COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION

DRAFT PROVISIONAL STANDARD
FOR SUSTAINABLE PRODUCTION OF AGRICULTURAL BIOMASS

April 14, 2010

CSBP

COUNCIL ON SUSTAINABLE BIOMASS PRODUCTION

The Council on Sustainable Biomass Production (CSBP) is a multi-stakeholder organization established in 2007 to develop comprehensive voluntary sustainability standards for the production of biomass and its conversion to bioenergy. CSBP intends for its Standard to serve as the foundation for an independent third-party certification program, which will set the emerging bioenergy industry on a course of continuous improvement. The participating members of the CSBP can be found on the website at: www.csbp.org**.** This document is prepared by the Council on Sustainable Biomass Production, and is the result of a collaborative effort by the members.

The following members associate themselves with this Provisional Biomass Producer Standard for Agriculture. Among these members, there is general agreement about the content of the standard, however not every member agrees with each of the statements in the document. In 2010, CSBP is conducting field testing and additional scoping to assess whether the provisions of the standard, individually and together, are feasible, auditable, sufficient to protect important environmental and social values and consistent with current science.

ArborGen LLC
Association of Fish & Wildlife Agencies
Ceres, Inc.
Chevron Corporation
Ducks Unlimited
Duke Energy
DuPont Danisco Cellulosic Ethanol LLC
Environmental Defense Fund
Mendel Biotechnology, Inc.
Monona Farms
National Wildlife Federation
Natural Resources Defense Council
NatureServe
Prairie Lands Bio-Products, Inc.
Show Me Energy Cooperative
Texas Agrilife Research & Extension, Texas A&M University
The Nature Conservancy
Theodore Roosevelt Conservation Partnership
Union of Concerned Scientists
Verenium Corporation
Weyerhaeuser Company
ZeaChem, Inc.

In addition, U.S. Department of Agriculture, U.S. Department of Energy and U.S. Environmental Protection Agency advised in the development of the Provisional Standard.

For further information on the **Council on Sustainable Biomass Production:**

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1. THE CSBP PROGRAM

1.1 WHO WE ARE

The Council for Sustainable Biomass Production (CSBP) was initiated to develop a voluntary sustainability standard for biomass[1] growers and bioenergy producers. After 18 months of work, CSBP agreed to develop a formal certification program and corresponding mechanism for verifying performance according to the sustainability standard - providing market recognition for biomass feedstocks and the bioenergy products they produce (fuel, electricity, and heat) that meet the standard - and guiding participants towards higher performance levels through continuous improvement.

CSBP has undertaken the unique challenge of promulgating a sustainability standard prior to the commercial-scale development of the biomass-based bioenergy industry. This ambitious objective sets CSBP apart from other standards organizations, which arose to improve production or management systems in a developed industry or to reward the best producers of a developed industry. This is particularly challenging because the science is still evolving best practices to produce biomass while protecting biodiversity, preventing undesirable land use change, and ensuring that soil and water quality are maintained or enhanced. The CSBP's ambition in meeting this challenge is captured in the vision and goal statements below.

- **Vision:** To ensure that in the United States biomass feedstocks and bioenergy (fuel, electricity, and co-generated heat) are produced in a sustainable manner, balancing economic, environmental and social imperatives.

- **Goal:** Generate broad multi-stakeholder consensus on guidelines for sustainability to set this emerging industry on a course of continuous improvement with full support from growers, germplasm providers, social and environmental interests, and refineries.

1.2 OUR HISTORY AND STATUS

Early in 2007, a group of companies, conservation organizations, academics, government agencies and growers met to discuss the fledgling biomass-based bioenergy industry and to consider how to ensure that biomass-based bioenergy would be produced sustainably. The companies included major international energy companies, companies developing cellulose to bioenergy conversion technologies, major developers of feedstocks for biomass-based bioenergy, early adopter growers of dedicated energy crops, and major environmental groups. Academics and representatives of the U.S. Department of Agriculture and Department of Energy rounded out participants in that first meeting.

The group agreed that it would be worth the time and energy to build consensus on sustainable practices, set this emerging industry on a course of continuous improvement, and avoid disputes over large-scale growing and harvesting of energy crops that will serve as feedstock for bioenergy facilities. To accomplish this, the organizations involved established the Council on Sustainable Biomass Production (CSBP) to develop a voluntary standard that would provide guidance to biomass producers and bioenergy companies on sustainable production methods for biomass-based bioenergy in the United States. *See above for a list of CSBP members.*

CSBP currently is managed by the Meridian Institute and Heissenbuttel Natural Resource Consulting. Meridian Institute designs and facilitates collaborative processes that help diverse parties identify critical issues, build relationships and trust, construct innovative solutions, and implement durable decisions (see www.merid.org). Heissenbuttel Natural Resource Consulting (HNRC) is a public affairs firm specializing in assisting organizations of all types to integrate the concept of sustainability into their strategic thinking and practices. CSBP intends to establish itself as an independent 501(c)3 nonprofit corporation in 2010.

CSBP intends to release a voluntary standard and establish a certification system that governs bioenergy production, meaning biomass production for liquid transportation fuel and biopower, in the U.S. The production of biomass for conversion into energy is the first step in this process, and the initial focus for CSBP. This portion of the draft standard focuses entirely on the feedstock side of the full production cycle. The full standard will be developed by 2012. Thus, the biomass production standard in this document pertains only to the responsibilities of growers. The later, complete standard will pertain to responsibilities of both growers and energy producers.

The Council also is committed to deploying a multi-stakeholder process to implement and manage the certification program. The Council is currently reviewing a number of structural options that would ensure multi-stakeholder governance, based on a review of other certification systems.[2]

[1] This Provisional Biomass Production Standard for Agriculture applies to dedicated fuel crops, crop residues, and native vegetation. It does not include food crops.

[2] The Council is reviewing: American Tree Farm System, ASTM, BIO Excellence through Stewardship, Forest Stewardship Council, Green Building Initiative ISO, Leadership in Energy and Environmental Design (LEED), Marine Stewardship Council, Programme for the Endorsement of Forest Certification, Responsible Care, and the Sustainable Forestry Initiative.

1.3 OBJECTIVES OF THE CSBP PROGRAM

At the outset, members of the Council agreed on a definition of sustainability to guide our process:

"Adopting practices and developing products that are environmentally, socially and economically sound, and that can meet present needs without compromising the ability of future generations to meet their needs."

Based on this definition and the vision and goal identified above, CSBP has identified the following objectives for its program:

- Develop and promote a voluntary certification system and corresponding verification mechanism for the sustainable production of biomass and bioenergy from the farm to the bioenergy facility.
- Work to ensure that biomass and bioenergy production systems maintain and enhance social, economic, and environmental well being. Establish and maintain a rigorous threshold for the sustainable production of biomass.
- Promote production of energy from biomass produced with a low carbon cost, including dedicated energy crops, crop residues, and native vegetation.
- Ensure that the expansion of biomass production is consistent with the protection of ecosystem services and biological diversity.
- From the launch of the program, certify as many acres of land that are in biomass production as possible that meet an entry level threshold for sustainable biomass production.
- Maintain a credible program in which growers achieve and are recognized in the market for environmental, social and economic sustainability through a certification regime that incorporates verification and reporting mechanisms.
- Establish a science-based standard for sustainable production of biomass and bioenergy that considers all relevant land use, water use, climate change, feedstock, biological diversity, and socioeconomic impacts.
- Encourage the practice of continuous improvement by program participants, as technological improvements allow and while maintaining the economic viability of the industry. The Council will also seek to continuously improve the standard, the certification program, and its own operations.
- Ensure that the standard is feasible and auditable and that all requirements are clearly linked to demonstrating the sustainability of biomass production and are not overly costly to meet.
- Include all relevant and affected stakeholders in development and implementation of the standard and certification system using consensus based decision-making. All members must support the goals and objectives of the CSBP program.

1.4 CERTIFICATION

The certification described by this standard applies to that biomass which can be distinguished as being produced in conformance with the CSBP standard. Conformance with the standard also requires a commitment on the part of the participant to continuous improvement and working to protect the credibility of the CSBP.

Scope of Participation: CSBP will encourage participants to adopt sustainable production practices on all of their biomass acreage. While participants may enroll a single field or management unit within a larger contiguous ownership[3], CSBP will require adherence to strict guidelines for producer claims regarding partial certification. Within five years of initial certification, all of the biomass to be used for biofuel or bioenergy production within the contiguous ownership must be in conformance with the CSBP standard to maintain certification. Some provisions of the CSBP Standard, particularly those related to protection of biological diversity at an eco-regional scale, may apply to entire contiguous ownerships from the time of enrollment.

Claims: Furthermore, because the program awards recognition to the biomass product and not the producer, any claim of producer affiliation to the CSBP program must refer to the product and to the level of participation in the program. For instance, it is permissible to state that "15% of the biomass from this farm is CSBP-certified" but not "Biomass produced on this farm is CSBP-certified," unless 100% of biomass produced on the farm is certified. It is never correct to claim that a farm or a producer is certified.

Optional Enrollment Period: During an optional trial period ("enrollment" period) of no more than three years, participants shall move towards economic, social and environmental sustainable performance, as measured by the specific Principles, Criteria, and Indicators (the "Standard") of the silver or gold levels of the Program.

Enrollees pledge that during this "enrollment" period, they are, to the best of their knowledge, actively working to meet the Standard in order to achieve certification. Enrollees can, if they choose, move straight into a third-party certification audit and begin the Program at the silver or gold levels.

During the "enrollment" period, participants will conduct annual self-assessments and report these results to the Program. Self-assessments must evaluate performance against all Principles,

[3] Fields management units must be distinct management units within the contiguous ownership where conformance with the CSBP standard can be established and biomass produced from the certified unit can be distinguished from adjacent units. A contiguous ownership are lands that are immediately adjacent or within the same county.

Criteria, and Indicators of the Program. CSBP will screen these self-assessments to monitor basic legal compliance and progress.

In conjunction with the Council's screening of self-assessments, and during the enrollment period, participants will conduct a preliminary baseline performance evaluation of their compliance, using a third-party auditor or another mechanism for quality assurance. The baseline evaluation will provide the participant with a comprehensive report on areas of compliance and areas where improvement is needed to meet the requirements of silver level certification. Participants may choose to attend a training program, utilize a guidebook offered by the CSBP, or have University Extension Service or other USDA NRCS review their Integrated Resource Management Plan (IRMP).

Participants may not make any claim regarding their participation in the CSBP during the enrollment period.

