- County Code

(<http://www.co.sanmateo.ca.us/planning/pdf/Zregs-wp.pdf>)

County Zoning- Chapter 2 Section 6110

- Chapter 10 A1 Agricultural Districts- permit all agricultural uses except hog farming, logging and timbering activities
- Chapter 11 A-2 Exclusive Agricultural Districts- permits all agricultural uses, logging and timbering
- Chapter 12.5- COSC Community Open Space Conservation District – permits agricultural uses including Christmas tree farms
- Chapter 14 H-1 Limited Highway Frontage District- permits crop and tree farming
- Chapter 20A Resource Management District- permits agricultural uses
 - o Permits timber harvesting and commercial woodlots, providing that no commercial timber harvests shall occur within 1,000 ft of any legal dwelling in existence on June 18, 1991, with exceptions that are listed
- Chapter 34 Timberland Preserve Zone (TPZ)- uses compatible with timber harvests include watershed management, management of lands for fish and wildlife, management of recreation, and grazing
 - o 34A Zoning, Re-zoning and Land Division in the Timberland Preserve Zone
 - o 34B Land Management Planning Requirements for uses and permits in the Timberland Preserve Zone

Santa Barbara- County Code

(<http://elib.cs.berkeley.edu/docs/data/2100/2136/HYPEROCR/hyperocr.html>)

- Sec 35-216, 35-217, 35-218 AG-1 Agricultural A, AG-II Agricultural II and RR Rural Residential all permit agriculture
- Sec 35-240 Resource Management- with a minor conditional use permit, allows agriculture and orchards
- Sec 35-240A MT-GOL Mountainous Goleta Zone- permits cultivated agriculture and orchards

Santa Clara- Zoning Code

(http://www.sccplanning.org/planning/content/PropInfoDev/PropInfoDev_Zoning_Ordinance.jsp)

- 2.20 Rural Base Districts
 - o A Exclusive Agriculture, RR Rural Residential- permits general agriculture which includes crop trees
 - o AR Agricultural Ranchlands, HS Hillside- permits general agriculture which includes crop trees and permits commercial timber harvest operations with a use permit
- 2.50 Special Purposes Base District
 - o A1 General Use- permits commercial timber harvest operations and agriculture
 - o RS Roadside Services- permits agricultural uses

- OS/F Open Space and Field Research- permits agricultural uses and tree farm operations that grow trees in containers or in the ground

Santa Cruz- Santa Cruz County Zoning Code:

(<http://ordlink.com/codes/santacruzco/index.htm>)

Santa Cruz County General Plan:

- Chapter 5 (PDF) provides timber resource guidelines
 - Timber harvesting specifically not allowed in residential, commercial, industrial, public and community facilities, and special use zone districts.
 - Timber harvesting allowed in PR Parks, Recreation and Open Space districts.
 - Timber Production District code (Chapter 13.10.371-378) contains specifications for timber harvesting lands.
 - Additionally, Chapter 13.10.695 provides riparian zone management guidelines (e.g. setback distances) for districts in which timber harvesting is otherwise allowed.
 - D (designated park), GH (geologic hazards), L (historic landmark), O (open space easement) and SP (salamander protection) combining districts may reserve land from development in some cases, meaning conservation projects on those sites may not be additional.
- County Environmental Impact Review Guidelines and Rules (Chapter 16)
 - Sensitive Habitat Protection ([Chapter 16.32](#)) (may be covered under Chapter 16.52 below)
 - Significant Trees Protection ([Chapter 16.34](#)) (may be covered under Chapter 16.52 below)
 - Timber Harvesting Regulations ([Chapter 16.52](#)): Covers harvests too small to be regulated by the state (3 acre minimum)

Shasta- Zoning Code: (<http://www.co.shasta.ca.us/Departments/Resourcemgmt/drm/zoningtoc.htm>)

- Sec. 17.08 Timber Production District – Table 17.08.04 sets minimum parcel sizes based on Site Classification or Site Index.
- Sec. 17.10 Timberland District – Allows more uses than TP. Specifies minimum lot area, setbacks, and maximum residential density.
- Sec. 17.14 Habitat Protection District – Minimum setbacks, maximum residential density; allowed uses include forest management and habitat enhancement projects.
- Sec. 17.16 Open Space District – Permitted uses include forest management. Purpose of district is to protect open space that is A) most properly kept as open space, B) needed as a greenbelt or buffer along significant stream corridors or around natural features, or C) kept as open space for health or safety reasons. Includes minimum setbacks and lot sizes.
- Sec. 17.22 Designated Floodway District – Prohibits the removal of natural riparian vegetation occurring along a watercourse.
- Sec 17.88.040 Forest Management – Permits all forest management activities described in the California Forest Practices Act as long as they comply with state regulations
- Sec 17.88.050 Fish and Wildlife Enhancement Projects- permitted as approved by the Department of Fish and Game

Sierra: Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2500/2530/HYPEROCR/hyperocr.html>)

- 15.12.160 AI Agricultural District – Allows “tree farming”
- 15.12.170 GF General Forest District – Includes size and stream setback guidelines.
- 15.12.180 FR Forest Recreation District – Emphasis on use of forests as tourism draw. Few specific guidelines, though, other than minimum yards.
- 15.12.230/40/60/70 Open Space Residential Districts – Overlaps with GF and AI (ag) districts, but allowing specific residential conditions. Only uses consistent with all three district types are allowed.
- 15.12.280 SC Scenic Highway Corridor District or SH Scenic Highway District – Overlay zone that provides for guidelines that restrict use within certain areas within SC/SH zones. *May not be relevant, but warrants further review.*
- 15.12.300 CE Community Expansion District – Overlay zone allowing uses permitted in underlying districts, but providing for specific future expansion sites for communities. May have bearing on Conservation Projects (business-as-usual of land use conversion)
- 15.12.310 TPZ Timberland Production Zone District – Permitted uses includes management of land for commercial production of timber, timber removal. Compatible uses include management for watershed and for fish and wildlife habitat for fishing and hunting.

