California Environmental Protection Agency
Air Resources Board

Proposed Regulation to Implement the California Cap-and-Trade Program

APPENDIX B

STAFF REPORT AND COMPLIANCE OFFSET PROTOCOL

RICE CULTIVATION PROJECTS

Release Date: October 28, 2014

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State of California
California Environmental Protection Agency
AIR RESOURCES BOARD
Stationary Sources Division

STAFF REPORT: INITIAL STATEMENT OF REASONS
PROPOSED REGULATION TO IMPLEMENT
THE CALIFORNIA CAP-AND-TRADE PROGRAM

APPENDIX B

STAFF REPORT AND COMPLIANCE OFFSET PROTOCOL

RICE CULTIVATIONRICE CULTIVATION PROJECTS

Public Hearing to Consider the Proposed Regulation
to Implement the California Cap-and-Trade Program

Date of Release: October 28, 2014
Scheduled for Consideration: December 18-19, 2014

Location:

California Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

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I. INTRODUCTION AND BACKGROUND ON COMPLIANCE OFFSET PROTOCOLS

A. Staff Proposal

Staff recommends the Board adopt a new Compliance Offset Protocol for Rice Cultivation projects to support the offset cost containment mechanism in the California Cap-and-Trade program. This appendix discusses the development of a Compliance Offset Protocol for Rice Cultivation projects.

B. Rationale for Compliance Offset Protocols

Under the Cap-and-Trade Program, covered entities may use ARB offset credits to satisfy up to eight percent of their compliance obligation. This limit applies to each individual covered or opt-in covered entity for each compliance period. ARB offset credits are tradable credits that represent verified greenhouse gas (GHG) emissions reductions or removal enhancements from sources not subject to a compliance obligation in the Cap-and-Trade Program. These offset credits result from one of the following: (1) a project undertaken using an Air Resources Board (ARB or Board) approved Compliance Offset Protocol pursuant to Subarticle 13 of the Cap-and-Trade Regulation; (2) an offset credit issued by a linked jurisdiction pursuant to Subarticle 12 of the Cap-and-Trade Regulation; or (3) a sector-based offset credit issued by an approved sector-based crediting program pursuant to Subarticle 14 of the Cap-and-Trade Regulation. These GHG sources are usually outside of the industrial, energy, and transportation sectors.

As required by Division 25.5 of the Health and Safety Code (Assembly Bill 32 or AB 32), any reduction of GHG emissions used for compliance purposes must be real, permanent, quantifiable, verifiable, enforceable, and additional (Health and Safety Code §38562(d)(1) and (2)). Any offsets issued by ARB must be quantified according to Board-approved Compliance Offset Protocols. The Cap-and-Trade Regulation (Regulation) includes provisions for collecting and submitting the appropriate monitoring documentation to support the verification and enforcement of reductions realized through the generation and retirement of compliance offset credits. The regulatory provisions and the requirements of the Compliance Offset Protocols will ensure the reductions are quantified accurately, represent real GHG emission reductions, and are not double-counted within the system. Compliance Offset Protocols are considered regulatory documents and are made publicly available so that anyone interested in developing an offset project can do so if the project meets Board-approved standards.

C. Board Adoption of Compliance Offset Protocols

At its October 2011 meeting, the Board adopted four Compliance Offset Protocols, including protocols for Livestock Manure (Digester) Projects, Ozone Depleting Substances (ODS) Destruction Projects, Urban Forest Projects, and U.S. Forest Projects. Resolution 11-32, adopted by the Board on October 20, 2011, directed the Executive Officer "to develop implementation documents laying out the process for review and consideration of new offset protocols, including a description of how staff will evaluate additionality." This direction signaled the Board's intention to adopt additional Compliance Offset Protocols in the future. The Compliance Offset Protocol Review Process document is available at http://www.arb.ca.gov/cc/capandtrade/compliance-offset-protocol-process.pdf. In 2014, the Board adopted a fifth Compliance Offset Protocol, the Mine Methane Capture Projects protocol, while updates to three existing Compliance Offset Protocols: Livestock Projects, Ozone Depleting Substances Projects and U.S. Forest Projects are proceeding through the adoption process.

D. Compliance Offset Protocol Structure and Regulatory Requirements

Compliance Offset Protocols consist of two main structural elements: project requirements and project quantification. Project requirements include items such as eligibility, monitoring and reporting, and verification and enforcement provisions. AB 32 requires ARB to adopt regulatory requirements for verification and enforcement of any offset reductions used for compliance purposes. Project quantification identifies the quantification methodologies and equations used in project accounting such as baseline determination and calculation of emissions and emission reductions.

The Cap-and-Trade Regulation includes offset program regulatory requirements, such as eligibility criteria for start dates, project locations, offset project reporting periods, project document retention, project listing information, project reporting information, verification requirements, and enforcement provisions. Staff has developed the Compliance Offset Protocol for Rice Cultivation Projects to be consistent with regulatory requirements in the Cap-and-Trade Regulation. Since Compliance Offset Protocols are used in the context of a compliance program, staff has included language in the proposed Compliance Offset Protocol for Rice Cultivation Projects to refer to the regulatory requirements in the Cap-and-Trade Regulation where needed rather than splitting the offset protocols into separate documents based on regulatory requirements and quantification methodologies. In sections that relate directly to a requirement in the Cap-and-Trade Regulation, text refers readers to the appropriate section(s) of the Regulation.

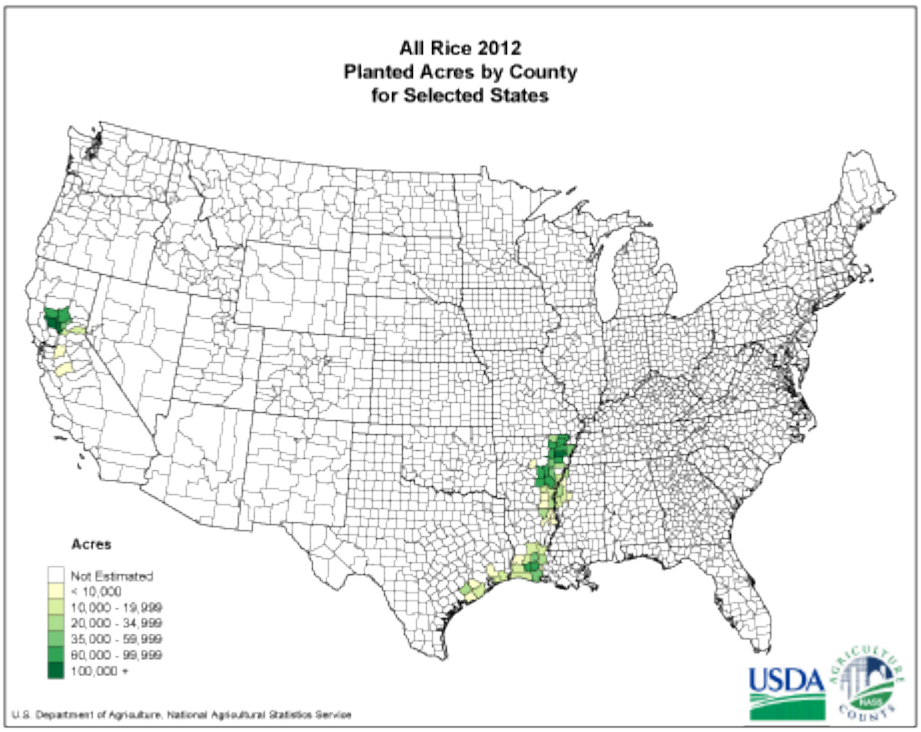
New Compliance Offset Protocols, including the proposed Compliance Offset Protocol for Rice Cultivation Projects, will be incorporated by reference into the proposed amendments to the Cap-and-Trade Regulation. This incorporation makes the offset protocol document an enforceable regulation. AB 32 exempts quantification methodologies from the Administrative Procedure Act (Government Code, section 11340 *et seq.*) (APA). However, those elements of the Compliance Offset Protocol are still regulatory. The exemption allows future updates to the quantification methodologies to be made through a public review and Board adoption process but without the need for rulemaking documents. Each Compliance Offset Protocol identifies sections that are considered quantification methodologies and exempt from APA requirements. Any changes to the non-quantification elements of the Compliance Offset Protocols would be considered a regulatory update subject to the full regulatory development process.