Silver Level Certification: Participant undergoes a third-party audit according to the specific Principles, Criteria, and Indicators of the Program. If a participant passes the audit, they can publicly claim that the product they produce is a "Silver" certified product. Only at that time, can they claim sustainable biomass production.

Gold Level Certification: The Gold standard is defined as the next and highest level of performance, where production practices significantly enhance environmental and socio-economic conditions beyond the baseline for sustainability set by the silver-level standard. High-level recognition is offered for gold standard adherents to the program, and needs to be specifically defined.

Upon achieving either the silver or gold level of certification, participants agree to undergo annual audits by a third-party CSBP-accredited auditor to insure ongoing compliance with the standard and to use the results to improve performance related to the standard over time, as technological improvements allow. CSBP recognizes that the marketplace claims for the two different levels requires further development. CSBP will ensure that the level of certification is clearly distinguishable for both business to business (off-product) as well as on-product claims of sustainability.

1.5 WHAT PROGRAM PARTICIPANTS CAN EXPECT FROM CSBP

CSBP will engage and support program participants in the following ways:

- Engage program participants in finalizing and updating the standard and certification program.
- Provide user-friendly educational materials about the requirements of the standard and management strategies for meeting it.
- Maintain strict confidentiality of all proprietary management and production information and data.
- Actively solicit input from growers if changes in the program may put their certification at risk.
- Promote research that advances economically viable sustainable production of biomass.

1.6 SCALABILITY OF THE STANDARD FOR GROWERS

CSBP is committed to establishing a sustainability certification program in which growers of all sizes can participate. CSBP recognizes that this will require keeping both the cost of meeting the standard and the cost of auditing and certification to levels manageable for small and large growers.

With respect to the costs of meeting the criteria and indicators, the CSBP standard is intended to be scalable, from farmers harvesting biomass on the margins of their croplands agriculture companies managing millions of acres. Scaling the standard to small and large growers will require accommodating business conditions on the ground that will change as the biomass-based bioenergy industry expands over time. The CSBP program will favor enrollment of the greatest numbers of acres on which production can meet its threshold sustainability standard and work with producers to improve outcomes over time on those acres. CSBP will provide guidance to program participants and auditors regarding how to appropriately apply the standard at various farm scales.

With respect to the costs of auditing and certification, the CSBP program will allow for biomass certification mechanisms that reduce costs for small-scale, individual growers, by allowing group certification on aggregated acreage from a group of growers utilizing common production methods, or their representatives (e.g., biomass aggregators). In addition, CSBP will accept sampling and programmatic approaches[4] to fulfilling criteria and indicators, for both individual and group certification, as considered appropriate by auditors.

1.7 APPROACH TO EVALUATING PARTICIPANT PERFORMANCE

There are two basic approaches to evaluating the environmental performance of an agricultural operation with respect to specific resource concerns: performance metrics or evaluation of practices implemented. Performance metrics provide participants a clear understanding about the relative success of resource treatments in place on an operation. In some cases, performance metrics may be expensive to test, or it may be difficult to establish a causal relationship between the resource that is being measured and the actions taking place on an operation. In these situations, the level of treatment of a resource concern can be evaluated by looking at the management practices that are in place. In many cases, state and

[4] Management planning for fields with comparable attributes based on sampled assessment or evaluation data.

federal agencies, universities and other organizations have identified management practices that have been proven effective in achieving environmental performance.

CSBP will use performance-based metrics in the standard when they can economically and feasibly be adopted in order to provide maximum flexibility to producers in meeting the standard. CSBP also will provide participants with guidance regarding practices that are likely to help them achieve required performance levels.

To the greatest extent practical and consistent with the standard, CSBP seeks to use the planning and evaluation protocols and tools developed by the Natural Resources Conservation Service (NRCS).

With respect to management practices, CSBP uses the framework of "conservation practices" and "conservation systems" employed by NRCS.

Conservation practices are agricultural management practices that have been determined by the Natural Resource Conservation Service as an effective method to address resource concerns, either alone or in combination with other practices. Conservation practices are not always equivalent to "best management practices."[5] In many cases, there are multiple conservation practice options that growers might consider for development of a resource conservation system to address a resource concern. In instances where producers wish to deviate from an established NRCS conservation practice standard required by the CSBP standard, the producer must provide a rationale for this deviation and demonstrate that all conservation goals are still being achieved.

To ensure that management practices serve as a reliable indicator of performance for a particular resource concern, program participants shall plan and implement their practices in a way that addresses all of the management components that comprise the conservation system required to address any particular resource concern. A management component is a specific part of agricultural management. The generic management components are: input management, field/stand management, harvest, incidental area treatment, carbon cost, and field/stand access (see Appendix B, Table 1 for further explanation of these components). For each resource concern being evaluated according to management practices for compliance with the standard, the participant shall check to see if all of the relevant management components are being addressed. CSBP will provide guidance to program participants regarding application of the management components framework to their operation.

[5] Best Management Practices (BMPs) are systems of specific practices designed to achieve certain benefits in the treatment of a particular resource concern. Most states have BMPs for agricultural operations related to water and soil. There can be significant variation in the quality of agricultural BMPs from one state to the next. Thus, a participant may have implemented all of the state-adopted agricultural BMPs within their state and still not be adequately addressing the resource concern.

1.8 ALIGNMENT WITH OTHER SUSTAINABILITY STANDARDS

CSBP maintains close communications with the American Tree Farm System (ATFS), Forest Stewardship Council (FSC), and the Sustainable Forestry Initiative (SFI) regarding their efforts to address biomass production and will seek to develop a complementary approach where there may be overlap.

CSBP also maintains close communications with the Roundtable on Sustainable Biofuels (RSB), an effort to develop an international "metastandard" for sustainable production of biofuels. CSBP will continue to work with the RSB to ensure that both standards are science based, focused on sustainable production of biomass, and are harmonized as much as possible.

1.9 FIELD TESTING OF THE PROVISIONAL BIOMASS PRODUCER STANDARD FOR AGRICULTURE

The **Provisional Biomass Producer Standard for Agriculture** contained in this document will be subject to field testing and additional scoping beginning in May, 2010. As part of the field testing effort, CSBP is commissioning an independent, third party evaluation to assess whether the provisions of the standard, individually and together, are feasible, auditable, sufficient to protect important environmental and social values, and consistent with current science. CSBP anticipates that the Provisional Standard will undergo substantial revisions -- on the basis of growers' experience with field testing and the evaluation CSBP has commissioned -- to ensure that the criteria and indicators of the Standard are consistent with the objectives of the Standard.

Once CSBP is satisfied that the standard is feasible, auditable, sufficient to protect important environmental and social values, and consistent with current science, CSBP will adopt a Final Standard for sustainable biomass production. CSBP will also develop a sustainability standard for biomass consumers who use CSBP certified biomass for conversion to bioenergy. Once these standards are complete, they will be reviewed and updated every three to five years.

2. CSBP'S APPROACH TO CLIMATE CHANGE

While this draft CSBP standard is focused on sustainable biomass production, CSBP anticipates completing biofuel and biopower certification programs subsequent to finalization of the biomass production standard. However in advance of the establishment of those standards, CSBP wishes to share its approach to biofuel and biopower standards as they relate to greenhouse gas emissions reductions. Greenhouse gas intensity of biofuel and biopower is of critical importance to the emerging cellulosic biofuel and renewable electricity industries. CSBP here outlines its approach to bioenergy GHG emissions to provide context for CSBP's requirements of growers regarding GHG emissions.

2.1 CSBP Standard for *Bioenergy* Greenhouse Gas Emissions

1. It is generally agreed that cellulosic biofuels and biopower should, considered over the whole life cycle, reduce greenhouse gas emissions relative to fossil-based energy.

2. The level of reduction in greenhouse gases required will be specified for both the silver and gold levels of the program and will be stated in physical units (g CO_2 eq/MJ) for the finished fuel or electricity.

3. In general the CSBP sustainable biomass standard will be applicable to feedstocks, but it is not possible to determine whether a greenhouse gas emissions target for biofuel or bioenergy has been met by considering only the characteristics of the feedstock. Therefore, it will be necessary to determine whether greenhouse gas emissions targets have been met based on the fuel or electricity produced by the bioenergy facility.

4. The evaluation/certification for greenhouse gas emissions will not be for the bioenergy facility as a whole, but for the portion of the fuel or electricity it produces using CSBP certified biomass. Certification will be for a percentage of all the fuel or electricity produced by that facility. This fuel or electricity may be fungible and the facility is not required either to track specific batches or to process only certified material, only to track the portion of its production derived from certified biomass.

5. The determination as to whether some of the fuels or electricity can be "certified" as sustainable with respect to greenhouse gas emissions targets will be based on the characteristics of the portion of the CSBP-certified feedstocks processed along with the characteristics of the processes of the bioenergy facility.

6. Feedstocks that are identified for "certification" as to greenhouse gas emissions targets must also satisfy all of the other sustainability principles that apply to feedstocks.

7. CSBP is currently developing a set of principles for the assessment of both attributional and consequential LCA models. Evaluation of feedstocks and refineries for greenhouse gas emission targets must be based on a life cycle assessment using a model that satisfies the LCA criteria developed by CSBP. To the maximum extent practicable, this assessment should utilize direct, measurement-based data.

8. The criteria for the greenhouse gas reduction principle will include a specification of the data about the feedstock that must be provided to a refiner so that an LCA evaluation can be made and verified.

An actual reduction in emissions for greenhouse gases compared to fossil fuels will apply in the CSBP standard for refiners and power producers to be developed by CSBP at a later time.

2.2 GHG Emissions Requirements

In the biofuel standard CSBP will be developing, CSBP is likely to set the silver standard at a level equivalent to the minimum reduction that is set by the federal government for cellulosic fuels to participate in the biofuels program governed by the Renewable Fuels Standard 2 (in current law a 60 percent reduction compared to gasoline blended in 2005).

For the gold standard, CSBP is likely to require a substantially greater reduction in emissions than is required for RFS biofuels. Evidence indicates that reductions substantially greater than 60 percent should be possible.

It is unclear at this time how CSBP will address the emissions reduction requirements associated with biomass used to produce electricity and heat.

Decisions regarding the targets for GHG emissions requirements will be based on thorough review of the scientific literature and other relevant references (such as documents developed by federal agencies), and consultation with relevant experts.

2.3 Indirect Land Use Change

In consultation with relevant experts, CSBP will explore a broad range of mechanisms to enable us to address potential emissions from indirect land use change associated with biomass production to ensure that cellulosic crops deliver significant overall GHG emissions reductions.

Among many factors, CSBP will consider the potential of increased yields of cellulosic crops to mitigate the possible indirect effects resulting from additional demand for land.