Siskiyou: County Zoning Ordinances (<http://www.co.siskiyou.ca.us/planning/zoning.htm>)

- o Article 48. Rural Residential Agricultural District (R -R) – Allows tree farming
- o Articles 49, 50: Non-Prime Agricultural District (AG-2) and Prime Agricultural District (AG-1) – Allows tree harvesting and farming.
- o Article 51. Timberland Production District (TPZ) – permits the growing and harvesting of timber and requires compliance with state regulations.
- o Article 52. Open Space District (O)- Permits crop and tree farming, wildlife refuges, and game preserves
- o Article 54. Floodplain Combining Districts (F) – Limits uses within floodplains.

Solano- Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2500/2524/HYPEROCR/hyperocr.html>)

- No zoning districts refer to forestlands or timber.

Sonoma- County Code:

<http://www.sonoma-county.org/prmd/Zoning/index.htm>

For Coastal and non-coastal zones:

- Articles 2,3,4,5,6,8,9,16: Land Intensive Agriculture, Land Extensive Agriculture, DA Diverse Agriculture, Resources and Rural Development District, Resources and Rural Development Agricultural Preserve District, Agricultural and Residential District, Rural Residential District, Agricultural Services District all allow for the growing and harvesting of trees, However, agriculture cultivation will not be allowed within 100’ from the top of the bank of the “Russian River

- Riparian Corridor, Within 50' from the bank of designated flatland riparian corridor, within 25' of designated "upland riparian corridors"
- Article 7 TP Timber Production Zone- must comply with the Forest Taxation Reform Act of 1976, defines specific requirements to convert to a Timber Production Zone,
- Article 67 Valley Oak Habitat Combining District- Requires mitigation for Valley Oak removal

Stanislaus- County Zoning Code

(<http://www.co.stanislaus.ca.us/planning/ZoningOrdinance.htm>)

- County zoning code does not refer to forestry or timber and most districts are agricultural or residential.

Sutter- County Zoning Code

(http://www.co.sutter.ca.us/depts/cs/ps/PDF/zoning_code_book.pdf)

- None of the zones specifically refer to forestry or timber and most of the zones are residential, agricultural or commercial
- 1500-1010, 1500-1410, UP Upland Agricultural, and AG General Agricultural District both allow conversion of agricultural land to permanent wildlife habitat or other habitat with approval of a development agreement

Tehama- County Zoning Ordinances:

(http://elib.cs.berkeley.edu/cgi-bin/doc_home?elib_id=2434)

- Section 17.10 Upland Agricultural Farming- allows tree farming
- Section 17.32 GR General Recreation Districts- may be used for recreation based primarily on their natural resource value, permits crop and tree farming
- Section 17.42 PF Primary Floodplain District- properties which lie within the primary floodway, free farming is permitted on these lands
- Section 17.44 Natural Resources Lands and Recreation District- includes properties which are to be preserved in a natural state and provide open space buffer areas in which uses are restricted to recreational, conservation, or light agricultural types
 - o 17.44.020 Uses permitted includes:
 - A. Measures to promote conservation of soil, water and vegetation and to reduce fire and erosion hazards
 - D. Crop and Tree farming, grazing
- Section 17.58 Agricultural Buffer District- permanent buffer or transition areas between agricultural land use, to mitigate adverse impacts on each other
- Section 17.66 Timber Preserve Zoning District- lands must meet the timber stocking standards of Section 4561 of the Public Resources code and forest practices rules adopted by the State Board of Forestry

Trinity- County Zoning Ordinances

(<http://elib.cs.berkeley.edu/docs/data/2500/2519/HYPEROCR/hyperocr.html>)

- Sec. 11 - Unclassified District – allows forestry
- Sec. 13 - Agricultural District – allows tree farming
- Sec. 13.1 – Agricultural Preserve District – allows forestry and most agricultural uses; district designation created for lands eligible for CA Land Conservation Act, with "Criteria for Inclusion" listed in Sec. 13.1K

- Sec. 14 – Agricultural Forest District – allows “Management of land and forest for the production and harvest of trees and other natural resources (including tree farming) management of land and forest in a manner designed to provide protection from fire caused either by man or nature, insects, diseases, or other catastrophe, logging”
- Sec. 14.1 – Timberland Production Zone – allows forestry, watershed management, wildlife and fisheries habitat improvement, grazing and other agricultural uses, recreation uses; lists requirements for Timber Management Plan
- Sec. 15 – Rural Residential District – Allows agricultural uses, though doesn’t specifically mention tree crops. Allows public/quasi-public parks.
- Sec. 16/17 – Single Family/Duplex Residential District – Allows public/quasi-public parks.
- Sec. 18.5 – Residential Office District – Part D: “Existing uses lawfully established prior to being zoned R-O shall be considered as having an existing use permit and in compliance with these standards.”
- Sec. 23 – Industrial District – Allows agricultural uses
- Sec. 25 – Scenic Conservation Overlay Zone – Overlay zone providing limits to underlying zones w/ respect to the protection of scenic areas important to the county. Sets buffers for streams, flood plains, Scenic Highways. Requires permit for vegetation removal, except in cases where Timber Harvest Plan or other environmental document pursuant to CEQA or NEPA has been completed.
- Sec. 25.5 – Open Space District – Allows forestry, tree farming, habitat enhancement (as approved by Cal DFG or other State or Fed Agency), other uses of similar nature as determined by the Planning Commission.
- Sec. 26 – Recreation Development Districts – “Timber management and tree harvesting by individual selection”; see section for specific requirements.
- Sec. 29 – Public Facilities District – Allows parks.
- Sec.’s 29.2 and 29.4 – Critical Water Resource Overlay Zone and Flood Hazard District (or Overlay Zone) – may limit some uses, though primarily related to development of structures and subdivisions.
- Sec. 30 – General Provisions and Exceptions – Provides general standards that apply to all zones, including mitigation for utilities development.
 - o Sec. 30.3 – Minimum Lot Size – Check text of code for standards listed for each section listed below:
 - C. Protection of a Public Resource (e.g. lands w/in riparian corridor setbacks, critical deer winter range)

Tulare- The Tulare County Code and Zoning Code are not available online, please contact county officials to locate a copy of the code.