II. COMPLIANCE OFFSET PROTOCOL FOR RICE CULTIVATION PROJECTS

A. Role of Rice and Rice Cultivation Activities in Climate Change Mitigation

Conventional rice cultivation practices generate anaerobic conditions in flooded rice fields that enhance methane production and emissions. Methane emissions from rice fields account for about 0.1% of total GHG emissions in the United States (FAO, 2007). Rice has been commercially cultivated for over 300 years in the United States. Over 80% of rice consumption in the U.S. is domestically grown rice (Ray, 2013). Rice farms are located in six major rice-producing states, as shown in Figure 1, including the Sacramento Valley area in northern California, the Mississippi delta, including the eastern part of Arkansas extending to Missouri and Mississippi; the Gulf coast in Louisiana; and the Gulf coast area in Texas.

Figure 1. Rice growing areas in 2012 in the United State. (source: http://www.nass.usda.gov/Charts_and_Maps/Crops_County/ar-pl.asp)

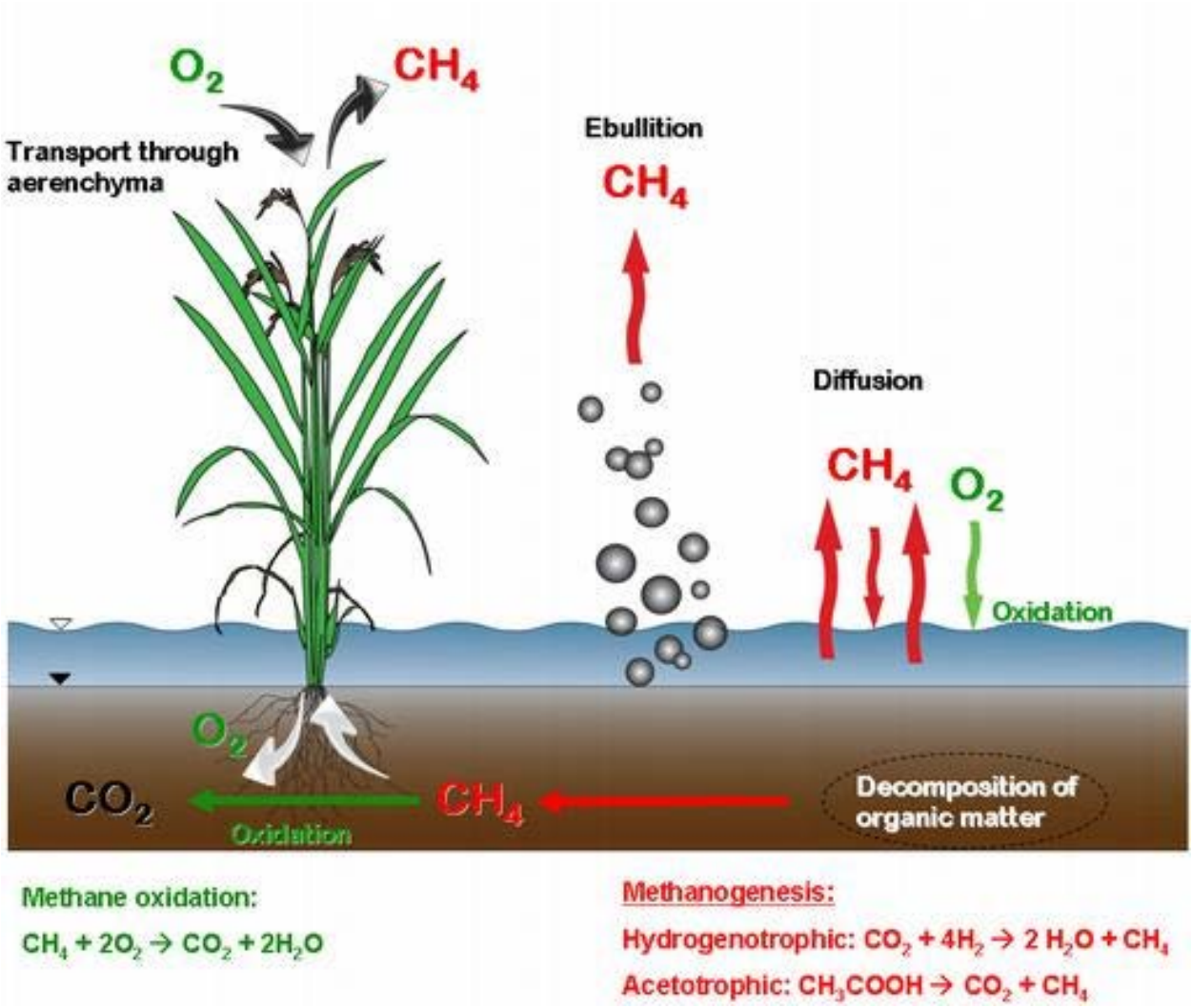


Over the past 10 years, the total planting area in the United States ranged from 2.6 M to 3.5 M acres per year (USDA Agriculture Baseline Data Base). Rice farming provides important economic and ecological value in the United States.

Flooded rice fields provide an important ecological function as manmade wetlands; however, they are also a source of GHG emissions. The proposed Rice Cultivation Protocol quantifies GHG emission reductions from changes in rice cultivation practices (eligible project activities). These proposed eligible project activities meet three overarching criteria: (1) reduce GHG emissions; (2) maintain yield; and (3) preserve current associated environmental and ecological benefits. To propose effective project activities, it is necessary to have a good understanding of the emission mechanisms in the rice fields; that includes the interaction between the rice plant, microbe, environmental conditions in the soil, and current farming practices in each of the geographic regions.

Methane and nitrous oxide are the two dominant greenhouse gases in rice cultivation practices. Methanogens produce methane under anaerobic conditions in the rice field. Nitrifying and denitrifying bacteria produce nitrous oxide when there is an absence of dissolved oxygen, also known as the anoxic condition. Nitrous oxide emissions are sensitive to both fertilizer management and flood duration. This protocol primarily focuses on methane emissions and is designed to modify current cultivation practices to reduce methane emissions. Any GHG emission reductions from nitrous oxide or carbon dioxide will not be eligible for crediting. In addition, any GHG emission increases from nitrous oxide or carbon dioxide will be debited from the final GHG emission reductions. Figure 2 provides a schematic illustration on how GHG emissions are produced from wetlands or flooded rice fields.

Figure 2. Greenhouse Gas Emissions from Wetlands and Flooded Rice Fields (source: http://www.ibp.ethz.ch/research/environmentalmicrobiology/research/Wetlands)



B. Development of the Compliance Offset Protocol for Rice Cultivation Projects

The process of developing the proposed Rice Cultivation Protocol involved an extensive review of relevant documents and literature as well as a stakeholder participation process that included soliciting input from industry experts, government agencies, project developers, Cap-and-Trade Program covered entities, academia and the public through a series of workshops, technical working group meetings, and small group discussions.