One approach CSBP may consider is whether the use of feedstock with minimal land use change impact might, along with a specified reduction of direct emissions, be an option in achieving the standard. For example, such feedstocks might be those drawn from: waste streams; crops grown on lands that have not recently been used, or are not suitable, for food or fiber production; and, biomass harvested from conservation lands

where a harvest provides supplementary revenue to support retention of the land in conservation status.

2.4 Greenhouse Gas Emissions Requirements of Growers for CSBP Biomass Producer Standard

In developing a program for the climate principle of the CSBP biomass standard, CSBP seeks an approach that:

a) Incentivizes production of low GHG intensity biomass,
b) Is scientifically valid, and
c) Is practically and economically feasible for growers.

These principles guided the CSPB's development of reporting and measuring GHG emissions standards, as outlined below.

2.4.1. Reporting Data on GHG Emissions

Program participants will be expected to provide data relevant to GHG emissions to the CSBP auditor and to the bioenergy facility to which the biomass will be sent (see Section 4, Criterion 4.1). It will be used by bioenergy facilities solely for the purpose of conducting life cycle assessment. All data will be kept strictly confidential by both CSBP and the bioenergy facility. In order to advance the science of biomass production, CSBP may request that data be aggregated with that of other growers in a manner that maintains confidentiality of the practices of any individual grower.

The categories of emissions identified under Criterion 4.1 represent those practices that life cycle assessment experts indicate influence greenhouse gas emissions resulting from biomass production. Not all are relevant to every grower. CSBP is continuing to consult experts regarding which of these factors most influence emissions, and will require growers to report only data for factors regarding which there is considerable variation among growers. Furthermore, CSBP will consider carefully where averaging is appropriate to reduce the burden of reporting for both small-scale and large-scale operations.

Within a life cycle assessment for biofuels or bioenergy, there are inputs for which industry average values are appropriate. Data for those factors will not be required. A full life cycle assessment will require integration of inputs from the grower as well as bioenergy facility operations and transportation.

Growers will not be required to minimize GHG emissions in all of the specified categories. Rather, they will have to determine how best to optimize production to deliver to refineries biomass that meets their GHG intensity requirements. Given highly variable production circumstances and methods, it is the effect of specific production practices that together will determine net GHG emissions. CSBP will provide guidance to growers regarding how they can reduce their GHG emissions.

CSBP recognizes that gathering and reporting data places a burden on all growers, particularly small growers, and seeks to minimize this burden to the greatest extent possible consistent with a scientifically-based GHG performance standard. CSBP has not made a determination regarding the scientific or practical feasibility of determining qualification under the standard based on a combination of feedstock type, land type, and production practices. CSBP will evaluate the supplementary adoption of scientifically valid, practice-based compliance mechanisms to certify biomass. Such mechanisms would necessarily consider variations by region, feedstock type, land type, and production practices.

2.4.2. CSBP Biomass GHG Intensity Scoring Tool

CSBP seeks both to provide tools to participants to help them understand how their production practices affect GHG emissions outcomes and to create incentives for growers to make continuous improvement in reducing the GHG intensity of the biomass they produce. To further these aims, CSBP is exploring the development of a tool to estimate the GHG intensity of biomass production. Along with such a tool, CSBP would provide technical guidance regarding the range of emissions reductions growers might expect from various practices.

A CSBP Biomass GHG Intensity Scoring Tool would be adapted from the biomass production portion of a life cycle assessment model that fulfills the CSBP "Principles for Greenhouse Gas Life Cycle Assessment" (available at www.csbp.org). The score generated by the tool would be based on the most important factors affecting the GHG intensity of biomass production. These factors would be a combination of default values and in-field measurements. The tool would not require any data not also needed by bioenergy facilities as described under criterion 4.1 above.

If developed, program participants might be required to use the tool to calculate and report the GHG intensity of their biomass production (Criterion 4.2).

2.5 Greenhouse Gas Expert Panel

CSBP has formed a panel of leading experts in GHG emissions related to biomass production and conversion to bioenergy to provide guidance to the Council regarding all aspects of the standard as they relate to GHGs, including:

- determining which data CSBP will require growers to collect and report for purposes of conducing GHG lifecycle analysis;
- assessing the viability of (and perhaps then developing) a GHG Scoring Tool for Biomass Production; and,
- suggesting how CSBP might structure incentives to growers to reduce GHG emissions from their operations.

3. PRINCIPLES IN BRIEF

CSBP expects that growers will consider how best to meet environmental, economic, and social objectives by selecting feedstocks and production systems that optimize the balance between improving yields, reducing inputs, limiting footprints, supporting biodiversity, and maintaining long term site productivity based on local conditions.

Maximizing production on lands dedicated to producing biomass and having additional lands with other primary uses provide supplementary biomass can help address the multiple demands for land resources in a sustainable way. Optimizing agricultural productivity (e.g., selecting feedstocks that balance interdependent goals of maximizing yields and minimizing input requirements based on local conditions) while limiting impacts to the environment can create profitable and sustainable agricultural systems, and help minimize the footprint required to support the growth of a large-scale industry of low carbon bioenergy.

The following principles express the key elements of sustainable biomass production and serve as the framework for the criteria and indicators of the standard.

3.1 INTEGRATED RESOURCE MANAGEMENT PLANNING

The preparation of and adherence to a complete management plan is considered the foundation for fulfillment of the standard and essential to ensuring that a grower can deliver on the multiple requirements for sustainable production.

PRINCIPLE: *Biomass production shall be based on an integrated resource management plan that shall be completed, monitored and updated to address objectives of the CSBP standard, appropriate to the scale and intensity of the operation.*

3.2 SOIL

This principle recognizes that soil stability is vital, and that soil fertility and organic matter are critical to the sustainable production of food, feed, fiber, and fuel.

PRINCIPLE: *Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.*

3.3 BIOLOGICAL DIVERSITY

The conservation of biological diversity is a critical component of sustainability at the field/stand level as well as at the landscape level. This principle articulates the expectation that growers will deploy management systems in their operations that maintain or enhance biodiversity.

PRINCIPLE: *Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.*

3.4 WATER

This principle recognizes the vulnerability of both the available water supply and the quality of available water. Biomass production should not contribute to the depletion of ground or surface water supplies. When irrigation is necessary, the most efficient irrigation technology appropriate to the circumstance should be used.

PRINCIPLE: *Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.*

3.5 CLIMATE CHANGE

One fundamental objective of biomass-based bioenergy systems is to mitigate GHG emissions, providing a low-carbon energy alternative to fossil fuels. This principle embraces full life cycle assessment (LCA) as the primary tool for ensuring substantive reduction in GHG emissions.

PRINCIPLE: *Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.*

3.6 SOCIO-ECONOMIC WELL-BEING

CSBP embraces a tripartite vision of sustainability, focusing on practices and products that are environmentally, socially and economically sound. This principle speaks to the need for sustainable distribution of socio-economic benefit to the various participants in biomass and bioenergy production systems. A sustainable commercial model benefits from the support of wealth creation in local communities.

PRINCIPLE: *Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.*

3.7 LEGALITY

Compliance with all legal requirements by a grower is a minimum expectation for the standard.

PRINCIPLE: *Biomass production shall comply with applicable federal, provincial, state, and local laws, ordinances, and regulations.*

3.8 TRANSPARENCY

The interactions of a participant with stakeholders must be conducted in a transparent manner while protecting commercially sensitive information and maintaining intellectual property.

PRINCIPLE: *Production of certified biomass shall be transparent.*

3.9 CONTINUOUS IMPROVEMENT

CSBP is committed to a process of continued assessment of the usefulness of the standard's practices to ensuring the desired sustainability outcomes. The standard will be updated periodically, incorporating scientific results that reveal better practices that are commercially viable. Growers are also expected to continuously improve performance as guided by annual certification audits.

PRINCIPLE: *Biomass production practices and outcomes shall continuously improve based on the best available science.*

PRINCIPLE 1 – INTEGRATED RESOURCE MANAGEMENT PLANNING

PRINCIPLE 1 - INTEGRATED RESOURCE MANAGEMENT PLANNING Biomass production shall be based on an integrated resource management plan that shall be completed, implemented, monitored and updated to address objectives of the CSBP standard, appropriate to the scale and intensity of the operation.	**Criterion 1.1Assessment** Conduct an assessment.	**1.1.S1 Baseline information** Program participant compiles and evaluates baseline information on existing conditions within the area proposed for certification to inform decisions about resource goals and land management options. **IMPLEMENTATION:** Assessments typically include gathering information on crop production, soils, natural vegetation cover, rare species and communities, existing wildlife habitats and aquatic ecosystems, and past and current land and water conservation activities. This information may pertain solely to the area proposed for certification or to a larger planning landscape that provides context for the area of interest. Given an understanding of expectations for certification, an assessment shall identify local factors that may influence options for biomass production as well as opportunities for integrating biodiversity conservation and wildlife habitat considerations into production goals. **For further indicators and implementation guidance regarding assessment, see the following:** 2.1.S1 Soil assessment and monitoring 3.1.S1 Assess habitat 3.1.S5 Control of Non-Crop Invasive Species 3.2.S1 Assessment of feedstock invasiveness 3.2.S3 Crop spread 4.1.S1 Integrated Resource Management Planning (Water Quality) 4.2.S1 Water management plan (Water Quantity) 4.3.S1 Integrated resource management plan (Aquatic Ecosystems)	**Criterion 1.2 Objectives** Identify management objectives.	**SILVER LEVEL INDICATORS** **Indicator 1.2.S1 Establish objectives** Program participant, using information developed during the assessment process, determines their priorities and describes management objectives and options for the area proposed for certification and for production, taking into account landscape factors as appropriate. **IMPLEMENTATION:** Certification criteria and indicators of the CSBP standard shall be addressed as appropriate for the area proposed for certification and the scale and intensity of the operation, at either the silver or gold level. As program participant priorities are established, consider significant issues and opportunities related to sustainability of biomass production and conservation of biodiversity and wildlife habitat. Certification indicators provide a structure for evaluating management practices, to identify potential conflicts, and to optimize achievement of management objectives. Explore opportunities to avoid, minimize, or mitigate environmental impacts during this phase. **For further indicators and implementation guidance regarding establishment of management objectives, see the following:** 2.1.S1 Soil assessment and monitoring 2.1.S2 Soil nutrient and conservation planning 3.1.S4 Rare, threatened and endangered wildlife and biodiversity 3.1.S5 Control of Non-Crop Invasive Species 3.2.S3 Crop spread 4.1.S1 Integrated Resource Management Planning (Water Quality) 4.2.S1 Water management plan (Water Quantity) 4.3.S1 Integrated resource management plan (Aquatic Ecosystems)