Tuolumne: General Plan

(<http://www.hereforbusiness.com/CDD/General Plan/Generalplan1.htm>)

Provides general guidelines and policies for land use in the county, but few in the way of specific standards.

County Zoning Code

(<http://elib.cs.berkeley.edu/docs/data/2500/2526/HYPEROCR/hyperocr.html>)

- 17.52.170 Commercial Growing and Harvesting of Timber- is permitted in all districts except for O Open Space and O-1 Open Space I
 - o Must comply with CA Forest Practice Rules

- Commercial harvests of lumber except for valley oak, aspen and old growth coniferous forests is permitted
- No harvesting of timber is permitted within 100 feet of a cultural resource site
- Harvesting of timber shall not occur within riparian or wetlands areas. Buffer lengths for various types of riparian and wetland areas is provided
- 17.08, 17.36 Exclusive Agriculture, Special Commercial District- permits the growing and harvesting of forest products
- 17.10, 17.12, 17.31 General Agriculture, General Agriculture(10 acre), Commerical Recreation C-K - permits general farming and the growing and harvesting of forest products
- 17.14 Open Space District, Open Space I District- Permit vegetation removal that is required by the Tuolumne County Fire Department subject to the approval by the director, and removal of vegetation by hand only when necessary for reasons of health and safety
- 17.16, 17.38, 17.40 General Recreation District, Light Industrial District, Heavy Industrial District- permits general farming
- 17.26,17.27,17.28, 17.29, Residential Estate (2 acre, 3 acre, 5 acre, 10 acre)- permit sawmills for the processing of timber grown on the same parcel as the sawmill, for a period of no more than 60 days.
- 17.41 Public District- permits wilderness, management for watershed, management for fish and wildlife habitat, general farming and parks
- 17.42 Timberland Production Zone- permits the growing and harvesting of timber , watershed management and fish and wildlife habitat management

Ventura: County Zoning Code

(http://www.ventura.org/planning/ordinances_regs/ords_regs.htm) or (<http://elib.cs.berkeley.edu/docs/data/2000/2049/HYPEROCR/hyperocr.html>)

- Section 8104-1.1 Open Space SO-S Zone- permits crop and orchard production and permits timber grown and harvesting of non-protected trees
- Section 8104-1.2 Agricultural Exclusive Zone- permits crop and orchard production and permits timber grown and harvesting of non-protected trees
- Section 8104-2.1 Rural Agricultural Zone- permits crop and orchard production and permits timber grown and harvesting of non-protected trees
- Section 8104-6.2 Timberland Preserve Zone TP
 - To classify for this zoning, must be timberland capable of growing an average annual volume of wood fiber of at least 15 cubic feet per acre
 - Must meet section 4561 of the Public Resources Code
 - permits crop and orchard production and permits timber grown and harvesting of non-protected trees
- Section 8104-7.1 Scenic Resource Protection SRP Overlay Zone- requires a use permit to alter any protected tree
- Section 8104-7 Scenic Highway Protection SRP Overlay Zone- requires a use permit to alter any protected tree
- Section 8107-25 Tree Protection Regulations- prohibits removals of protected trees
 - Table I Provides List of protected trees

Yolo – County Code:

(<http://www.yolocounty.org/CountyCode/TOC.pdf>)

- Title 10 Environment
 - o Chapter 2 Sec. 10-2.01 Elm Trees- No person shall import or export from the county any plants or parts thereof of the genus Ulmus, including firewood, logs, cuttings, bark, branches or mature trees
 - o Chapter 4 Sec. 10-4.35 Off Channel Surface Mining Vegetation Protection- existing vegetation and habitat to be retained shall be enclosed in temporary fencing, and replacement habitat and vegetation shall be established where complete avoidance is not possible
 - o Chapter 4 Sec. 10-4.440 Off Channel Surface Mining Wildlife Habitat- Avoid disturbance of important wildlife habitat including essential cover associated with riparian forest and oak woodland habitat

County Zoning Code- Title 8, Chapter 2

(<http://www.yolocounty.org/CountyCode/Title08.pdf>)

- 8-2.1921 Open Space Zone- permitted areas include areas used for managed resource production, natural areas, riparian area, and fish wildlife and plant habitat

Yuba- County Zoning Code:

www.co.yuba.ca.us/Supervisor/ordinance/titleXII.pdf

- Chapter 12.20 “AE” Exclusive Agricultural Zone, 12.25 A/RR Agricultural/Rural Residential Zone, 12.30 “RRE” Rural Residential Estate Zone, and 12.43 “RC” Rural Commercial Zone – all permit the growing and harvesting of any agricultural crop
- Chapter 12.62 “RPZ” Resource Preserve Zone- preserves open space and requires a minimum parcel size of 20 acres
- Chapter 12.65 “TPZ” Timberland Preserve Zone- permits management of the watershed, management for fish and wildlife habitat or hunting and fishing, uses integrally related to growing, harvesting, and processing forest products
 - o Requires that timber stocking standards meet Sec 4561 of the Public Resources Code
- Chapter 12.70 “FP-1” Primary Flood Plain Zone- permits crop farming and wildlife preserves

III. Additional Information

The following sites providing listings of many California County zoning codes, county codes and planning sites.