The formal Rice Cultivation Protocol stakeholder participation process began on March 28, 2013, when ARB staff held a public workshop to discuss the development of two potential Compliance Offset Protocols, the Mine Methane Capture Projects Protocol, adopted by the Board in April 2014, and the Rice Cultivation Projects Protocol, the subject of this document. During this public workshop, ARB invited interested members of the public to participate in a rice cultivation technical working group and in the formal rulemaking process. The technical working group included almost 70 members from the following areas:

- Subject experts from federal, state, and local government including:
    - Federal agencies: U.S. Department of Agriculture, U.S. Fish and Wildlife Service, U.S. Geological Survey;
    - State agencies: Department of Food and Agriculture, Department of Water Resource, Department of Fish and Wildlife, Department of Public Health, and Rice Commission; and
    - Local agencies: Mosquito and Vector Control Districts (Sac-Yolo and Placer);
- Subject experts from academia including University of Arkansas, University of California—Davis, and Mississippi State University;
- Subject experts from industry and/or private business;
- Environmental and/or conservation groups;
- Voluntary registries;
- Cap-and-Trade Program covered entities;
- ARB accredited verifiers;
- Potential offset project operators and/or authorized project designees; and
- Other interested stakeholders.

The technical working group held four meetings in 2013. The meetings included discussion of many topics, including:

- Rice specific verification techniques;
- Project aggregation;
- Common rice cultivation practices by region;
- Emission quantification simplification and streamlining;
- Rice straw removal after harvest;
- Missing data substitution;
- The use of remote sensing and satellite images for record keeping and verification;

- The DeNitrification-DeComposition (DNDC) model validation and calibration review;
- Structural uncertainty;
- Soil sampling techniques; and
- Potential adverse environmental impacts resulting from implementing a project.

As part of its development of this protocol, ARB staff reviewed existing voluntary market offset protocols to evaluate their scope, additionality provisions, GHG assessment boundary, quantification methodologies, and requirements for monitoring, reporting, and verification. ARB staff also reviewed documents related to GHG emissions from rice cultivation practices and related biological values as wildlife habitats. These documents are included in the reference section of this staff report, and are cited when relied upon for facts. The proposed Rice Cultivation Protocol incorporates elements from many of the existing voluntary methodologies as well as the best available science and information to ensure that emission reductions are real, permanent, quantifiable, additional, verifiable and enforceable.

ARB staff held another public workshop in March 2014 to provide a discussion draft of the proposed Rice Cultivation Protocol for public review and comment. Staff received comments from 57 entities on this discussion draft. Staff also had individual interactions with stakeholders interested in discussing protocol related issues, and the staff proposal reflects those discussions. Staff considered all comments and incorporated them to the extent applicable and held a subsequent workshop on June 20, 2014 to discuss the proposed protocol. A revised draft version of the proposed Rice Cultivation Protocol was also made publicly available for this workshop.

ARB staff solicited and incorporated input from stakeholders into the proposed final version for Board consideration released with this staff report for public review on October 28, 2014. The formal 45-day public comment period begins on October 31, 2014 and the new Compliance Offset Protocol will be considered at the December 18 and 19, 2014 Board hearing with the proposed amendments to the Cap-and-Trade Regulation.

C. Description of the Compliance Offset Protocol for Rice Cultivation Projects

1. Overview

ARB's proposed Rice Cultivation Protocol incentivizes the reduction of GHG emissions resulting from rice cultivation activities in the United States. The proposed Rice

Cultivation Protocol will allow for the issuance of compliance offset credits for emission reductions achieved by switching to lower GHG emission rice cultivation practices that reduce methane emissions that would otherwise be released into the atmosphere as a result of conventional rice cultivation activities. The proposed Rice Cultivation Protocol is applicable to projects within the United States. The proposed Rice Cultivation Protocol requires the use of the DNDC model, which has only been calibrated for the two rice-growing regions identified in the protocol based on available data.

The two Rice Growing Regions in the United States are:

- California Rice Growing Region: comprises rice growing areas in the Sacramento Valley; and
- Mid-South Rice Growing Region: comprises the following areas in the Mid-South states:
    - The Mississippi Delta: Includes eastern part of Arkansas, the southern portion of Missouri, and the western part of the Mississippi; and
    - The Gulf Coast of Louisiana.

The proposed Rice Cultivation Protocol allows for three types of project activities based on the currently available calibrated and validated DNDC model and business-as-usual practices as discussed in section II.C.2. below:

- Switch from wet seeding to dry seeding (eligible in the California Rice Growing Region only);
- Alternate wetting and drying (eligible in the Mid-South Rice Growing Region only); and
- Early drainage in preparation for harvest (eligible in both Rice Growing Regions).

An explanation of the limitations for the different project activities is included below.

Switching from wet-seeding to dry-seeding means changing the seeding method from sowing dry or soaked seed into flooded fields to drilling or broadcasting dry or germinated seeds onto dry or moist fields.

Alternate wetting and drying is a change to continuous flooding practices after the development of a 4-5 leaf stage when cyclic wetting and drying of the field occurs. For every cycle of wetting and drying, the field will be irrigated but not necessarily flooded. It is important for fields employing this practice to always keep the soil moisture level above 50% to ensure necessary water uptake and maintain a normal yield. For each drying event, methane emissions will decrease and nitrous oxide emission will increase.

The protocol does not credit any emission reductions for nitrous oxide or carbon dioxide. In addition, the protocol debits any increase in nitrous oxide or carbon dioxide emissions.

Early drainage in preparation for harvest means the field will be drained 7-10 days earlier than a normal drainage schedule. The proposed Rice Cultivation Protocol ensures that farmers do not drain the rice fields too early because that could harm crop yield. The protocol requires that in California standing water must be present at least 24 days after fifty-percent heading or 26 days after forty-percent heading; and in the Mid-South Region at least one grain on the main stem panicle must have a yellow hull before drainage begins. The draining events for all farmers within each rice-growing region will not fall on the same day because farmers plant on different days. All draining events in each rice-growing region should happen within in a four to six week window. Therefore, even with early drainage events taking place in some fields, these fields may not be the first ones to drain in that rice-growing region. The proposed Rice Cultivation Protocol incorporates the following precautionary approaches to ensure the current environmental and ecological benefits are preserved.

- For wildlife conservation purposes in the California Rice Growing Region, no more than 90% of a participating field's perimeter may be shared with a public road, a field that is also employing early drainage activities or land zoned for commercial, industrial, residential, planning, special, or mixed use to be eligible for crediting. This restriction protects any remaining flightless late broods that still use flooded rice fields as habitat.

- The proposed Rice Cultivation Protocol prohibits fields whose tail water flows directly into a natural wetland that has no standing water at the beginning of the drainage and does not pass through another rice field, drain canal, or irrigation canal first, from receiving offset credits. This ensures that no increased natural wetlands from early drained water are created, which could increase methane emissions or create mosquito habitats.

To further protect wildlife habitats, the proposed Rice Cultivation Protocol excludes the Butte Sink Wildlife Management Area in the Sacramento Valley. This exclusion ensures the Butte Sink Wildlife Management Area and its important wildlife habitat is unaffected by the implementation of any rice cultivation projects.

All three eligible project activities reduce the formation and emission of methane from flooded rice fields by reducing the duration of flooding. Project activities will vary depending on the rice field's location and the Offset Project Operator's discretion. For a project comprising multiple fields, the Offset Project Operator may employ different

activities on each field. The project operator may also choose to rotate and/or change the project activities within a crediting period.

Voluntary protocols included one additional project activity referred to as baling. In baling projects, rice straw is removed from the fields after harvest. Staff reviewed this option and determined that there was not enough information to make a determination as to the potential adverse environmental impact from the removal of the rice straw.

In California, winter flooding became a business-as-usual practice after the passage of Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991. Winter flooded rice fields in California serve as manmade wetlands and are an important wildlife habitat for many avian and aquatic species. The Sacramento Valley is located on the Pacific Americas Flyway for migratory birds. The Mid-South Rice Growing Region is also a critical bird habitat being located on the Mississippi Americas Flyway. It is crucial to ensure that the current wildlife habitat dynamics are not adversely affected by the proposed Rice Cultivation Protocol.

Stakeholders also provided comments and information in support and in opposition to baling. In the abundance of caution, staff has determined additional time and information is needed to accurately assess the impacts of baling on the environment and wildlife. While staff is not proposing to add this project activity to the currently proposed compliance offset protocol, staff will continue to review and evaluate information and propose the addition of this project activity, if warranted, in a future update to the protocol.