Criterion 1.3 **Management plan** **Develop and implement a plan.** **For further indicators and implementation guidance regarding establishment of management objectives, see the following:** 2.1.S1 Soil assessment and monitoring 2.1.S2 Soil nutrient and conservation planning 3.1.S4 Rare, threatened and endangered wildlife and biodiversity 3.1.S5 Control of Non-Crop Invasive Species 3.2.S3 Crop spread 4.1.S1 Integrated Resource Management Planning (Water Quality) 4.2.S1 Water management plan (Water Quantity) 4.3.S1 Integrated resource management plan (Aquatic Ecosystems)	**SILVER LEVEL INDICATORS Indicator 1.3.S1 Management planning** Program participant develops specific land management actions for each mapped production area, soil type, and vegetation cover type within the area proposed for certification. **IMPLEMENATION:** Depending upon the scope of the plan, management actions may be described for a larger planning landscape.	**Indicator 1.3.S2 Implementation** Program participant develops a timetable to implement management actions, and establishes a corresponding system for documenting implementation.	**Indicator 1.3.S3 Monitoring** Program participant continually monitors specific management practices in order to ensure that management objectives are being met.	**Indicator 1.3.S4 Adaptive management** Program participant adapts plans as needed to changing conditions. **IMPLEMENTATION:** To monitor the results of implementation over time, the plan shall identify relevant crop and natural resource measures and other indicators, including those used in the standard to assess achievement of certification criteria. The program participant also shall use those measures to identify improvement opportunities and adjust the management plan accordingly.	**Indicator 1.3.S5 Review** Management plans are comprehensively reviewed by program participant at least every five years and updated as needed.

PRINCIPLE 2 – SOIL

Principle 2 - SOIL Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.	**Criterion 2.1 Maintain or improve soil health** Minimize erosion and maintain soil carbon and nutrients at appropriate levels, as well as the overall physical, chemical and biological properties of the soil.	**SILVER LEVEL INDICATORS** **Indicator 2.1.S1 Soil assessment and monitoring** Program participant assesses and monitors nutrient levels of the soil or plants and soil capabilities guide management decisions. *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION:** Soil assessment shall be conducted at the level of the area proposed for certification and include use of data from soils maps where available. Soils shall be tested annually for organic matter and for nitrogen, phosphorus and other nutrients relevant to local resource concerns. Management decisions shall be based on soil capabilities in selection of species or crops, appropriate cultural practices, expected yields, and erosion control.	**Indicator 2.1.S2 Soil nutrient and conservation planning** Program participant conserves soil and maintains its productivity through an integrated resource management plan. *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION:** Agricultural program participants shall use planning protocols supported by the Natural Resource Conservation Service (NRCS) Conservation Planning process. Nutrients shall be managed to reduce loss to air and water.	**Indicator 2.1.S3 Residue removal** Program participant retains biomass materials required for erosion control and soil fertility. **IMPLEMENTATION:** The use of agricultural and forest residues shall not be at the expense of long-term soil stability, health and organic matter content.

Indicator 2.1.S5 Compaction Program participant identifies soils vulnerable to compaction and uses appropriate methods to reduce compaction if necessary and maintain site productivity.	**Indicator 2.1.S6 Road construction** Program participant limits field travel zones or paths as needed to meet management objectives. **IMPLEMENTATION:** Temporary field travel zones or paths should be used when practical and consistent with management objectives, and should be closed and rehabilitated when operations are complete.	**Indicator 2.1.S7 Erosion** For agricultural operations, score less than or equal to T on RUSLE-II, with recognition of variances for extreme weather events or upgrades to on-farm conservation systems.	**Indicator 2.1.S8 Soil carbon** Program participant maintains or improves soil carbon levels. **IMPLEMENTATION:** A zero or positive score on the Soil Conditioning Index shall be considered an adequate proxy for maintaining or improving soil carbon content.	**GOLD LEVEL INDICATOR** **2.1.G1 Soil function and productivity** Program Participant establishes comprehensive management planning and implementation of practices to improve soil function and productivity.

PRINCIPLE 2 – BIOLOGICAL DIVERSITY

Principle 3 - BIOLOGICAL DIVERSITY Biomass production shall contribute to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.	**Criterion 3.1** **Biodiversity** Ensure that biomass production systems support native biodiversity both on-site and at an eco-regional level. **IMPLEMENTATION:** Program participants shall consider eco-regional, state, and national conservation plans and develop plans and activities to protect biological diversity in consultation with resource agencies, conservation organizations, or expert professionals (who may be employees of the program participant).	**SILVER LEVEL INDICATORS** **3.1.S1Assessment of wildlife habitat** To support effective management planning, program participant assesses vegetation cover types and wildlife habitats on enrolled acres and associated incidental areas and, where credible data are available, across the landscape. *(Component of Principle 1: Integrated Resources Management Planning, 1.1 Assessment.)* **IMPLEMENTATION:** Specifications for assessment: The assessment shall be appropriate to the scale of the area proposed for certification and intensity of the operation and conducted prior to the commencement of site-disturbing operations. The assessment must be conducted during the "enrollment period." The prior condition of vegetation and habitat shall be considered in both the assessment and management planning. The assessment shall include, but not necessarily be limited to, information on known occurrences of rare, threatened, and endangered species and communities* and, important wildlife species and habitats identified in state wildlife action plans. (For assistance program participants should contact their State fish and wildlife agency's private lands division, State Natural Resources Conservation Service, state US Fish and Wildlife Service, office University Extension Wildlife specialists/staff, Wildlife Conservation Organizations, or private wildlife consultants). Findings of the assessment shall be documented and incorporated into planning and management activities. ***Footnote:*** Rare, threatened and endangered species and communities shall include species listed as endangered or threatened by the US Endangered Species Act; species and communities considered critically imperiled, imperiled, or vulnerable by NatureServe and Natural Heritage programs; and important wildlife species and habitats identified in regional, state, or national conservation plans (e.g., state wildlife action plans, conservation organization eco-regional conservation plans).

Indicator 3.1.S2 Habitats and their wildlife values Program participant develops and implements practices that contribute to the conservation of native vegetation and native wildlife and minimize the effects of their operations on wildlife habitat. **IMPLEMENTATION:** Practices to be adopted appropriate to scale of the operation and effect on the resource: Agricultural cropping systems shall conserve habitat of native wildlife and plants significant to maintenance of biological diversity. Program participants shall utilize diversity of feedstock within a stand as appropriate to provide structural habitat that supports native wildlife. Agricultural operations shall avoid harvesting during wildlife nesting, calving, fawning, and brood-rearing seasons by adhering to local primary nesting and fawning/calving season dates. Program participants shall retain sufficient vegetative cover for wildlife inhabiting their biomass fields (e.g. leaving stubble on the field, leaving strips of unharvested biomass, and/or other effective practices).Disruptive mechanical operations (such as, but not limited to, mowing, discing, and harvesting) shall be timed to minimize impacts on wildlife, especially during critical reproduction and migratory periods.	**Indicator 3.1.S4 Rare, threatened and endangered wildlife and biodiversity** Program participant develops and implements practices to protect rare, threatened and endangered wildlife and biodiversity appropriate to the scale and intensity of the operation. *(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION:** Management plans shall include measures needed to protect rare, threatened and endangered species (see footnote * above) as well as biodiversity.. Plans and activities shall be developed in consultation with resource agencies, conservation organizations, or expert professionals (who may be employees of the program participant), and shall include mapping, cataloging, and monitoring of biodiversity elements, as well as the design and adoption of set-asides, buffers, corridors, conservation management treatments, or other appropriate strategies to achieve conservation objectives identified in the IRMP and biodiversity protection.	**Indicator 3.1.S5 Control of Non-Crop Invasive Species** Program participant adopts conservation practices related to control of non-crop invasive species (e.g., those not intentionally planted) on biomass production acres. If invasive species are observed, program participant includes in the IRMP a strategy to manage them. *(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)*

GOLD LEVEL INDICATORS		
Indicator 3.1.G1 Enhance native and other priority wildlife habitat Program participant uses biomass production systems that enhance the value of wildlife habitats, and biodiversity conservation on an eco-regional scale, through a management plan that complements broader conservation efforts. **IMPLEMENTATION** Program participants shall enhance or restore habitat for native and other priority wildlife species identified in regional, state, or national conservation plans through some combination of the following or other beneficial practices, appropriate to the scale, intensity, and location of the operation: Establish and maintain new riparian buffers, Establish and maintain new wildlife corridors, Establish and maintain field borders, Plant and maintain hedgerows/windbreaks using diverse native species, Restore a portion of the site with native vegetation, Provide for expanded nesting/calving seasons, Leave stubble height that provides optimum wildlife cover, Leave some section of a field unharvested each year as a winter refuge, and/or companion plant.	**Indicator 3.1.G4 Use of natural ecological processes** Management plans incorporate the role of prescribed or natural fire or other ecological processes where appropriate and practical.	**Indicator 3.1.G5 Non-crop Invasive species** Habitat quality improved by implementing practices designed to control the spread of and reduce the occurrence of non-crop invasive species on enrolled lands. IMPLEMENTATION: Program participants shall contribute to the control of non-crop invasive species that may occur on their lands. Invasive species control may include prescribed fire, mechanical or chemical treatments of invasive species, or program participant cooperation in broader public programs to address invasive species problems in the community.