CA County Zoning Ordinances- <http://ceres.ca.gov/planning/zoning/county.html>

CA Municipal/County Codes (alt.) – <http://www.bpcnet.com/codes.htm> - CA

CA County Planning Sites - http://ceres.ca.gov/planning/countylists/county_gov.html

Land Use Conversion Trend Tables

Table F. California Forestland Conversion Rates

County	Avg. Acres Converted/year	Total Forestland Acres	Forestland Conversion rate
Alameda	7	476,621	0.00001469
Amador	59.6	381,951	0.00015604
Butte	809.8	1,072,709	0.00075491
Colusa	0	625,279	0
Contra Costa	4	475,058	0.00000842
Del Norte	0	650,061	0
El Dorado	141.2	1,145,810	0.00012323
Glenn	0	849,213	0
Humboldt	2.4	2,289,626	0.00000105
Kern	0	5,223,231	0
Lake	0	851,912	0
Lassen	0	2,951,996	0
Los Angeles	0	2,615,328	0
Marin	0	336,663	0
Mendocino	0	2,240,825	0
Modoc	0	2,687,407	0
Monterey	0	2120174	0
Napa	3.4	505,469	0.00000672
Nevada	90.8	623,252	0.00014569
Orange	6.8	511,480	0.00001329
Placer	109.4	960,277	0.00011393
Plumas	3.8	1,673,707	0.00000227
Riverside	0	4,672,261	0
San Benito	0	889,395	0
San Bernadino	0	12,866,979	0
San Diego	0	2,712,246	0
San Luis Obispo	0	2,214,785	0
San Mateo	0	291,054	0
Santa Barbara	0	1,759,195	0
Santa Clara	1.4	832,804	0.00000168
Santa Cruz	0	285,211	0
Shasta	119.8	3,818,705	0
Sierra	0	615,584	0
Siskiyou	0	345,029	0
Solano	0	539,323	0
Sonoma	44.8	1,013,388	0.00002391
Stanislaus	0	969,608	0
Tehama	83.4	3,488,683	0.00002391
Ventura	0	1,188,255	0
Yolo	0	653,883	0
Yuba	8.8	411,977	0.00002136

Sources: Land Cover Mapping and Monitoring Program (LCMMP) Data, Fire and Resource Assessment Program (FRAP).²¹

Please Note:

- Development refers to residential development, commercial development and land conversion to agricultural crop pasture or grazing lands.
- Data for the Southern Sierra region was unavailable. Data for this region that includes Alpine, Calaveras, Tuolumne, Mariposa and Mono Counties will be analyzed in 2004 and should be available in future years. Monitoring reports when finished should be posted on the LCMMP Publication Page. The Southern Sierra region has now been reorganized into the Northern Sierra and Southern Sierra mapping and monitoring areas
- The LCMMP excludes counties that do not have significant timberlands. The Central Valley, and Southeastern desert counties of Kern, Kings, Fresno, Merced, San Joaquin, Imperial, Riverside, San Bernadino and Inyo counties are partially or entirely excluded.
- The LCMMP re-monitor areas over 5 year periods, and the Registry will work with CDF to update the conversion rates as new data is made available

²¹ California Department of Forestry and Fire Protection, and the U.S. Forest Service Monitoring Land Cover Changes in California, North Coast Project Area May 2003. Pg. 3, 13, 17. ; California Department of Forestry and Fire Protection and the U.S. Forest Service Monitoring Land Cover Changes in California, Northeast Project Area January 2002. Pg. 3,9,12.; California Department of Forestry and Fire Protection Monitoring Land Changes in California, South Coast Project Area August 2002. Pg. 3,10,13.

Public Report for Forest Entities

The following document is an example of a CARROT report (Climate Action Registry's Online Reporting Tool report) for Forest Entities that will be utilized by the project developer to report information to the Registry. The CARROT report will be used to ensure transparency through public access to GHG reporting information.

See separate "CARROT Report" attachment

ANNEX B- Project Pre-screening Worksheet

For Registry pre-screening, please provide a summary of your project information, as requested below. More detailed information of the required criteria are provided in parts II and III of the Protocol. You may write directly on this form and submit the completed version to the Registry. Or, if you need additional space, you may transfer this outline to another document to draft your summary, so long as the same format is used and all of the criteria outlined below are addressed (unless they are listed as optional). Once the summary is complete, please submit the draft and any necessary attachments to the Registry for pre-screening.

Forest entity name and contact information:

Please include phone number, e-mail, and mailing address

Project developer name and contact information (if different from the forest entity):

Please include phone number, e-mail, and mailing address

Project start date (month and year):

Check the project type:

(See Part II. A for additional information)

Conservation-based forest management _____

Reforestation _____

Conservation _____

Identify reporting entity and project developer (if different from the entity) as well as other relevant criteria, as identified in Part II. C:

Describe extent of entity level reporting (i.e. California or nationwide):

Identify project location, address, county and state, and describe characteristics of project area:

Project address, county or counties, and state:

Please check geographic boundaries for scope of entity reporting:

California only _____

Nationwide _____

Project description:

Provide brief description of the physical characteristics of the project area:

Provide brief description of the project goals, including the intended GHG reductions

Describe any additional environmental co-benefits that your project will achieve (optional):

Carbon security & environmental integrity:

(See Part II D for additional information)

Provide the date (or intended date) of easement execution:

List the native tree species that comprise or will comprise the project area:

Forest management projects: please describe how your project meets or will meet the natural forest management requirement:

Project Baseline and additionality:

(See Part II E&F for additional information)

Please provide a brief description of your project's baseline characterization (i.e. provide a qualitative description that includes the practices that would have occurred in the baseline and the resulting physical characteristics over time):

Please describe how your project activity is additional:

ANNEX C- Project Summary Worksheet

This project summary must be submitted to the Registry and Certifier in the first year of reporting at the time of certification.