As proposed, the Rice Cultivation Protocol provides project definitions, eligibility rules, conservative GHG emission reduction quantification methodologies, and procedures for offset project monitoring, reporting, and verification. All projects that pass the eligibility requirements set forth in the proposed Rice Cultivation Protocol and the Cap-and-Trade Regulation are eligible to register GHG emission reductions for the duration of the project crediting period, which is ten reporting periods.

2. Additionality

AB 32 and the Cap-and-Trade Regulation require emission reductions achieved under Compliance Offset Protocols to be additional to what would have occurred in the absence of the project in a conservative business-as-usual scenario. The proposed Rice Cultivation Protocol ensures compliance with the Regulation's additionality requirement through a performance standard evaluation and assessment of legal requirements. This approach is similar to the Compliance Offset Protocols approved by

the Board in 2011 and 2014, which also ensured additionality by utilizing a regulatory additionality requirement and a performance standard approach. The performance standard is an identified standard of performance applicable to all Rice Cultivation projects. A performance standard establishes a threshold for greenhouse gas emissions that is significantly better than average, business-as-usual greenhouse gas (GHG) emissions for a specified activity. If a project developer meets or exceeds the standard, the project satisfies the criterion of "additionality." If the project meets the threshold, then it exceeds what would happen under the business-as-usual scenario and generates additional GHG reductions.

Unlike the previous Board adopted Compliance Offset Protocols, due to differing agricultural practices in the two rice growing regions as a result of differing soils, climate, water availability, cultivation practices, cultivars and other factors, it is appropriate to evaluate the performance standard for the proposed Rice Cultivation Protocol for each activity type and each rice growing region independently. In addition to the performance standard, projects must show regulatory additionality. Regulatory additionality, in this instance, means that there are no federal, state or local laws, regulations or legally binding mandates requiring the project activities in the protocol that would result in a reduction of methane emissions. In addition, projects must comply with all applicable local, state, and federal laws and regulations, including air and water quality, pesticide and herbicide use, fertilizer use, energy regulations, or others imposed by any local, state or federal agency with authority over the project.

Performance Standard Evaluation for Switching from Wet Seeding to Dry Seeding

Based on ARB staff's review of the existing literature and discussions with the technical working group described in section II.B., very few rice fields in California employ dry seeding due to weed (e.g. red rice) control (USDA NIFA, 1998; Carol, 2009; Cline, 2003). Therefore, ARB does not consider dry seeding to be business-as-usual in California. Dry seeding in the California Rice Growing region is additional because it is not used prevalently in California, and is an eligible project activity under the proposed Rice Cultivation Protocol.

However, in the Mid-South Rice Growing Region, where crop rotation provides some weed control benefits, dry seeding is the predominant seeding method (McCauley, 2012). According to University of Arkansas Rice Production Handbook (Kumar & Ladha, 2013), dry seeding is practiced on about 94 percent of the Arkansas rice acreage. Dry seeding normally involves less land preparation which has some beneficial effects, such as lowering production costs, generating more profit per acre, requiring less labor demand (the same labor handles more acres), and less wear on

equipment (Smith, 2005; LSU, 2000). Based on ARB staff's review of the existing practices, dry seeding is considered to be business-as-usual in the Mid-South Rice Growing Region. Dry seeding in the Mid-South Rice Growing Region is not considered additional and is not an eligible project activity under the proposed Rice Cultivation Protocol.

Performance Standard Evaluation for Alternate Wetting and Drying

Based on ARB staff's review of the existing literature and discussions with the technical working group described in section II.B., very few rice fields in either California or Mid-South practice alternate wetting and drying (Anders, 2012; Saichuk , 2009; Hardke, 2014). Alternate wetting and drying requires constant monitoring of soil moisture to ensure adequate water for a crop's water uptake requirements and does not have the potential to increase crop yield. Therefore, rice farmers normally do not employ such practice because of increased labor/management costs. Alternate wetting and drying is not considered business-as-usual in either California or the Mid-South Regions. However, alternate wetting and drying is only an eligible project activity in the Mid-South Rice Growing Region under the proposed Rice Cultivation Protocol because the DNDC model has not been validated for this activity in the California Rice Growing Region. If validation of the DNDC model for alternate wetting and drying occurs in the future, ARB will consider adding it as an eligible project activity.

Performance Standard Evaluation for Early Drainage in Preparation for Harvest

Based on ARB staff's review of the existing literature and discussions with the technical working group described in section II.B., very few rice fields in either California or the Mid-South adopt early drainage in preparation for harvest (Champagne et al, 2005; Counce, 2009). Early drainage cannot increase yield and draining too early can actually reduce yield, which is why the protocol specifically includes drainage criteria to maintain yield. Early drainage in preparation for harvest is not considered to be business-as-usual in either California or Mid-South. Early drainage in both the California and the Mid-South Rice Growing regions is considered additional and is an eligible project activity under the proposed Rice Cultivation Protocol.

Legal Requirements

Emission reductions achieved by a Rice Cultivation project must also exceed those required by any law, regulation, or legally binding mandate at the time of offset project commencement. If no law, regulation, or legally binding mandate requiring the adoption of any project activity in the region where the project is located exists at the time of

offset project commencement, methane emission reductions caused by a change in rice cultivation practices are eligible for crediting under this proposed Protocol, subject to the performance standard evaluation above. If any law, regulation, or legally binding mandate requiring the reduction of methane from rice fields where the project is located exists at the time of offset project commencement, methane emission reductions in excess of what is legally required is eligible for crediting under this Protocol, subject to the performance standard evaluation as described above.

With the recent experience of record drought in California, ARB has recognized the need to ensure that temporary mandated emergency measures are treated differently than permanent laws and regulations when assessing legal requirements for additionality and when determining the baseline scenario. Therefore, staff proposes that, if a federal, or state official mandates an emergency temporary law or measure resulting in a change of rice cultivation practices, projects can still meet the regulatory additionality requirement at project commencement because the emergency temporary law or measure will not affect a long term change in practice. Additionally, any changes in rice cultivation practices as a result of an emergency temporary law or measure during a project's baseline period are excluded when establishing the project's baseline scenarios. However, a project must still have at least two included rice cultivation years in the baseline scenario that do not include years during the emergency temporary law or measure even if it requires a project to go back more than five years to identify applicable baseline years.

3. Permanence

Project operators may choose from an array of eligible project activities, but to be eligible for crediting under the proposed Rice Cultivation Protocol, changes in practices that result in emission reductions must be verified. The protocol prescribes practices that will prevent methane from being released to the atmosphere. Because the Cap-and-Trade Regulation requires verification of the claimed avoided emission prior to the issuance of offset credits and once avoided there is no risk of the emission entering the atmosphere, the avoided methane emissions do not pose a risk for reversal. Therefore, GHG emission reductions resulting from changes in rice cultivation practices are permanent.

4. Leakage

The Cap-and-Trade Regulation requires offset protocols to conservatively account for activity-shifting and market-shifting leakage risks associated with an offset project.

(a) Activity-Shifting Leakage

Activity-shifting leakage means increased GHG emissions or decreased GHG removals that result from the displacement of activities or resources from inside the offset project's boundary to locations outside the offset project's boundary because of the offset project activity. Staff believes that the prospect of activity-shifting leakage is not a concern because:

- The proposed Rice Cultivation Protocol provides no financial incentive to reduce yields due to the small financial benefit of potential offset credits compared to the sale of rice. The proposed Rice Cultivation Protocol provides a financial incentive for rice growers to reduce methane emissions that would otherwise be released into the atmosphere because of conventional rice cultivation practices, not to reduce rice cultivation. ARB staff examined concerns raised over the impact of this additional gross revenue stream on rice production and found the potential gross revenue from offsets is less than one percent of the operational cost. ARB staff reached this conclusion by evaluating United States Department of Agriculture (USDA, 2014) and University of California, Davis data (UC COOP, 2012) and staff conversations with rice farmers. This percentage will be even smaller when accounting for project operational costs (e.g. monitoring, reporting, verification, registry fees, etc.).