Criterion 3.2 Avoiding Introduction of Invasive Feedstock Species Avoid introduction or production of an energy crop that is potentially invasive in the target region and that may disrupt biodiversity on an eco-regional scale. **IMPLEMENTATION:** An important role in avoiding the introduction of invasive species is that of the seed or cultivar developer and feedstock consumer specifying which crops should be grown. A crop will not be deemed to be "introduced" if it is already in production at a reasonable scale in the target region for similar purposes (e.g., biomass production for pulp), and not been found to be invasive.	**3.2.S1 Assessment of invasiveness** Program participant does not utilize species that are known to be invasive or are potentially invasive in the relevant eco-region. Prior to planting, an assessment is completed by a suitable 3rd party (e.g., crop developer, academic scientist, government agency). *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment.)* **IMPLEMENTATION:** The following decision methodology will be used to determine whether a species is known to be invasive or potentially invasive in the target region. • A feedstock crop would be "known to be invasive" in the target region if it appears on a list for that target region compiled by a scientifically credible national, state, or county authority, and would therefore not be eligible for certification. • A feedstock crop will not require assessment for invasiveness if the crop has been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive. • If the crop is not "known to be invasive" in the target eco-region, but has not previously been grown in the target region or is a variety that includes characteristics beyond the known range of the species, then it will be evaluated to determine if it is "potentially invasive" in the target region. Such evaluation may include a published, peer reviewed, and validated tool (at this time, the Australian Weed Risk Assessment is the only such tool available) or other methods provided that the input data and results are scientifically credible and are made generally available for review. If the results of the assessment determine that the crop is not potentially invasive, it is eligible for certification. • If the results of the assessment determine that the crop is potentially invasive, additional protocols, still to be determined, will be required to determine whether the feedstock is eligible for certification in target region. This will include evaluating the crop for invasiveness using carefully controlled field trials in the target region.	**3.2.S2. Deployment of species and cultivars**: Program participant adheres to appropriate conservation practices, crop developer recommendations, and federally-mandated label requirements, where applicable, for species or cultivars being deployed.	**3.2.S3 Crop spread** Program participant includes, in the Integrated Resource Management Plan, protocols for the biomass crop prior to cultivation that includes, where applicable: • Adoption of conservation practices that limit potential for the spread of the crop, including: o Harvest, transportation, equipment cleaning, and storage protocols(e.g., steps to limit seed dispersal during transport). o Chemical or cultural control methods to ensure crop removal at the conclusion of production. • Conservation practices, or chemical, cultural or physical control methods, for removal of plants or pests that represent a significant risk of establishment outside the production system, including assistance to owners or managers of neighboring properties to respond if spread occurs. *(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION:** Where adoption of conservation practices do not prevent the establishment of a crop or its genetic material outside the production area; control methods taken by the responsible party fail to remediate the invasion of plants or genetic material within two growing seasons; and the invasion is considered problematic to the neighboring landowner/leaseholder or to the integrity of natural ecosystems, CSBP certification will be revoked.

Criterion 3.3 Land Conversion Promote the conservation of native ecosystems by limiting land conversion activities to lands that do not support important conservation objectives.	**SILVER LEVEL INDICATORS** **Indicator 3.3.S1: Documentation of vegetation category** Program participant has documented the vegetation category as of January 1, 2008, of all lands in each contiguous ownership / leasehold where they are seeking certification.	**Indicator 3.3.S2: Lands eligible for conversion** Program participant only shifts the intensity of land management in accordance with the matrix in Appendix C.	**Indicator 3.3.S3: Protection of known communities** Program participant protects known globally- and state-ranked G1-G3 / S1-S3 species and communities and supports inventory of lands where there could be a lack of information and a need for surveys and other information gathering. ***Note:*** Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage programs.

PRINCIPLE 3 – WATER

PRINCIPLE 4 – WATER Biomass and bioenergy production shall maintain or improve surface water, groundwater and aquatic ecosystems.	**Criterion 4.1 Water quality** Maintain or improve surface and ground water quality.	**SILVER LEVEL INDICATORS** **Indicator 4.1.S1 Integrated Resource Management Planning** Program participant complies with a water management plan that addresses impacts to water quality, or complies with an existing plan meeting these objectives. The Plan customizes application rates of agrochemicals based on results from soil and plant tissue testing conducted as recommended by the NRCS. *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION**: In cases where the participant does not apply manure, the participant shall have an up to date IRMP that addresses nutrient management planning, pesticide application (runoff and drift control) for their entire operation. In cases where the participant applies manure, an up to date Comprehensive Nutrient Management Plan (in accordance with NRCS FOTG) is also required. Plan should be based on university extension recommendations unless conditions on site differ significantly from the assumptions on which extension recommendations are based.	**Indicator 4.1.S2 Erosion and sediment** Program participant adopts conservation practices related to erosion control.	**Indicator 4.1.S3 Use of wastewater for irrigation** Program participant tests wastewater (or receives documentation of testing conducted by provider) and treats waste water as needed before using it for irrigation. **IMPLEMENTATION:** • Wastewater may be applied for irrigation, consistent with nutrient management planning. • Wastewater must be tested before application. Growers shall secure documentation of testing by the water provider or shall have the water tested themselves. • Animal wastewater must be tested for N, P, and TSS. • Wastewater from municipal sources shall be tested for N, NO3, P and TSS. • Wastewater from industrial sources must undergo a complete chemical profile, to include metals, ions, organics, and volatiles.

Indicator 4.1.S4 Trace elements in biosolids Program participant tests sludge and manure for heavy metals on a quarterly basis.	**Indicator 4.1.S5 Nitrogen** Program participant uses a farm gate nitrogen budget to balance nitrogen entering and leaving operation with minimum amount of residual nitrogen left on operation, or adopts a comprehensive set of conservation practices. **IMPLEMENTATION:** Conservation practices must address N management at each point where it needs to be managed in operation, and shall include: nutrient balancing, nutrient use efficiency, field management, in-field treatment, and edge of field management.	**Indicator 4.1.S6 Phosphorus** Program participant adopts a comprehensive set of conservation practices that address phosphorus management if fertilizer (organic or synthetic), sludges or manure is applied. Program participant takes steps necessary (either through reduced application or additional mitigation measures) to achieve a score of low or medium risk on the NRCS Phosphorus Index. **IMPLEMENTATION:** Conservation practices must address each point where P needs to be managed in the operation. These points include: nutrient balancing, nutrient use efficiency, field management, in-field treatment, and edge of field management. The Phosphorus Index can be found at http://www.nrcs.usda.gov/technical/ecs/nutrient/pindex.html.	**Indicator 4.1.S7 Pesticide management** Program participant adopts pest management methods that effectively control outbreaks of pests, diseases, fire, and introduction of invasive plants while not harming human health or the environment. **IMPLEMENTATION:** Integrated Pest Management (IPM) shall be used when practical. Regardless of use of IPM, pest management methods shall include: a. Where possible, use of least-toxic and narrow-spectrum pesticides to achieve management objectives. b. Application of pesticides in compliance with label requirements. c. Application of pesticides in accordance with conservation practices. d. Provision of equipment and training to employees and contractors for the safe application, storage of pesticides and response to hazardous spills. e. If biological control agents are used, they are applied by trained workers using proper equipment. Their use will be documented, monitored and strictly controlled in accordance with state and national laws and internationally-accepted scientific protocols.	**Indicator 4.1.S8 Pesticide use** Program participant mitigates for impacts on identified resource concerns (e.g., through erosion control, timing of application, etc.) when risk ratings on the Natural Resources Conservation Service Windows Pesticide Screening Tool (NRCS' WIN-PST) are intermediate or greater.	**Indicator 4.1.S9 Waste Disposal** Program participant disposes of agricultural chemicals, containers, and liquid or solid non-organic wastes, including fuel and oil, off-site and in compliance with federal and state laws.

GOLD LEVEL INDICATORS **Indicator 4.1.G1 Management practices more rigorous than conservation practices** *Note: Where adjoining waterways meet water quality standards for pollutants related to agricultural production, participants will be exempted and must only comply with silver level indicators.* Program participant applies management practices demonstrated through research to improve surface and/or ground water quality.	**Indicators 4.1.G2 Pesticide use** Program participant achieves a score of low risk on the Natural Resources Conservation Service Windows Pesticide Screening Tool (NRCS' WIN-PST).	**Indicator 4.1.G3 Pesticide use** Program participant adopts Integrated Pest Management (IPM) as an integral part of the management plan, with prevention, biological control, and cultural control methods rather than chemical pesticides used whenever they are a reasonable option.	**Indicator 4.1.G4 Precision agriculture** Program participant uses precision agriculture or other equivalent applications appropriate to the scale of the operation to reduce the operation's environmental footprint.

Criterion 4.2 Water Quantity Irrigation and water management practices do not deplete the quantity of surface or ground water.	**SILVER LEVEL INDICATORS Indicator 4.2.S1 Water management plan** Program participant provides annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices. *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)* **IMPLEMENTATION:** a) Water management plans must include: A strategy to maximize efficiency in irrigation systems and reduce water use where possible. Re-use of treated wastewater where possible. b) Conservation practices related to water management shall be adopted.	**Indicator 4.2.S4 Legal compliance** Program participant demonstrates compliance with local water laws.	**Indicator 4.2.S3 Preventing Depletion** In areas where the local water authority determines that ground or surface water is being depleted faster than it is being naturally replenished, program participant acquires existing water rights for any new irrigation, rather than securing new water rights from the local water authority, that would increase ground or surface water depletion rates. **IMPLEMENTATION:** a) Areas with depleted water supplies are identified by state designations or local designations where applicable. b) New irrigation in areas with depleted water supplies can only be done if it is offset by a reduction elsewhere in the irrigation district, unless the irrigation is just done for perennial crop establishment purposes for one or two years.

Indicator 4.2.S2. Use rights Program participant uses for irrigation only water for which they held legally valid use rights before commencement of biomass production or rights that have been subsequently acquired through legal means.	**Indicator 4.2.S5 Irrigation /Salinity** Program participant demonstrates that salinity of soil is within acceptable parameters for the crop produced. **IMPLEMENTATION:** If soil salinity exceeds acceptable parameters, program participants shall take action to bring soil salinity into acceptable parameters. One method to consider is NRCS Salinity and Sodic Soils Management (Practice code 610).	**Indicator 4.2.S6 Maximum water use per acre** Program participant measures water use in a fashion that allows calculation of acre-feet of water applied per acre of cropland and ensures that water use per acre of cropland is consistent with the water use rates of the most efficient irrigation technology available in the area for the same or similar crops. **IMPLEMENTATION:** Water recycled within an operation should only be counted as being applied once. Where specific circumstances warrant the use of other irrigation methods, program participants shall provide satisfactory documentation of the rationale and demonstrate that water is being used in the most efficient manner reasonable given the circumstances. In their assessment of the appropriateness of alternative irrigation methods, auditors may consider groundwater levels, soil type, topography, existing permits, water source, use of recycled water, use of irrigation to deliver fertilizers or pesticides, and other relevant factors.	**GOLD LEVEL INDICATOR** ***Note:*** *If there is no irrigation, program participants will qualify for the gold level. Short-term use of irrigation for establishment of perennial crops will be permitted.* **Indicator 4.2.G1 Water Savings** Program participant achieves a net reduction in water use, either on their operation or within an irrigation district, and demonstrates that unused water is returned to the environment according to the relevant laws and procedures.