If you have already submitted a pre-screening worksheet and none of the information in the worksheet has changed since its submission the Registry, you may provide this worksheet in lieu of Section I. However, you must fill out the remainder of the project summary information, starting with Section II.

Section I.

Forest entity name and contact information:

Please include phone number, e-mail, and mailing address

Project developer name and contact information (if different from the forest entity):

Please include phone number, e-mail, and mailing address

Project start date (month and year):

Check the project type:

(See Part II. A for additional information)

Conservation-based forest management _____

Reforestation _____

Conservation _____

Identify reporting entity and project developer (if different from the entity) as well as other relevant criteria, as identified in Part II. C:

Describe extent of entity level reporting (i.e. California or nationwide):

Identify project location, address, county and state, and describe characteristics of project area:

Project address, county or counties, and state:

Please check geographic boundaries for scope of entity reporting:

California only _____

Nationwide _____

Section II

Project description:

Please provide a detailed description of the physical characteristics of the project area (map can substitute if it includes the following information), including:

- latitude and longitude of project (or public survey information)
- Existing land cover and land use
- Topography
- Forest vegetation
- Site classes of project area
- Wildlife Habitat Relationship (WHR) Classes
- Watercourse in area
- Land pressures and climate regime

Please provide a detailed description of the project's goals, including its intended GHG reductions

Please provide a description of the project's local environmental benefits (e.g. water quality, biodiversity, habitat etc.)

Carbon Security and environmental integrity:

Please provide the date of easement execution and county in which easement was recorded (a copy of the easement will also be reviewed by the certifier):

Please describe how the terms of the easement conform with the Section 42823 of the California Public Health and Safety Code and are consistent with Section 170(h)(4)(A)(ii) and (iii) of Title 26 of the United States Code:

Please list the native tree species that comprise the project area:

If your project is conservation-based forest management, please describe how your project meets the natural forest management criteria:

Project Baseline and Additionality Analysis:

Please state the duration of your project (if any). If the project is perpetual, please indicate this.

Conservation-based forest management projects:

Please describe your baseline characterization – 1) its duration; 2) practices that will occur in the baseline over the baseline duration and 3) the assumptions that underlie this baseline characterization

Please cite the laws, regulations and rules that support your baseline characterization

Please describe the scope of your legal analysis to determine that statutes and regulations do not require the implementation of your project activities

Conservation Projects:

Please describe your baseline characterization (site-specific or land use trend table) and the nature of the project's conversion threat and the type of information you will supply to demonstrate this threat:

Please describe the scope of your legal analysis to determine that statutes and regulations do not require the protection of your project area from conversion:

If your baseline is based on the land use trend table, please state whether your project area is dominated by softwoods or hardwoods:

If your baseline is a site-specific, immediate threat, please describe the type of documentation that you will provide to demonstrate that your project area would have been converted to a non-forest use within five years from the date the project was initiated:

If your baseline is a site-specific, immediate threat, please describe the documentation that you will provide to demonstrate that the baseline conversion rate is consistent with similar conversions that have occurred in the region within the last five years:

Reforestation Projects

Please describe your baseline characterization, any practices that would have occurred in the baseline and the information that supports your baseline:

Please describe the documentation that you will provide to demonstrate that your project area was once in forest cover, but was out of forest cover for at least ten years prior to project initiation:

Please describe the scope of your legal analysis to determine that statutes and regulations do not require the protection of your project area from conversion:

All Projects

Please describe how your project is additional and the specific project activities that you will over the project life to ensure its additionality:

Leakage

Please attach your project's initial leakage assessment (See Annex D)

Do you address activity-shifting leakage or market leakage in your project design? If so, please explain how you do this:

Please identify the types of non-biological emissions that are or would be associated with your project (e.g. use of logging trucks and harvesting equipment)

ANNEX D- Project Monitoring Worksheets

**Monitoring Plan Worksheet—Direct Sampling
Monitoring Plan Worksheet--Annual Monitoring Report
Annual Leakage Assessment Questionnaire & Statement**

Monitoring Plan Worksheet – Direct Sampling

<p>Is there a change in your estimate accuracy for any carbon pools that rely on a sampling process using only plots that are 10 years old or less?</p> <p>Maximum sampling interval: Forest management – 10 years Reforestation – 10 years Conservation – 10 years (if reductions are counted over time)</p>	<p>(if yes, adjustments will need to be made to reporting of carbon stocks)</p>	
<p>Was there a natural significant disturbance or an unplanned harvest/removal not accounted for in original proposed project activity that triggered the current direct sampling? If yes, please describe briefly the nature and extent of the disturbance. (Direct sampling must occur & be reported w/in 3 years of disturbance/unplanned harvest.)</p>		
<p>Current Carbon Stocks (based on sampling from sample plots established in original project sampling design)</p>		
Pool	Originally Sampled?	Carbon (lbs.)
(1A) Tree biomass		
(2A) Shrub and Herbaceous understory		
(3A) Standing dead biomass		
(4A) Lying dead biomass		
(5A) Soil		
(6A) Wood products		
<p>Model used to project carbon stocks during project initiation:</p>		
<p>Projection of Carbon Stocks for current year (as estimated by model during project initiation or readjusted following previous direct measurement)</p>		
<u>Pool</u>	<u>Carbon (lbs.)</u>	
(1B) Tree biomass		
(2B) Shrub and Herbaceous understory		
(3B) Standing dead biomass		
(4B) Lying dead biomass		
(5B) Soil		
(6B) Wood products		