- Maintaining the current crop yield for each participating field is another important design element in the proposed Rice Cultivation Protocol to ensure there is no activity-shifting leakage.

- Natural barriers such as soil suitability, water availability, climate and availability of specialized farming equipment make activity shifting leakage unlikely.

Staff believes the design of the proposed Rice Cultivation Protocol and the nature of rice growing conditions minimize the risk for activity shifting leakage as a result of implementing the proposed Rice Cultivation Protocol.

(b) Market-Shifting Leakage

Market-shifting leakage means increased GHG emissions or decreased GHG removals outside an offset project's boundary due to the effects of an offset project on an established market for goods or services. Staff believes that the prospect of market-shifting leakage is not a concern because:

- The proposed Rice Cultivation Protocol has provisions to ensure maintenance of the current yield.

- Rice is a staple of over half the world's population (Rejesus, 2012). World rice consumption and production is highly dependent on diet shifting, world hunger status, and natural disasters. Rice planting area and acreage shifting is a result of world rice consumption and demand (IRRI). This type of shifting is based on real market consumption and demand and is not considered as market-shifting leakage because of implementation of the proposed Rice Cultivation Protocol.

Staff believes the design of the proposed Rice Cultivation Protocol and the nature of rice growing conditions minimize the risk for market-shifting leakage as a result of implementing the Rice Cultivation Protocol.

5. Quantification Methodologies

The quantification methodologies contained in the proposed Rice Cultivation Protocol are derived after a thorough review of available voluntary protocols: American Carbon Registry Voluntary Emission Reductions in Rice Management Systems Parent Methodology, version 1.0 (ACR, 2013a); American Carbon Registry Voluntary Emission Reductions in Rice Management Systems – California Module, version 1.0 (ACR, 2013b); American Carbon Registry Voluntary Emission Reductions in Rice Management Systems –Mid-South Module (ACR, 2014); and Climate Action Reserve Rice Cultivation Project Protocol, version 1.1 (CAR, June 3, 2013). ARB staff worked with members of the technical working group and other industry experts to develop a protocol based on the latest available scientific research and policies and practices consistent with the requirements of AB 32.

Emission sources identified in the project boundary can be categorized into two groups: the primary effects and the secondary effects.

(a) Primary effects

Primary effects include GHG emissions from the biogeochemical process between crop growing and its surrounding environment. Primary effect GHG emissions are quantified using the DNDC model. Due to the inherent complexities of measuring the soil biogeochemical processes identified, the proposed Rice Cultivation Protocol uses the DNDC model to quantify soil carbon dynamics and GHG emissions. To use the DNDC model to quantify a crop's associated GHG emissions, the model needs to be calibrated and validated for both the specific crop and the specific growing region in order to

accurately quantify GHG emissions. The uncertainty of the model is also accounted for in quantification. Based on the validation of the model, ARB staff has included an adjustment for model uncertainty based on the total participating hectares. ARB will annually publish the participating hectares to allow project operators to calculate conservative emission reductions.

ARB adopts a conservative approach in accounting for primary effect GHG emission reductions. Emission reductions in nitrous oxide or due to soil organic carbon as a result of project activities are not credited. However, any emission increases in nitrous oxide or due to soil organic carbon as a result of project activities will be debited from methane emission reductions.

(b) Secondary effects

Secondary effects include GHG emissions from project and baseline activities such as cultivation equipment and on-site crop residue management. For emissions from cultivation equipment, depending on data availability the quantification method could be fuel based, time based, or field dimension based.

6. Monitoring, Reporting, and Verification

The determination of each reporting period in the proposed Rice Cultivation Protocol is different from all other Compliance Projects Protocols. Figure 3 provides examples illustrating how reporting periods are determined.

- Each reporting period is based on a traditional crop cultivation year. A cultivation year starts the day after the harvest of the previous cultivation year and ends after the next harvest. Each cultivation year is approximately 12 months.
- The first reporting period in the initial crediting period may comprise one or two cultivation years and may commence prior to the effective date of the regulation.
- A fallow year is a separate reporting period that starts the day after the harvest of the previous cultivation year and ends the day before the land preparation starts for the following cultivation year.
- A winter crop is not considered a reporting period. Rather, it is included in the reporting period immediately following the harvest of a winter crop. If the previous reporting period is a fallow reporting period, a winter crop is included in the next reporting period immediately following the fallow year.

Figure 3. Examples of Reporting Period Determination

Example 1

Reporting period (RP) 1		**RP 2**	**RP 3**	**RP 4**	**RP 5**	**RP 6**	**RP 7**		**RP 8**		**RP 9**	**RP 10**	
Rice	Rice	F	Rice	S	S	Rice	R	Rice	WW	A	Rice	R	Rice

Example 2

RP 1			**RP 2**	**RP 3**	**RP 4**	**RP 5**		**RP 6**	**RP 7**		**RP 8**	**RP 9**	**RP 10**	
Rice	R	F	Rice	Rice	F	WW	F	Rice	WW	Rice	A	W	WW	F

(Note: A: alfalfa, Rice: rice, F: fallow, R: ratooning, S: soy bean, W: wheat, WW: winter wheat)

The Offset Project Operator (OPO) or Authorized Project Designee (APD) is responsible for monitoring the performance of the project, following each step of eligible project activities as specified by the proposed Rice Cultivation Protocol and operating equipment according to manufacturer's specifications.

Project monitoring and documentation serves two primary purposes: (1) to generate data for quantification purposes and (2) to retain evidence of project implementation for verification. The proposed Rice Cultivation Protocol contains explicit requirements for monitoring and recording these parameters. OPOs and APDs are also required to maintain project monitoring documentation as set forth in the Regulation and the protocol.

To preserve the evidence of project implementation in a timely and less costly method, the Rice Cultivation Protocol allows an OPO and APD to contract with a verification body prior to the end of the reporting period to witness project activities. No other verification services may start before submittal of the Offset Project Data Report. OPOs, APDs, and verifiers may use a variety of techniques to verify project activities including, but not limited to, remote sensing, video conferences, digital photographs (dated and geotagged), or digital escrow services. ARB, in conjunction with the

California Department of Food Agriculture (CDFA), is working to create a limited-term pilot program for up to three years to provide funding to cover the cost of verification to aid in ARB's evaluation of the best methods for cost-effective verification of rice cultivation projects that retain the level of rigor that already exists in the compliance offset program. Unlike previous ARB adopted Compliance Offset Protocols, the proposed Rice Cultivation Protocol relies heavily on modeled results with little, or no, direct measurement. Therefore, it is important for ARB to evaluate the data from the initial rice cultivation projects to inform on a verification process that supports project types that do not have direct measurement procedures and are cost-effective.

Rice Cultivation Protocol Pilot Verification Program

The purpose of the Rice Cultivation Protocol Pilot Verification Program (Pilot Verification Program) is to fund the verification of rice cultivation projects as required in Regulation and also fund alternative verification procedures to identify practices that are more cost-effective than, but of equivalent functionality to, the existing regulatory verification process. Alternative verification processes will include various practices and levels of review. ARB will evaluate the results of the study and may propose updates to the verification requirements in a subsequent version of the rice protocol.

OPOs and APDs who are interested in participating in the Pilot Verification Program would need to allow for at least two independent verifications of their projects. Upon successful regulatory verification of the project, the OPO and/or the APD will be issued ARB offset credits.

ARB and CDFA are consulting with stakeholders on the development of the Verification Pilot Program and will be providing additional information in 2015. OPOs and APDs who would like to apply for this funding will likely need to notify ARB or CDFA by a pre-determined date of their intent. Additional details will be made available as part of implementation of this protocol pending Board approval. If ARB can identify less costly means of verification, then the Verification Pilot Program may inform changes to verification requirements in a future update to the protocol. OPOs or ARDs have the option to transition their project to the updated protocol or stay with the original protocol for the remainder of the crediting period.