Criterion 4.3 Aquatic ecosystems Preserve or enhance the functions and services of aquatic ecosystems.	**Indicator 4.3.S1 Integrated resource management plan** Program participant complies with an integrated resource management plan that addresses the impact of operation on aquatic ecosystem health within the watershed. *(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)*	**Indicator 4.3.S2 Stream flow** Program participant adopts conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices.	**Indicator 4.3.S3 Stream temperature** Program participant adopts conservation practices considered sufficient to avoid negative impact on local stream temperature regimes, conservation practices	**Indicator 4.3.S4 Hypoxia** Program participant does not increase the risk of hypoxia in downstream environments. (This indicator will be assumed to be met if silver level water quality indicators are met.)	**Indicator 4.3.S5 Wetlands** Program participant prevents negative impact on local wetlands through adoption of relevant conservation practices and other measures as appropriate. **IMPLEMENTATION:** Program participants shall not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision.	**GOLD LEVEL INDICATORS** ***Note:*** *Participants in areas where aquatic ecosystems of receiving waters are healthy and there is little room for improvement will be exempted from additional action as long as conditions remain stable.* **Indicator 4.3.G1 Management Practices** Program participant applies management practices demonstrated through research to improve the functions and/or services of aquatic ecosystems.

Principle 5: Climate Change

PRINCIPLE 5 – CLIMATE CHANGE Bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.	**Criterion 5.1** Program participant provides data needed for the biofuel or biopower producer to conduct a life cycle assessment (LCA) that accurately reflects emissions from the production and pre-conversion processing of biomass on the acres under consideration for certification.	**Indicator 5.1.S1** Yield	**Indicator 5.1.S2** Emissions resulting from production inputs (fertilizer, pesticides, fuel).	**Indicator 5.1.S3** Emissions resulting from land conversion, planting methods, and tillage practices.	**Indicator 5.1.S4** Emissions resulting from soil carbon depletion, including from crop/forest residue removal.	**Indicator 5.1.S5** Emissions resulting from harvesting, collection, handling, processing, and storage of biomass.	**Indicator 5.1.S6** Emissions resulting from transportation of biomass.

Principles 6: Socio-Economic Well-Being

PRINCIPLE 6 - SOCIO-ECONOMIC WELL-BEING Biomass feedstock production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders, (including land owners, farm workers, suppliers, biorefiners, and local community)ensures compliance or improves upon all applicable labor and human rights laws, and provides for decent working conditions and terms of employment.	**Criterion 6.1 Compliance with labor law** Ensure that human rights and labor laws are respected in biomass production fields.	**SILVER LEVEL INDICATORS** **Indicator 6.1.S1 Fair Labor Standards Act** Program participant demonstrates compliance with the Fair Labor Standards Act (FLSA) and all other federal and state labor laws. IMPLEMENTATION: Employers shall maintain and provide documentation of compliance with the Fair Labor Standards Act (FLSA) provisions concerning minimum wage and overtime pay; health, retirement and leave benefits; equal opportunity hiring; safety and health in the workplace; fair youth employment; and, union rights, among others, unless state law requires greater employee protection.	**Criterion 6.2** **Fair treatment of workers** All workers shall receive fair treatment.	**Indicator 6.2.S1 Grievance procedures** Program participants with 10 or more full time employees (including seasonal workers) have a management policy that provides a mechanism for employees to raise concerns, safety issues, or grievances without fear of termination or any other reprisal, and inform workers of the policy at the time of hire or adoption of the policy.	**Indicator 6.2.S2 Employment contract** Employer provides workers with a written agreement (e.g., employment contracting) describing the terms of hire. **IMPLEMENTATION:** The contract must include the following provisions: - the employer shall not require workers to work more than 12 consecutive hours in a 24- hour period - workers are provided a minimum of 24 consecutive hours rest (one day off) for every six consecutive days of work - specify that if an employee is underperforming, employer will provide employee an opportunity to improve their performance before terminating employment.	**Indicator 6.2.S3 Workplace improvements** Program participant provides opportunities for employees to make suggestions for workplace improvements.

Criterion 6.3 Environment, Health and Safety (EHS) Program participant shall ensure that biomass production activities are conducted in a manner that protects the health and safety of employees.	**Indicator 6.3.S1 Compliance with laws and regulations** Employer maintains and provides documentation of compliance with federal, state, and local occupational health and safety laws and regulations.	**Indicator 6.3.S2 Training** Employer maintains and provides documentation that employees are trained for health and safety in the workplace. IMPLEMENTATION: All employees, including seasonal employees, receive health and safety information, in a language they understand. All full time employees receive health and safety training and get updated training at least every 5 years. All employees using potentially dangerous chemicals and machinery have received appropriate training. Supervisors are trained in emergency procedures and all provided information about who to contact in case of emergency and location of emergency kits.	**Indicator 6.3.S3 Hazardous Materials Protection** Employer provides and employees use adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs for workers handling highly toxic chemicals.	**Indicator 6.3.S5 Accidents and injuries** Employees are prepared to handle injuries and chemical spills. IMPLEMENTATION: Employees have access to well-stocked first aid kit at each work site. Employees are trained in emergency response procedures. Appropriate to the size of operation, procedures, materials, and training to address spills of hazardous materials are maintained.	**Indicator 6.3.S5 Sanitation** Employer provides clean drinking water and clean latrines with handwashing stations to workers.	**Indicator 6.3.S6 Insurance against workplace injury** Employer provides workers compensation and disability insurance for all full time employees.

Criterion 6.4 Freedom of association Workers may organize and associate freely, including for negotiating working conditions.	**Indicator 6.4.S1 Freedom of association** Employer respects the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions. IMPLEMENTATION: Verified through private interviews with employees.	**GOLD LEVEL** **Criterion 6.5 Additional benefits** Program participant shall provide benefits beyond what is expected of them to meet the silver standard and to comply with Federal and State law. **Indicator 6.5.G1 Additional benefits** Employer complies with at least two of the following: • Provide hourly employees or subcontractors overtime pay of 1.5 times regular wages after 40 hours of work per week and for work on Sundays. • Provide at least 10 days annually of paid leave to all employees working 20 or more hours per week (pro-rated for less than full time workers) . • Provide at least 5 days annually of paid sick leave to all employees working 20 or more hours per week (pro-rated for less than full time workers). • Contribute at least $100 per month to the cost of family major medical health insurance or to a health savings account for all employees working 20 or more hours per week (pro-rated for less than full time workers).

Principle 7: Legality

PRINCIPLE 7 - LEGALITY Biomass production shall comply with applicable federal, state, and local laws, statutes and regulations.	**Criterion 7.1** Program participant and employees are knowledgeable about and comply with laws, statutes, and regulations applicable to their operation.	**SILVER LEVEL INDICATORS** **Indicator 7.1.S1 Knowledge of law** Program participant, employees, and relevant contractors are able to demonstrate working level awareness and knowledge of the laws, statutes, and regulations that apply to their ownership / leasehold and operation.	**Indicator 7.1.S2 Ensuring compliance** Program or processes to ensure compliance with applicable laws, ordinances, and regulations are in place.	***Note: There are no additional criteria or indicators for the Gold level standard for the Legality principle.***

Principle 8: Transparency

PRINCIPLE 8 - TRANSPARENCY Production of certified biomass shall be transparent.	**Criterion 8.1** Make results of certification audits and general information related to producing sustainable biomass available to the public.	**SILVER LEVEL INDICATOR** **Indicator 8.1.S1** Program participant promotes transparency by allowing the Council to release summary certification audit reports that do not contain any proprietary data to the public upon request. (CSBP will not require public disclosure of proprietary information or information protected by intellectual property laws.)	**GOLD LEVEL INDICATOR** **Indicator 8.1.G1** Program participant supports and promotes at the local, state or other appropriate level, mechanisms for public outreach, education, and involvement related to sustainable biomass production. **IMPLEMENTATION:** This could include things like: a. field tours, seminars, or workshops; b. educational trips; c. publication of articles, educational pamphlets, or newsletters; or, e. Support for state and local organizations and soil and water conservation districts.

Principle 9: Continuous Improvement

PRINCIPLE 9 - CONTINUOUS IMPROVEMENT Biomass producers and fuel developers will continuously improve practices and outcomes based on the best available science.	**Criterion 9.1** Comply with all changes made to the standard over time.	**SILVER LEVEL INDICATORS** **Indicator 9.1.S1** Program participant complies with changes to the standard within the specified compliance period.	**Criterion 9.2** Demonstrate efforts to improve the environmental outcomes of operations.	**SILVER LEVEL INDICATORS** **Indicator 9.2.S1 Improve performance** Program participant demonstrates efforts to improve environmental performance based upon monitoring programs and actions to address any non-conformances identified during certification audits.	**Indicator 9.2.S2 Auditor recommendations** Program participant considers adoption of practices recommended by auditors to improve performance to the standard.	**GOLD LEVEL INDICATOR** **Indicator 9.2.G1** Program participant initiates or participates in programs that contribute to the expansion of public scientific knowledge related to sustainable biomass production. **IMPLEMENTATION:** Program participants can contribute to development and testing of increased scientific knowledge and technology by providing funding, in-kind support, or study sites for new research and development to improve sustainable biomass production. This may be accomplished individually, through cooperative efforts, or through industry associations and producer communities. Small producers shall explore collaborative research and testing opportunities through universities, government agencies, and industry processing facilities in their communities.

GLOSSARY

Aggregator: any individual or organization that combines biomass from multiple individual producers for sale to a bioenergy facility.

Agriculture: all facilities and equipment engaged in growing crops and raising animals. (Department of Energy)

Aquatic ecosystems: a basic ecological unit composed of living and non-living elements interacting in an aqueous environment. (U.S. Fish and Wildlife Service)

Bioenergy: energy produced from biomass (electricity; liquid, solid, and gaseous fuels; and heat). (Cornell University College of Agriculture and Life Sciences)

Biological diversity (biodiversity): the variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global. (Helms)

Biofuel: Biomass converted to liquid or gaseous fuels such as ethanol, methanol, methane, and hydrogen. (National Renewable Energy Laboratory)

Biomass: organic matter intended for conversion into bioenergy or other bioproducts, including dedicated fuel crops, crop residues, purpose-grown wood, forestry residues, and native vegetation. (CSBP specific definition)

Biopower: the use of biomass to generate electricity; system technologies include direct-firing, co-firing, gasification, pyrolysis, and anaerobic digestion. (National Renewable Energy Laboratory)

Biorefinery: a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass. (National Renewable Energy Laboratory)

Conservation Practice: an agricultural management practice that have been determined by the Natural Resource Conservation Service as an effective method to address resource concerns, either alone or in combination with other practices. Conservation practices are not equivalent to "best management practices." In many cases, there are multiple conservation practice options that growers might consider for development of a resource conservation system to address a resource concern.