Comparison of Projected and Estimate of Carbon Stocks for the current reporting year–

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Pool	Formula	% Difference from projected
Tree biomass	$[(1A - 1B)/1B]*100\%$	
Shrub and Herbaceous understory	$[(2A - 2B)/2B]*100\%$	
Standing dead biomass	$[(3A - 3B)/3B]*100\%$	
Lying dead biomass	$[(4A - 4B)/4B]*100\%$	
Soil	$[(5A - 5B)/5B]*100\%$	
Wood products	$[(6A - 6B)/6B]*100\%$	
<p>* Positive values represent underestimations of carbon stocks, whereas negative values represent overestimations.</p>		
<p>Are any differences > 10% (positive only)?</p>		

Monitoring Plan Worksheet – Annual Monitoring Report

Reporting Period	
Project activity verification: (Describe activities taking place during the past year within the context of the initial project description.)	
Were there any unplanned harvests or other vegetation removals during the past year? If yes, provide description including dates, extent of removals, and impact on carbon stocks.²²	

²² Unplanned removals or significant natural disturbances require direct sampling follow-up (Part VI, G).

<p>Were there any natural significant disturbances during the past year? If yes, provide description including dates, extent of disturbance, and impact on carbon stocks.²³</p>	
<p>Were there any planned activities during the past year (as stated in original project description)? If yes, describe, including dates and extent of occurrence. Also, be sure to have any public documentation related to such activities (e.g. timber harvest plan) available for review by certifiers.</p>	
<p>Please identify and briefly describe any voluntary agreements that you have entered into within the past year that may impact your project's forest carbon stocks (e.g. habitat conservation plan)</p>	

²³Unplanned removals or significant natural disturbances require direct sampling follow-up (Part VI, G)

Annual Leakage Assessment Questionnaire & Statement

Forest entities must answer the following question:

1. Has your entity changed its operations outside of its reporting boundary as a result of participating in the Registry? If yes, please describe. (For example, if an organization is reporting its CA emissions, did it change its operations outside of the state as a result of participating in the Registry.)

For each emission reduction project, please answer the following questions:

Activity-Shifting Leakage

On-site:

2. If your project's physical boundaries are smaller than your entity's physical boundaries: has your entity's forest carbon stocks outside of the forest project boundary, but within your entity boundary, decreased over the past year? If yes, please answer questions 2a –f.
 - 2a. Is this decline consistent with your established entity baseline (if applicable)?
 - 2b. If this decline is not reflected in an established entity baseline, please explain the reason for the decline in stocks.
 - 2c. If your decline in entity stocks is not a result of activity-shifting leakage on-site, please explain how one of the exceptions in Part II, section H is applicable.
 - 2d. If you have established an entity baseline and your annual entity results indicate a negative deviation from the baseline, please calculate the difference between the entity baseline carbon stocks and annual reported amount and state the amount here.
 - 2e. If you have not established an entity baseline and your reported annual entity stocks show a decline from the previous reporting year, please calculate the difference and state the amount here.
 - 2f. Please state the amount of on-site activity-shifting leakage that you attribute to your project (s) over the past year.

Off-site:

3. Is there any evidence that your project caused another entity to change its operations or business activities? If so, what are the GHG implications of the changes to the other organization's activities? Does this represent positive or negative leakage?
4. (Optional) If possible, estimate the tons of C that will be lost due to activity-shifting leakage that occurred offsite in the past year.

Market Leakage (optional)

5. Has the project resulted in an increase or decrease in the production of commercial products? If so, please describe the amount of increase or decrease in production and estimate the associated GHG emissions.

6. Has this project resulted in an increase or decrease in the availability of land (i.e., for development of agriculture.) To the extent possible, please describe the scope of the increase or decrease.
7. Please describe any monitoring or market studies that were undertaken to estimate market leakage or impacts of your project.
8. If the answer to either question 5 or 6 is yes, has this change resulted in a change in the market for land or products? Please describe the potential market impacts.

Written Attestation Regarding On-site Activity-shifting Leakage

This statement serves as an assurance that activity-shifting leakage (please check one that applies) _____ has _____has not been detected during annual monitoring of the project.

Required: If activity-shifting leakage has been detected, please describe the nature and extent of the leakage:

Required: Additional Supporting Rationale:

Optional: Please estimate the amount of emissions caused by the leakage:

Authorized Representative

ANNEX E - References

Market Leakage References

Murray, Brian C, Bruce McCarl, and Heng-Chi Lee “Estimating Leakage from Forest Carbon Sequestration Projects”, 2003.

http://www.ssc.uwo.ca/economics/econref/html/WP2004/wp2004_3.pdf

Sohngen, Brent and Sandra Brown “Measuring Leakage from Carbon Project in Open Economies: A Stop Timber Harvesting Project in Bolivia as a Case Study 2” Department of Agricultural, Environmental and Development Economics, Ohio State University, 2003.

Sampling Methodology References

Avery, T. and Burkhardt, H. 1994. Forest measurements. McGraw-Hill. 408 pp.

Bell, J. and Dilworth, J. 1985. Log scaling and timber cruising. Oregon State University Book Stores, Inc.

Brown, J. K. 1974. Handbook for inventorying downed woody material. General Technical Report INT-16. USDA Forest Service Intermountain Forest and Range Experiment Station: Ogden, Utah. 24 pp.

Brown Sandra, David Shoch, Tim Pearson and Matt Delaney 2004. “Methods for Measuring and Monitoring Forest Carbon Projects in CA.” Winrock International: Arlington VA, for the Regents of California/ California Institute of Energy Efficiency.