The proposed Rice Cultivation Protocol includes quality assurance and quality control (QA/QC) requirements for soil moisture sampling tools and requires detailed, replicable soil moisture sampling procedures to be documented. The proposed Rice Cultivation Protocol also provides methods for soil and weather data substitution.

OPOs or APDs must report GHG emission reductions resulting from project activities and submit an Offset Project Data Report (OPDR) for each reporting period. The proposed Rice Cultivation Protocol and the Cap-and-Trade Regulation include specific requirements for these OPDRs, which must be verified by an ARB-accredited offset verification body prior to credit issuance. APDs that operate rice cultivation projects on behalf of multiple OPOs will be able to submit a consolidated OPDR under one cover that includes the required information for each project, including the unique ARB project identification number. Each project will be independently verified and an offset verification statement issued for each project under the consolidated OPDR. For transparency and as is practice in the existing compliance offset program, project information will be made publically available.

Both the Regulation and Protocol also provide a deferred verification schedule for small projects to reduce project verification costs. Section 95977(b) of the regulation states that for reporting periods in which an Offset Project Data Report for a non-sequestration offset project shows that the offset project produced fewer than 25,000 metric tons of GHG reductions in a reporting period verification may cover two consecutive reporting periods. The proposed Rice Cultivation Protocol also provides flexibility to the OPO/APD to perform deferred verification covering up to three reporting periods including at least one reporting period with no GHG emission reductions reported. As specified in the Regulation, an OPO/APD may contract the same verification body to perform verification services for up to six consecutive reporting periods before rotation is required.

Like all other compliance project protocols, the deferred verification schedule does not apply to the first reporting period of the initial crediting period. Verification also may not be deferred for the first reporting period upon change of the OPO. The first reporting period of the initial crediting period may be up to two cultivation years. Figure 4 shows four example projects of how verification may be conducted.

Figure 4. Examples of How Verification May Be Conducted

Example 1

RP 1		**RP 2**	**RP 3**	**RP 4**	**RP 5**	**RP 6**	**RP 7**	**RP 8**	**RP 9**	**RP 10**
Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice

V (VB 1)	V (VB 1)	V (VB 1)	V (VB 2)	V (VB 2)	V (VB2)

Example 2

RP 1		**RP 2**	**RP 3**	**RP 4**	**RP 5**	**RP 6**	**RP 7**	**RP 8**	**RP 9**	**RP 10**
Rice	S	S	Rice	S	S	Rice	S	S	Rice	S
V (VB 1)		V (VB 1)		V (VB 1)			V (VB 2)			-

Example 3

Reporting period (RP) 1		**RP 2**	**RP 3**	**RP 4**	**RP 5**	**RP 6**	**RP 7**		**RP 8**		**RP 9**	**RP 10**	
Rice	Rice	F	Rice	S	S	Rice	R	Rice	WW	A	Rice	R	Rice
V (VB 1)		V (VB 1)		V (VB 1)			V (VB 2)					V	

Example 4

RP 1			**RP 2**	**RP 3**	**RP 4**	**RP 5**		**RP 6**	**RP 7**		**RP 8**	**RP 9**	**RP 10**	
Rice	R	F	Rice	Rice	F	WW	F	Rice	WW	Rice	A	W	WW	F
V (VB 1)			V (VB 1)		V (VB 1)				V (VB 2)				-	

(Note: A: alfalfa, Rice: rice, F: fallow, R: ratooning, s: soy bean, w: wheat, ww: winter wheat, V: Verification, VB: verification body)

Recognition of Early Adopters

To recognize early action, ARB is proposing two alternatives for the issuance of offset credits for emission reductions that occurred prior to Board adoption of the compliance offset protocol. ARB is continuing to work with stakeholders to determine which approach is most appropriate. Staff intends to finalize only one early action method.

First, OPOs and APDs could submit OPDRs under the adopted Compliance Offset Protocol and receive ARB offset credit for activities that occurred on or after January 1, 2011. ARB recognizes that project operators will not have collected all information identified in the protocol. Because of this specifically identified requirements including photographic evidence, soil moisture sampling and early drainage criteria which OPOs/APDs were unaware of at the time of project implementation will not be required for these projects. All other protocol requirements must still be met.

Second, ARB could accept early action projects using early action quantification methodologies identified in the Regulation that did not claim emission reduction credits for nitrous oxide (N_2O), soil organic carbon (SOC), fossil fuel use or project activities ineligible in the Compliance Offset Program. During the development of the Rice Cultivation Practices Compliance Offset Protocol, these sources were determined not to be consistent with Regulation and therefore excluded. Ineligible sources/practices include:

- Staff has not yet determined if N_2O emission reductions would meet the AB 32 offset criteria, therefore, those reductions are not eligible to receive compliance offset credits at this time.

- The 100-year permanence of SOC has not yet been determined by ARB; therefore, that source of GHG emissions reductions in not eligible to receive compliance offset credits at this time.

- Fossil fuel is a covered source under the Cap-and-Trade Program. As a matter of policy, ARB does not issue offset credits for reductions from sources that would be covered by the cap but are located outside the State.

- There is also no determination on the potential environmental impacts of rice straw removal, which was excluded from the Compliance Offset Protocol.

- Projects that rely on a common practice baseline would also be ineligible for ARB offset credits. It is appropriate to not credit the reporting periods that take credit for emission reduction based on a common practice baseline because this indicates that a project was implementing emission reduction activities prior to

project commencement; therefore, these activities would not be considered additional and would not be eligible for ARB offset credits.

7. Project Crediting Period

The crediting period for rice cultivation projects is ten reporting periods, which is approximately ten to eleven years depending on if the first reporting period is one or two cultivation years. Each subsequent reporting period is one cultivation year, which is approximately 12 months. Once a project begins a crediting period, the project may continue to monitor, report, verify and receive ARB offset credits under the original protocol for the entire crediting period. To provide certainty, a project will not be required to switch to a new version of the protocol during the crediting period. However, a project may voluntarily decide to transition to a new protocol for the remainder of the projects crediting period. The baseline is also maintained throughout a crediting period and project additionality is only assessed at the beginning of each crediting period. There is no requirement for a project to participate for the entire crediting period and a project may decide not to participate at any time.

III. ENVIRONMENTAL ANALYSIS

A. Introduction

This chapter of the Staff Report provides an environmental analysis (EA) that evaluates the potential environmental impacts of the proposed Compliance Offset Protocol Rice Cultivation Projects (Rice Cultivation Protocol). The Rice Cultivation Protocol would allow for the issuance of carbon offset credits for emission reductions achieved from eligible alternative rice cultivation practices that reduce methane emissions to the atmosphere.

Based on ARB's review, staff has determined that implementation of the proposed Rice Cultivation Protocol would not result in significant adverse impacts on the physical environment. This analysis provides the basis for reaching this conclusion. This chapter of the Staff Report also discusses environmental benefits expected from implementing the proposed Protocol.

B. Project Description

1. Compliance Offset Program

The Compliance Offset Program allows GHG emission reductions and removal enhancements from qualified existing offset projects to become eligible for use in the

Cap-and-Trade Program. Recognizing existing projects supports the requirements of AB 32 to ensure that voluntary reductions receive appropriate credit and helps create an initial supply of offset credits for the Cap-and-Trade Regulation. The proposed Rice Cultivation Protocol is the first crop-based offset protocol under consideration by ARB.