Criterion: A category of conditions or processes by which biomass production can be assessed: characterized by a set of related indicators which are monitored periodically. (adapted from Forest Stewardship Council)

Cultural Vegetation: vegetation with a distinctive structure, composition, and development determined by regular human activity. Cultural vegetation has typically been planted or treated, and has relatively distinctive physiognomic, floristic, or site features when compared to natural vegetation. Distinctive physiognomic and structural attributes typically include one or more of the following:

a) Dominant herbaceous vegetation that is regularly-spaced and/or growing in rows, often in areas with substantial cover of bare soil for significant periods of the year, usually determined by tillage or chemical treatment.

b) Dominant vegetation with highly-manipulated growth forms or structure rarely found as a result of natural plant development, usually determined by mechanical pruning, mowing, clipping, etc.

c) Dominant vegetation comprised of species not native to the area that have been intentionally introduced to the site by humans and that would not persist without active management by humans.

Eco-region: a relatively large unit of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. (WWF)

Ecological Society of America (ESA): a nonpartisan, nonprofit organization of scientists founded in 1915 to promote ecological science by improving communication among ecologists; raise the public's level of awareness of the importance of ecological science; increase the resources available for the conduct of ecological science; and ensure the appropriate use of ecological science in environmental decision making by enhancing communication between the ecological community and policy-makers. (www.esa.org)

Ecosystem services and resources: goods and services that are traditionally viewed as free benefits to society, or "public goods," including wildlife habitat and diversity, water filtration, carbon storage, and scenic landscapes. (USDA Forest Service)

Edge of field management: a management practice, usually in the form of a forest or grass buffer, that protects the environment from adverse impacts associated with intense agricultural production. (Dabney, Moore, and Locke , *Integrated Management of in-Field, Edge-of-Field, and after-Field Buffers*)

Energy crop lands: land used to grow crops that are specifically grown to produce some form of energy.

Environment, Health and Safety (EHS): broad set of regulations or procedures to ensure acceptable working conditions.

Extensive management: low level of management, with little human intervention, to improve yield per acre. (US Forest Service)

Fair Labor Standards Act (FLSA): establishes minimum wage, overtime pay, recordkeeping, and youth employment standards affecting employees in the private sector and in Federal, State, and local governments. (Department of Labor)

The Federal Geographic Data Committee (FGDC): an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. (www.fgdc.gov)

Field management: fields and forest stands are distinct management units within the contiguous ownership where conformance with the CSBP standard can be established and biomass produced from the certified unit can be distinguished from adjacent units.

Fragile ecosystems and landscapes: Native ecosystems characteristic of locations where environmental extremes (substrates, climates) severely constrain biotic composition, rates of succession are very slow, recovery from human disturbance is very slow (several decades-to-centuries) or poorly understood, and environments are documented as being particularly susceptible to invasion by non-native species when disturbed by humans. (NatureServe) Greenhouse gas (GHG) emissions: releases of gases that trap heat in the atmosphere, contributing to climate change. These gases include carbon dioxide (CO2), methane, and chlorofluorocarbons (CFSs). Greenhouse gases (GHGs) are often measured in equivalents to carbon dioxide (CO2-e) as CO2 is the most prevalent GHG.

Group certification: an arrangement by which biomass production management units (i.e., fields or forest stands) owned or managed by a number of distinct legal entities (group members) may be evaluated and subsequently certified within the scope of a single certificate. (adapted from Forest Stewardship Council)

Incidental areas: idle lands that are not used for forage or crop production immediately adjacent to (e.g., hedgerows) or within (e.g., watercourses, wetlands) agricultural fields or forest management units.

Indicators: a quantitative or qualitative variable that can be measured or described, and which provides a means of judging whether biomass production complies with the requirements of a criterion. (adapted from Forest Stewardship Council)

Indirect land use change: land use change likely to have indirectly resulted from changing patterns in land management practices in another location. There is a wide range of opinion concerning the extent to which increased use of land to grow crops for biofuels is resulting in more conversion of forests to crop production in order to make up for land taken out of crop production to grow biomass.

Integrated Resource Management Plan: a comprehensive and detailed plan that outlines management goals and objectives for a designated area of land, based on consideration of all of the resources on that land and that may be impacted by activities on that land, and that specifies the practices that will be used to achieve management objectives.

Intensive management: utilizing practices and production methods to maximize production per acre.

Invasive species: plants, animals, and microbes not native to a region, which when introduced either accidentally or intentionally cause economic or environmental harm or harm to human health. (USDA National Agricultural Library, http://agclass.nal.usda.gov/)

Landowner priorities: the primary goals a landowner has for their ownership.

Life cycle assessment (LCA): a technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by: compiling an inventory of relevant energy and material inputs and environmental releases; evaluating the potential environmental impacts associated with identified inputs and releases; interpreting the results to help you make a more informed decision. (EPA)

Management component : a specific part of agricultural and/or forestry management, including: input management, field/stand management, harvest, incidental area treatment, carbon cost, and field/stand access.

Management objectives : the specific aims a landowner or manager seeks to achieve through management plans and practices.

Management options : different practices or programs that may be used to achieve management objectives.

Management practices : specific activities, measures, courses of action, or treatments used to achieve management objectives.

Mitigation: 1. action taken to alleviate potential adverse effects of natural or human-caused disturbances 2.compensation for damage done – note in this usage, in-kind mitigation is replacement of a lost resource with one similar (stream for stream or species for species), while out-of-kind is replacement of one kind with another (lake for stream or one species for another).

Narrow spectrum pesticide: a selective pesticide (usually an insecticide) that is toxic to one or a few species or species groups —*synonym* selective pesticide. Contrast with broad-spectrum pesticide (a nonselective pesticide - usually an insecticide -that is toxic to many species).

Natural Heritage programs: state-level programs that manage site-specific and species/ecosystem-specific information on priority species and ecosystems identify which species and ecosystems are priorities for conservation effort; build and maintain a database for priority species and ecosystems; and share the information with others so that it can be used for environmental assessments and conservation planning purposes. (Washington State Department of Natural Resources)

Natural/native ecosystems and lands: Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms

recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes. (NatureServe)

NatureServe : a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action; represents an international network of biological inventories-known as natural heritage programs or conservation data centers-operating in all 50 U.S. states, Canada, Latin America, and the Caribbean. (www.NatureServe.org)

Natural Resources Conservation Service (NRCS): a program of the U.S. Department of Agriculture to help America's private land owners and managers conserve their soil, water, and other natural resources. NRCS provides technical and financial assistance for many conservation activities. (www.nrcs.usda.gov)

Natural Resources Conservation Service Windows Pesticide Screening Tool (WIN-PST): a pesticide environmental risk screening tool that NRCS field office conservationists, extension agents, crop consultants, pesticide dealers and producers can use to evaluate the potential for pesticides to move with water and eroded soil/organic matter and affect non-target organisms. (Natural Resource Conservation Service)

Nutrient Management Plan: the overall conservation system that addresses all aspects of an animal feeding operation to help ensure that both agricultural production goals and natural resource concerns dealing with nutrient and organic by-products and their adverse impacts on water quality are achieved. A CNMP incorporates practices to utilize animal manure and organic by-products as a beneficial resource. (Natural Resource Conservation Service, http://www.nrcs.usda.gov/technical/afo/pdf/CNMPFactSheet.pdf; Texas State Soil and Water Conservation Board)

Program participant: a biomass producer who enrolls in the CSBP program to achieve third-party certification for meeting the CSBP Standard for sustainable biomass production.

Renewable Fuel Standard (RFS): U.S. law that directs EPA to promulgate regulations ensuring that applicable volumes of renewable fuel are sold or introduced into commerce in the United States annually. RFS regulations apply to refiners, blenders and importers and set forth a phase-in for renewable fuel volumes beginning with 9 billion gallons in 2008 and ending at 36 billion gallons in 2022. The proportion of cellulosic biofuels that must be sold rises from 100 million gallons in 2010 to 16 billion gallons in 2022.

Restored lands: lands that through human intervention or natural processes once again exhibit some or all natural ecosystem characteristics.

RUSLE2 (T score) : Revised Universal Soil Loss Equation, which estimates soil loss from rill and interrill erosion caused by rainfall on cropland (rill and interrill erosion is the removal of layers from the land surface by the action of rainfall and runoff); used to predict the long-term average rate of rill and interrill erosion for several alternative combinations of crop system and management practices. T score refers to soil loss tolerance, the amount of soil that can be replenished annually through soil forming processes, and usually varies from 1-5 tons per acre per year, depending on the soil type. RUSLE2 calculates the average annual soil loss (A) based on factors of climate, soil, slope length, slope steepness, cover management and support practice. This value is compared with T to determine whether the system is sustainable from a soil loss perspective. (http://www.ia.nrcs.usda.gov/news/factsheets/RUSLE2FactSheet.html)

Self-assessment: an evaluation of management practices against a set of criteria and indicators conducted by the landowner or land manager.

Semi-natural vegetation / lands : typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue is known, but they are a largely spontaneous set of plants shaped by ecological processes.

Silviculture: the science, art, and practice of establishing and tending forest stands to produce forest stands with the desired composition, constitution and growth rate. (USDA National Agricultural Library)

Socio-economic well-being: the social and economic health, stability, and vitality of a community.

Soil Conditioning Index (SCI): a qualitative tool that predicts the effects of management systems on soil organic matter as one of three outcomes - organic matter decline, organic matter increase, or organic matter equilibrium. The index considers organic material (biomass) produced and returned to the soil, the influence of climate on organic matter decay, the influence of tillage, and the influence of erosion. (NRCS)

Sustainability: Adopting practices and developing products that are environmentally, socially and economically sound, and that can meet present needs without compromising the ability of future generations to meet their needs.

Un-fragmented habitat block: an undeveloped area that is not impacted by roads or development (Maine Department of Transportation)

APPENDIX A: EXPERTS CONSULTED IN THE DEVELOPMENT OF THE DRAFT STANDARD

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APPENDIX B: MANAGEMENT COMPONENTS FOR CONSERVATION PRACTICES

Table 1: Generic Management Components for Conservation Practices

Management Component	Conservation Practices
input management	amount of inputs used, type of inputs used, application techniques, application timing
field/stand management	tillage type, cover cropping, terracing, cropping practices, soil organic matter management, use of buffers, water management, runoff management, crop species – native or non-native; monoculture
harvest	harvest timing, harvest equipment type, residue handling, residue removal rate
incidental area treatment	wetlands management or creation, runoff management, set aside wildlife habitat areas, farm buildings (drainage and storage of manure, chemicals)
field/stand access management	number of trips across field, road construction and maintenance

The framework of management components is likely to be different in agriculture and forestry for each resource concern. As such, the baseline assessment will need to show which management components are relevant on a given operation. For instance, if an operation does not apply fertilizer (synthetic or organic) then the nutrient balancing and use management component would not be relevant.