Cairns, M. A., S. Brown, E. H. Helmer, and G. A. Baumgardner. 1997. Root biomass allocation in the world’s upland forests. *Oecologia* 111:1–11. D

Halpern, Charles B, Miller, Eric A., Geyer, Melora A. 1996. Equations for predicting aboveground biomass of plant species in early successional forest of the western Cascade Ranges, Oregon. *Northwest Science*. 70(4): 306-320

Hamburg, S.P. 2000. Simple rule for measuring changes in ecosystem carbon in forestry offset projects. *Mitigation and Adaptation Strategies for Global Change*. 5:25-37

Harmon, M.E. and J. Sexton. 1996. Guidelines for measurements of woody detritus in forest ecosystems. US LTER Publication No. 20. U.S. LTER Network Office, University of Washington, College of Forest Resources, Seattle, WA. 73 pp. (<http://www.lternet.edu/documents/Publications>)

Harmon, M.E., K.J. Nadelhoffer, and J.M. Blair. 1999. Measuring decomposition, nutrient turnover, and stores in plant litter pp. 202-240 In Robertson, G.P., C.S. Bledsoe, D.C. Coleman, and P Sollins editors, *Standard Soil Methods for Long Term Ecological Research*, Oxford University Press, New York.

Larsen, David R. 1999. *Course Woody Debris Estimation* The School of Natural Resources, University of Missouri-Columbia <<http://www.snr.missouri.edu/natr211/pdf/cwd.pdf>> May 4, 2004

MacDicken, K.G. 1997. A guide to monitoring carbon storage in forestry and agro-forestry projects. Winrock International Institute for Agricultural Development pp. 87

Robertson, G.P., C.S. Bledsoe, D.C. Coleman, and P. Sollins 1999. *Standard Soil Methods for Long Term Ecological Research*, Oxford University Press, New York.

Sampson, Neil. 2002. *Monitoring and Measuring Wood Carbon* The Sampson Group <<http://www.sampsongroup.com/Papers/Monitoring%20and%20Measuring%20Wood%20Carbon.pdf>> May 4, 2004

Van Wagner, C. E. 1968. The line intersect Method in forest Fuel Sampling. *Forest Science* 14(1): 20-26.

Warren, W. G. and P. F. Olsen. 1964. A line intersect technique for assessing logging waste. *Forest Science* 10:267-276.

Wenger, K.F. (ed.) 1984. *Forestry handbook*. 2d ed. John Wiley & Sons, New York. 1335 pp.

U.S. Department of Agriculture, Forest Service. 2003. *Forest inventory and analysis national core field guide, volume 1: field data collection procedures for phase 2 plots, version 1.7* U.S. Department of Agriculture, Forest Service, Washington Office. Internal Report. On file with: U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis, 201 14th Street Washington D.C. 20250

U.S. Department of Agriculture, Forest Service 2003. *Forest inventory and analysis methods for phase 3 measurements. Down Wood Debris and Fuels*. U.S. Department of Agriculture, Forest Service, Washington Office.
<http://fia.fs.fed.us/library.htm#Manuals>

U.S. Department of Agriculture, Forest Service 2003. *Forest inventory and analysis methods for phase 3 measurements. Soil Measurement and Sampling* U.S. Department of Agriculture, Forest Service, Washington Office.
<http://fia.fs.fed.us/library.htm#Manuals>

Wood Products References

Miner, Reid. 2004. "Characterizing carbon sequestration in forest Products in use" National Council for Air and Stream Improvement.
<http://www.ncasi.org/>

PART VII. PROJECT CONTRIBUTORS

Forest Work Group/Authors: The following individuals and organizations gave significant input into the writing and development of the Forest Protocols

California Climate Action Registry, Jill Gravender
California Department of Forestry and Fire Protection, Doug Wickizer
California Energy Commission, Jeff Wilson
Hancock Natural Resources Group, David Brand
Mendocino Redwood Company, John Nickerson
The Nature Conservancy, Cathleen Kelly
The Pacific Forest Trust, Michelle Passero
Winrock International, John Kadyszewski

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California Department of Forestry and Fire Protection, Andrea Tuttle,
California Department of Forestry and Fire Protection, Bill Schneider
California Department of Forestry and Fire Protection, Helgi Eng
California Department of Forestry and Fire Protection, Chris Maranto,
California Climate Action Registry, Diane Wittenburg
Mendocino Redwood Company, Mike Jani
The Nature Conservancy Ellen Hawes
The Nature Conservancy, Tia Nelson
The Nature Conservancy, Bill Stanley
Oregon State University, Mark Harmon
The Pacific Forest Trust, Laurie Wayburn
The Pacific Forest Trust, Jon Remucal
The Pacific Forest Trust, Wendy Rodgers
Societe Generale de Surveillance, Bill Reynolds
World Resources Institute, Suzie Greenhalgh
Gene Forsburg RPF, Buena Vista Services

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American Forest and Paper Association, F.Deer Gavora, Mitch Dubensky
Brown University, Center for Environmental Studies, Dr. Steven Hamburg
California Air Resources Board, Lisa Kasper
Climate Leaders, Vince Camobreco
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Conservation International, Sonal Pandya
Consultant, Mark Pawlicki
Environmental Defense, Melissa Carey
MJ Bradley and Associates, Brian Jones
National Council for Air and Stream Improvement, Dr. Alan Lucier
Natural Resources Defense Council, Jeff Fiedler