An offset credit is a compliance instrument in the Cap-and-Trade Program that represents a reduction or removal of GHG by an activity that can be measured, quantified, and verified. This compliance instrument is fungible with all other compliance instruments and can be used to meet compliance obligation in the Cap-and-Trade Program. Individual offset projects can be carried out to generate offset credits, which can then be traded and used by a covered entity as a compliance instrument in the Cap-and-Trade Regulation. Under the Cap-and-Trade Regulation, covered entities may use a limited number of offset credits to fulfill their compliance obligation. Specifically, covered entities may use offset credits to fulfill up to eight percent of their annual compliance obligation as specified in sections 95855 and 95856(h)(1)(A) of the Regulation. Offsets are tradable credits that represent verified GHG emission reductions in GHG emission sources not covered under the cap. The inclusion of offsets in the program will support the development of innovative projects and technologies from sources not subject to a compliance obligation and provide a cost-containment mechanism.

As required by Assembly Bill (AB) 32 (the Global Warming Solutions Act of 2006), any reduction of GHG emissions used for compliance purposes must be real, permanent, quantifiable, verifiable, enforceable, and additional (Health and Safety Code [HSC], Section 38562(d)(1) and (2)). Offsets issued by ARB must be quantified according to Board-adopted methodologies. The Cap-and-Trade Regulation includes requirements for collecting and submitting the appropriate monitoring documentation to support the verification and enforcement of reductions incentivized through the generation and retirement of ARB offset credits. The regulatory criteria for compliance offsets will ensure that the reductions are quantified accurately and are not double-counted within the system.

ARB's primary roles in the offset program are to develop and adopt Compliance Offset Protocols and perform all required CEQA analyses associated with their adoption; oversee and review ARB-approved Offset Project Registry activities, ARB-accredited offset verification bodies and offset verifiers, and Offset Project Operators; and issue ARB offset credits. ARB's oversight of the conduct of Offset Project Registries and ARB-accredited verifiers is critical to the program's overall integrity. ARB does not delegate any of its legal authority to review or enforce the offset program to any entity, including approved Offset Project Registries.

Apart from program review and oversight, ARB also serves administrative roles, reviews documents, implements appeals processes, and ultimately issues ARB offset credits.

2. Project Objectives

The proposed Rice Cultivation Protocol is intended to help implement the program objectives of the Cap-and-Trade Regulation, as described in the *2010 Functional Equivalent Document prepared for the California Cap on GHG Emissions and Market-Based Compliance Mechanisms* (2010 FED). Primary objectives of offset protocols in the Cap-and-Trade Regulation applicable to the proposed Protocol include the following:

a) Ensure Program Cost Effectiveness. AB 32 states that the Board shall adopt rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions in furtherance of meeting the State's GHG reduction goals. Offsets serve to broaden the compliance instrument market to provide greater flexibility to California businesses by offering a wider range of emissions reduction opportunities and greater market liquidity.

b) Encourage Technological Innovation and Reductions from Non-Capped Emission Sources. Offsets encourage reductions (beyond common business practice and what is required by regulation) from non-capped sources. Offsets support the development of innovative projects and technologies from sources outside capped sectors that can play a key role in reducing emissions both inside and outside California.

c) Decrease GHG Emissions. Offsets decrease GHG emissions in order to achieve the AB 32 mandate.

d) Maximize Environmental Benefits. Offsets maximize the environmental benefits for California.

3. Proposed Rice Cultivation Protocol

(a) Overview of Existing Rice Cultivation Practices in the U.S.

The proposed Rice Cultivation Protocol may be applied to two eligible rice growing regions of the United States (U.S.), based on current model calibration and validation (described below). The two eligible regions in the U.S. are:

- The California Rice-Growing Region: includes the Sacramento Valley of California only; and
- The Mid-South Rice-Growing Region: includes the Mississippi River Delta (eastern part of Arkansas that extends to the western part of Mississippi and the southern part of Missouri), and the Gulf Coast of Louisiana.

All U.S. rice is grown in flooded fields. Rice farmers may apply seed aerially in dry or flooded fields, or may drill or broadcast seed into dry fields. California rice farmers seed primarily by air directly into flooded fields. Fertilizers, insecticides, and pesticides may also be applied by air. Mid-South rice farmers mainly drill seed. Once the crops are planted and the stand is established, the fields are typically maintained in a flooded condition throughout the growing season until they are drained in preparation for harvest.

Planting typically begins in early March in the Gulf Coast area of Louisiana. The Mississippi Delta region plants the bulk of its crop in April, and California rice farmers plant from late April through mid-May. Harvest begins in early or mid-July in the Gulf Coast of Louisiana and extends to August. Peak harvest in the Mississippi Delta is in September and early October. Some producers in the Mid-South Rice Growing Region are able to re-flood their fields in August or September after the first harvest and achieve a partial second or "ratoon" crop from the stubble of the first. Harvesting of the second crop is typically completed by late November. California typically begins harvest in mid-September through October, and may occasionally extend harvesting through early November.

(b) Eligible Activities and Compliance Responses

The proposed Rice Cultivation Protocol incentivizes the reduction of GHG emissions resulting from existing traditional rice cultivation practices in the U.S. The proposed Rice Cultivation Protocol would allow for the issuance of ARB offset credits for emission reductions achieved from qualified alternative rice cultivation practices that reduce methane emissions to the atmosphere. Methane emissions at rice farms occur as a result of activity by methanogens (microorganisms that produce methane) under anaerobic conditions, which are caused by maintenance of flooded conditions in rice fields during the growing season. The proposed Rice Cultivation Protocol allows for three types of eligible project activities and associated compliance responses that would result in a reduction in total flooding time and associated anaerobic conditions during the first crop of the growing season and, thus, would result in a net decrease in methane emissions: Dry Seeding Activities; Alternate Wetting and Drying Activities; and

Early Drainage in Preparation for Harvest Activities. No eligible activities would be permitted during the second crop of the growing season.

- **Dry Seeding Activities:** Dry seeding is a seeding method that involves sowing of seeds into dry or moist seedbed (i.e., non-flooded fields) by drilling or broadcasting. Dry seeding would result in an additional seven to ten non-flooded days during the cultivation season, compared to wet-seeding methods. Only dry-seeding activities located in the California Rice-Growing Region would be eligible for crediting under the proposed Rice Cultivation Protocol.

- **Alternate Wetting and Drying**: This practice would allow traditionally continuously flooded fields to switch to a cyclical wetting and drying pattern in the fields throughout the growing season. Only Alternate Wetting and Drying activities located in the Mid-South Rice-Growing Region would be eligible for crediting under the proposed Rice Cultivation Protocol.

- **Early Drainage in Preparation for Harvest**: This practice applies to rice-cultivation practices that drain standing water from rice fields earlier than an established baseline drainage date. This would typically occur seven to ten days earlier than under existing methods. Early Drainage in Preparation for Harvest activities located in either the California or Mid-South Rice-Growing Regions would be eligible for crediting under the proposed Rice Cultivation Protocol.

The proposed Rice Cultivation Protocol provides project definitions; eligibility rules; conservative GHG emission reduction quantification methodologies; and offset monitoring, reporting, and verification instructions.

Due to the inherent complexities of measuring the soil biogeochemical processes identified above, the proposed Rice Cultivation Protocol uses the DNDC biogeochemical process model to quantify net methane reductions. The DNDC model is a computer program that simulates carbon and nitrogen biogeochemistry in agro-ecosystems. It was originally developed for predicting carbon sequestration and trace gas emissions for non-flooded agricultural lands, simulating the fundamental processes controlling the interactions among various ecological drivers, soil environmental factors, and relevant biochemical or geochemical reactions, which collectively determine the rates of trace gas production and consumption in agricultural ecosystems.

Details of management (e.g., crop rotation, tillage, fertilization, manure amendment, irrigation, and weeding) have been parameterized in the model and linked to the various biogeochemical processes (e.g., crop growth, litter production, soil water infiltration,

decomposition, nitrification, denitrification, etc.) embedded in DNDC. These management values reflect field specific activities and are part of the monitoring required by the OPO or APD. The model can be used for predicting crop growth, soil temperature and moisture regimes, soil carbon dynamics, nitrogen leaching, and emissions of trace gases including nitrous oxide (N_2O), nitric oxide (NO), nitrogen (N_2), ammonia (NH_3), methane (CH_4) and carbon dioxide (CO_2). At this time the DNDC model has only been calibrated and validated for the California and the Mid-South Rice-Growing Regions; therefore, only these regions are eligible to use the proposed Rice Cultivation Protocol.