APPENDIX C: LAND CONVERSION – Draft Approach

The table below presents a draft approach developed by CSBP to address the limits to and opportunities for intensifying land management while qualifying for silver certification under CSBP. It is the result of a collaborative effort by CSBP members, but *should not* be read to mean that every member agrees with the full content of this appendix. For many on the Council, this is a pivotal issue, requiring additional exploration and discussion. As a result, all or portions of this Appendix are subject to revision based on additional study.

Introduction

CSBP presents a four category approach to land classification, for the purposes of defining qualifying land conversion. These categories utilize the national vegetation classification* system developed by NatureServe, the Ecological Society of America, and federal agency partners, and adopted as the U.S. federal standard for vegetation description by the Federal Geographic Data Committee (FGDC 1997, 2008) (see glossary). The basic land classification system defines natural, semi-natural and cultural vegetation classifications for all lands in the U.S. (see definitions below). The CSBP draft approach further divides lands into the following four categories:

A) Un-Managed vegetation ("natural")
B) Managed vegetation ("semi-natural"): Extensively managed forest or non-forest lands
C) Managed vegetation ("semi-natural"): Intensively managed semi-natural forest and non-forest lands
D) Cultural vegetation planted with native species, exotic species, and short-rotation woody crops

Overview of Approach

Landowners initiate consideration for enrollment in CSBP by defining and documenting an initial vegetation classification for their lands, A) – D) (first column in the table below), and by identifying the management history and practices of lands, as of January 1, 2008 (second column in the table below). Once documented, lands may intensify land management practices and move one level of management intensity down the table, and qualify for CSBP silver certification. CSBP members disagree, however, as to whether lands should be able to move from C) to D) and still qualify for silver certification. Some members suggest that lands in a natural or semi-natural state of any type can be more intensively managed, but it would be unsustainable, according to CSBP's definition (see glossary), if acreages were allowed to move to native or exotic species cultural vegetation. Other members believe that moving from C) to D) represents a reasonable intensification of management practices that should be allowed within the definition of sustainability under the standard. Therefore, two options are presented in yellow as bracketed and unresolved.

For the provisional standard, landowners should protect G1-3 imperiled and vulnerable species (see definitions below). This means: a) they are important components of biodiversity, and b) while lands associated with the species can be managed, consistent with the protection of these species, communities and their habitat, there should not be intensification of production on lands associated with G1-3 biodiversity to the next land classification in all of the A-D categories. During field testing, CSBP will assess whether additional land area is required to be added to the "assumed area occupied" associated with Natural Heritage Points in order to assess the costs of addressing G3 sites and conserve biodiversity within the context of intensified biomass production. Some are concerned that the assumed area of impacts in the NatureServe Analysis are significantly understated. On the ground experience indicates that the acreage impacted by G-3 and S1-3 species may be an order of magnitude higher than what is assumed in the report.

For the provisional standard, the G4G5-S1S2 and G4G5-S3 biodiversity of globally common species and communities that have been identified as imperiled or vulnerable in a particular state will tend to be included as priorities for conservation in State Wildlife Action Plans (SWAPs) and/or in The Nature Conservancy (TNC) conservation areas. However, SWAPs are inconsistent in their consideration of these species, many do not address imperiled or vulnerable plants, and not all of the data is spatially explicit. In addition, not all TNC Eco-regional Conservation Areas include S1-S3 species and communities in their analyses. Because of the rare and special nature of the S1-S3 biodiversity in a particular state, these lands should receive special consideration, including potential protection from intensification, reference to SWAP's and TNC, and/or inclusion of specific requirements for management, protection, or restoration in the IRMP. The practicality of implementation and the efficacy of these approaches in protecting S1-S3 biodiversity will be assessed in the field. Use of available information or funding support to conduct these activities may be needed, in some circumstances.

Table 3: Land Conversion

National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
Natural & Semi-natural[2] vegetation			
A) Un-Managed vegetation ("natural")	• No past harvest (e.g., primary forest; unplowed prairie) • Past harvest followed by little or no vegetation management and with sufficient time for recovery to natural composition and structure.	• Maintain in natural vegetation – Maintain under non-extractive management; OR – If secondary forest and G4-G5 or S4-S5 community types[3] shift to extensively managed vegetation	• Convert either G1-G3 or S1-S3 types to managed or cultural vegetation • Convert either G4-G5 or S4-S5 types to intensively managed or cultural vegetation
B) Managed vegetation ("semi-natural"): **Extensively managed forest or non-forest lands**	• Extensive management – Regeneration strategies rely on natural seeding or coppicing; no soil disturbance activities – Selective harvesting; including scattered single-tree removal and small patch harvest in support of natural regeneration; – Extensive grazing – Low use of mowing – Prescribed fire/limited fire suppression. – Very low use of vegetation disturbance for stand access. – Low chemical input – Low nutrient input	• Restoration to natural vegetation • Maintain as extensively managed vegetation • Shift to intensively managed vegetation	• Convert to cultural vegetation
C) Managed vegetation ("semi-natural"): **Intensively managed semi-natural forest and non-forest lands**	• Intensive management – Regeneration strategies may include plantings and assisted natural regeneration, but result in no significant change in within-stand species composition or structure – Low use of soil disturbance for regeneration/ Very low tillage planting – Regeneration harvesting (including clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. – Extensive, rotational grazing – Rotational mowing – Prescribed fire/fire suppression. – Low to moderate vegetation disturbance for stand access – High-efficiency irrigation – Moderate chemical input – Moderate nutrient input	• Restoration to extensively managed vegetation • Maintain as intensively managed vegetation • [OPTION 1) For intensively managed vegetation types, shift to cultural vegetation with special consideration of high priority stated conservation goals nationally through Federal agency identified areas, State Wildlife Action Plans, or TNC Eco-regional Portfolio sites. • OPTION 2) Delete prior bullet, meaning that lands could be restored or maintained as C), but that conversion to cultural vegetation would be non-qualifying.]	

Cultural vegetation[4]			
D) Cultural vegetation planted with native or exotic species	• Intensive Culture – Active regeneration (planting, seeding, deliberate seed tree retention) with one or two [native] species – Regeneration harvesting (including clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. – Intercropping – Short rotation crops – Moderate-high use of soil disturbance for regeneration – Moderate-high vegetation & soil disturbance for stand access – Moderate - high use of chemical inputs – Moderate-high use of nutrient inputs – Use of irrigation and high-efficiency irrigation	• Restoration to natural/semi-natural vegetation • Maintain in cultural vegetation with native or exotic species •	

***National Vegetation Classification Definitions:**

Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes.

[2] Semi-natural vegetation typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue is known, but they are a largely spontaneous set of plants shaped by ecological processes.

[3] Global ranks (G4-apparently secure, G5 secure globally or range-wide, respectively) for standard national classification concepts provided by NatureServe. State ranks for community types (e.g., S5 – 'secure' within state boundaries) provided by state Natural Heritage programs.

[4] Cultural vegetation is defined as vegetation with a distinctive structure, composition, and development determined by regular human activity. Cultural vegetation has typically been planted or treated, and has relatively distinctive physiognomic, floristic, or site features when compared to natural vegetation. Distinctive physiognomic and structural attributes typically include one or more of the following:
a) Dominant herbaceous vegetation that is regularly-spaced and/or growing in rows, often in areas with substantial cover of bare soil for significant periods of the year, usually determined by tillage or chemical treatment.
b) Dominant vegetation with highly-manipulated growth forms or structure rarely found as a result of natural plant development, usually determined by mechanical pruning, mowing, clipping, etc.
c) Dominant vegetation comprised of species not native to the area that have been intentionally introduced to the site by humans and that would not persist without active management by humans.

****Mitigation Options:** CSBP members did not fully investigate the array of mitigation options available or agree on whether they should be employed. Mitigation options may be considered for situations when participants seek to intensify management more than one level of classification, if mitigation efforts are expected to have direct and measurable native wildlife benefits within affected geographic areas (to be determined). Mitigation will not be allowed for natural systems that are rare or are not replicable (yet to be specified).

APPENDIX D: GREENHOUSE GAS EMISSIONS FACTORS

The following list represents those factors that, to the best of CSBP's knowledge, 1) growers have control over, and 2) there is significant variation among growers. CSBP will continue to consult with life cycle assessment experts and bioenergy facilities regarding which data are most important for growers to report in order for them to conduct accurate GHG emissions life cycle assessment for bioenergy they produce. This list may therefore change before the CSBP biomass production standard is finalized; some factors may be removed, others may be added.

5.1. S1. Yield

Yield	lbs/acre

5.1.S2. Inputs: Emissions resulting from production inputs (fertilizer, pesticides, fuel).

Parameters for crops (annual and perennial)	Units
Nitrogen application rate	lb/ac
Phosphate application rate	lb/ac
Potassium application rate	lb/ac
Lime application rate	lb/ac
Lime application frequency	Years
Manure application rate	tons/ac
Manure type	
Manure hauling distance	Miles
Harvests per year	Number
Gasoline	Gal/ac*
Diesel	Gal/ac*
LPG	Gal/ac*
Natural gas	ft^3/ac
Electricity	kWh/ac

** Fuel use may also be measured by recording the number of passes and equipment type (tractor make, model, horsepower, etc.) and extrapolating fuel use. (USDA has fuel efficiency ratings for agricultural equipment, though its level of accuracy is not known.)*

5.1.S3. Land Management Practices: Emissions resulting from land conversion, planting methods, and tillage practices.

Previous vegetation cover / crop rotation history of all energy crop lands owned and managed by the grower supplying the particular biorefinery or other biomass use facility under review.	Format to be consistent with LCA model TBD. For data that are not available due to land tenure / tenant changes, default values will be used.
Planting methodology	
Tillage Method	

5.1.S4. Soil Carbon: Emissions resulting from soil carbon depletion, including from crop / forest residue removal.

Residue Removal Rate -	%
Soil Carbon released due to all causes, including crop residue removal	Format consistent with LCA

5.1.S5. Harvest and Handling: Emissions resulting from harvesting, collection, handling, processing, and storage of biomass.

Gasoline	Gal/bdt (per bone dry ton) **
Diesel	Gal/bdt*
LPG	Gal/bdt*
Natural gas	ft^3/bdt
Electricity	kWh/bdt

*** The feasibility of calculating fuel use by bone dry ton needs to be reviewed as growers generally calculate tonnage as delivered, regardless of moisture content.*

5.1.S6 Transportation: Emissions resulting from transportation of biomass.

Transportation mode (barge, class 1 truck, class 2 truck, rail)	
Transport distance	Mi