Oregon Climate Trust, Mike Burnett
Oregon Department of Forestry, Jim Cathcart
OSU Department of Forest Science, Dr. Mark Harmon
Pacific Gas & Electric, Wendy Pulling, Greg San Martin
Sierra Club, Paul Mason
Simpson Timber Company, Mike Truax
Societe Generale de Surveillance, Bill Reynolds
Society for the Protection of New Hampshire Forests, Charlie Niebling
Tellus Institute, Michael Lazarus
UC Berkeley Dept. of ESPM, Dr John Harte
Union of Concerned Scientists, Michelle Manion
USDA Forest Service, Richard Birdsey
USDA Global Change Program Office, Bill Hohenstein
US EPA Sequestration Branch, Ken Andrasko
UW College of Forest Resources, Dr. Jerry Franklin
Weyerhaeuser, Bob Prolman
World Resources Institute, Suzie Greenhalgh

PART VIII. BIBLIOGRAPHY

Birdsey, R.A. Carbon storage for major forest types and regions in the conterminous United States. In: Sampson, R.N. and Hair, D. (eds.) *Forests and Global Change Vol. 2: Forest Management Opportunities*, American Forests, Washington D.C. pp. 23-39 and App. 2 1996.

Brown, Sandra “Guidelines for inventorying and monitoring carbon offsets in forest-based projects” Winrock International. 1999.
<http://www.winrock.org/REEP/Guidelines.html>

Brown, Sandra “Measuring, monitoring and verification of carbon benefits for forest-based projects” *Philosophical Transactions: Mathematical, Physical & Engineering Sciences* 360. 1797:1669-1683 (2002).

Dixon R.K., et al. “Carbon pools and flux of global forest ecosystems. *Science* 263: 185-190. (1994).

Ellis, Jane “Developing Guidance on Monitoring and Project Boundaries for Greenhouse Gas Projects” Organisation for Economic Co-operation and Development. 2002. <http://www.oecd.org/dataoecd/44/50/2757386.pdf>

Ellis, Jane and Martina Bosi “Options for project emissions baselines Organisation for Economic Co-operation and Development and the International Energy Agency, 1999. <http://www.ghgprotocol.org/docs/options.pdf>

Hamburg, Steven. “Simple rules for measuring changes in ecosystem carbon in forestry-offset projects” *Mitigation and Adaptation Strategies for Global Change*, 5:25-37 Netherlands: Kluwer Academic Publishers, 2000.

Intergovernmental Panel on Climate Change, Working Group III to the Third Assessment Report, Bert Metz, Ogulade Davidson, Rob Swart, Jiahua Pan, Eds. *Climate Change 2001: Mitigation*, Cambridge University Press, 2001

Koch P. “Estimates by species group and region in the USA of I. Below-ground root weight as a percentage of oven-dry complete-tree weight; and II. Carbon content of tree portions. Consulting Report p. 23. Unpublished, (Sampson and Dwight, 1996) p 15, 1989.

MacDicken, K.G. “A guide to monitoring carbon storage in forestry and agro-forestry projects” Winrock International Institute for Agricultural Development. 1997. <http://www.winrock.org/REEP/PDF_Pubs/carbon.pdf>

Mayer, Kenneth E. and William F. Laudenslayer Jr. Eds. *A Guide to Wildlife Habitats of California*. Sacramento, CA: California Department of Fish and Game, 1988.

Prisley, S.P. and M.J. Mortimer. General guidelines for forest carbon accounting models: a synthesis of literature on evaluation of models for policy applications. In Press

Row, C. and R.B. Phelps “Wood Carbon flows and storage after timber harvest”. In: (Sampson, R.N. and D. Hair, eds.) Forests and Global Change Vol 2: Forest Management Opportunities for mitigating carbon emissions. P.27-58 American Forests, Washington D.C. 1996.

Sampson, Neil R. and Dwight Hair, Eds. Forest and Global Change Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions. Washington D.C.: American Forests, 1996.

Schwarze, Reimund, John O. Niles and Jacob Oleander, “Understanding and managing leakage in forest-based greenhouse-gas-mitigation projects” Philosophical Transactions: Mathematical, Physical & Engineering Sciences 360. 1797:1685-1703 (2002).

Skog, Kenneth E. and Geraldine A. Nicholson “Carbon sequestration in wood and paper products” USDA Forest Service General Tech Report RMRS-GTR-59 Chapter 5, 2000. <http://www.fpl.fs.fed.us/documents/pdf2000/skog00b.pdf>

Standards Australia Committee EV-015 Carbon Accounting for Greenhouse Sinks: Part 1 Afforestation and Reforestation. Sydney Australia: Standards Australia International, 2002.

U.S. Department of Energy “Sector Specific Issues and Reporting Methodologies Supporting the General Guidelines for the Voluntary Reporting of Greenhouse Gases under Section 1605(b) of the Energy Policy Act of 1992” Part 5 of 6 Forestry Sector. 1996. <http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/gg-v2-5-forest.pdf>

Willems, Stephane “Framework for baseline guidelines” Organisation for Economic Cooperation and Development. 2002. <http://www.ghgprotocol.org/docs/baseline-framework.pdf>

Watson, Robert T., Ian R Noble, Bert Bolin, N.H. Ravindranath, David J. Verardo, and David J. Dokken Land Use, Land-Use Change, and Forestry. Cambridge, UK: Cambridge University Press, Intergovernmental Panel on Climate Change, 2000.

World Resources Institute “The Greenhouse Gas Protocol: Project Quantification Standard Roadtest and Review Draft” World Resources Institute and World Business Council for Sustainable Development 2003. http://www.ghgprotocol.org/docs/GHG%20Protocol_ProjectRTDraft_linenumbers_Sept_2003.pdf

World Resources Institute “The Greenhouse Gas Protocol: A corporate accounting and reporting standard (Revised edition) 2004. <http://www.wristore.com/ghgprotorev.html>