C. Impacts and Mitigation Measures

1. Regulatory Setting

As described in the 2010 FED, which is incorporated into this EA by reference, the Cap-and-Trade Regulation is authorized with the development and adoption of Compliance Offset Protocols, which include several elements to support existing health and environmental protection. Specifically, each individual offset protocol requires all offset projects to be developed in compliance with all federal, state, and local laws, regulations, ordinances, and any other legal mandate, including all CEQA and National Environmental Policy Act (NEPA) requirements, where applicable. The Offset Project Operator or Authorized Project Designee for an offset project is required to attest to ARB that their project meets these requirements. If during verification, it is found that the offset project does not meet any of these requirements, the project is ineligible to be issued ARB offset credits for the entire reporting period or the duration depending on the types of non-conformity. In addition to the regulatory compliance requirements, Offset Project Operators or Authorized Project Designees must provide detailed information regarding the project at the time of listing that will be posted on the Internet and available for public review.

Many of the compliance responses under the proposed Rice Cultivation Protocol are regulated activities that require the acquisition of a permit from a relevant governing body or jurisdiction. The Regulatory Setting established in the 2010 FED, and as amended in this EA, includes a number of federal or other laws and regulations that could be applicable to the proposed Rice Cultivation Protocol and would likely trigger such permitting activity.

(a) Pesticide/Herbicide

i. Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) gives the U.S. Environmental Protection Agency (U.S. EPA) the authority to oversee the sale and use of pesticides. FIFRA was first passed in 1947 and it established procedures for registering pesticides and provisions for labeling pesticides (U.S. EPA 2012).

ii. California Environmental Protection Agency Department of Pesticide Regulation

California's Food and Agricultural Code (3 CCR 6) authorizes the state's pesticide regulatory program administered by the California Department of Pesticide Regulation (DPR) and mandates it to protect the environment from harmful pesticides, including herbicides, by prohibiting, regulating, or ensuring proper stewardship of those pesticides. Pesticide use enforcement in the field is largely carried out by county agricultural commissioners (CACs) and their staff members (approximately 280 biologists) in California's 58 counties. 3 CCR 2281 states that CACs shall be responsible for local administration of the enforcement program, and DPR shall be responsible for overall statewide enforcement and shall issue instructions and make recommendations to the CACs (DPR 2011).

iii. California Rice Commission

The California Rice Commission (CRC) is a state statutory organization established by the legislature that represents California's rice industry. The CRC identifies management practices and regulations necessary to improve and maintain water quality, implements practices to ensure compliance with regulatory standards, including pesticide regulations, and maintains communication programs. The CRC operates under the California Food and Agricultural Code (3 CCR 71000-71138) (CRC 2014).

iv. Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry

The Bureau of Plant Industry registers all pesticides and herbicides sold or distributed within Mississippi. Pesticides available at retail and distribution outlets are regularly inspected by Bureau personnel for compliance with state and federal pesticide laws including the Mississippi Pesticide Law and Mississippi Pesticide Application Law. Samples of products are collected and prepared for analysis at the Mississippi State Chemical Laboratory to determine if products meet their label guarantee (The Mississippi Department of Agriculture and Commerce 2014a).

v. Arkansas State Plant Board, Pesticide Division

The Pesticide Division of the Arkansas State Plant Board licenses pesticide dealers, commercial applicators, non-commercial applicators, and private applicators and registers thousands of pesticide products sold in the state. The Pesticide Division enforces the FIFRA within Arkansas under a grant from U.S. EPA. Much of the Division's work is investigating complaints of pesticide sales and misuse (Arkansas State Plant Board 2011a).

vi. Missouri Department of Agriculture

The Missouri Pesticide Program is administered through the Bureau of Pesticide Control in the Plant Industries Division. The Bureau is responsible for licensing pesticide applicators and dealers, registering pesticides and performing inspections and investigations in the enforcement of the Missouri Pesticide Use Act and Administrative Rules (281.005 - 281.180 RSMo & 2 CSR 70-25) and the Missouri Pesticide Registration Act (281.210-281.310 RSMo.) (Missouri Department of Agriculture 2014).

vii. Louisiana Department of Agriculture and Forestry

The Louisiana Department of Agriculture and Forestry (LDAF) is designated as the state's lead agency in the regulation of pesticide use and application. The LDAF's Pesticide and Environmental Programs Division is responsible for licensing and training pesticide applicators, overseeing worker protection, registering pesticides for sale in the state, and ensures the proper labeling, distribution, storage, transportation, use, application, and disposal of pesticides within the state through implementation and enforcement of applicable state and federal laws including Louisiana Pesticide Law. Through the Advisory Commission on Pesticides and the Structural Pest Control Commission, the Division investigates and brings actions against those charged with violations of pesticide laws, rules and regulations (LDAF 2011a).

(b) Fertilizers

i. California Department of Food and Agricultural

The California Department of Food and Agriculture's (CFDA) mission is to promote and protect the agricultural industry in California. CFDA also seeks to enhance, protect, and perpetuate the ability of the private sector to produce food and fiber in a way that benefits the general welfare and economy of the state, and to maintain the economic well-being of agriculturally dependent rural communities in California (CFDA 2014a). Use of fertilizers in California is regulated by the CDFA under the California Food and

Agriculture Code (3 CCR, 2300). The Fertilizing Materials Inspection Program ensures consumers receive fertilizing materials that are safe and effective and meet the quality and quantity guaranteed by the manufacturer. Inspectors conduct routine sampling and inspections, respond to consumer complaints, and enforce the laws and regulations that govern the manufacturing and distribution of fertilizing materials (CDFA 2014b).

ii. Mississippi Bureau of Plant Industry

Under provisions of Mississippi laws regulating feed, fertilizer, lime and amendment products, the Bureau of Plant Industry carries out activities that include registering products and facilities, collecting registration and inspection fees, inspecting and sampling products for label guarantees, and assessing penalties for substandard products (Mississippi Department of Agricultural and Commerce 2014b).

iii. Arkansas State Plant Board, Fertilizer Division

The Fertilizer Division of the Arkansas State Plant Board enforces the Feed and Fertilizer Laws and Regulations in Arkansas. Fertilizer samples are inspected to ensure consistency with guarantees provided by the guarantor (Arkansas State Plant Board 2011b).

iv. Missouri Fertilizer/Ag Lime Control Service

The Missouri Fertilizer/Ag Lime Control Service carries out the day-to-day administration of the Missouri Fertilizer and Ag Liming Materials Laws and Rules. The Control Service has had responsibility for implementing the Fertilizer Law since 1893 (Missouri Agricultural Experiment Station 2014).

v. Louisiana Feed, Fertilizer, and Agricultural Liming Commission

The Louisiana Feed, Fertilizer, and Agricultural Liming Commission is responsible for regulating fertilizers within the state in accordance to the Louisiana Fertilizer Law and Rules and Regulations of the Commission. All companies that manufacture or ship fertilizer to Louisiana are required to register with the Commission (LDAF 2011b).

(c) Air Quality

i. Dust (Particulate Matter)

As described in the 2010 FED, there are national and state air quality standards for particulate matter (PM). The PM_{10}standard includes particles with a diameter of 10

micrometers or less (0.0004 inches or one-seventh the width of a human hair). EPA's health-based national air quality standard for PM_{10} is 50 µg/m3 (measured as an annual mean) and 150 µg/m3 (measured as a daily concentration). Each state determines how to meet the standards in a way that makes the most sense for that area. The majority of states have not required the agriculture industry to take any actions that reduce PM_{10} emissions; focusing their efforts on sources such as industrial processes, and construction and demolition. However, because agricultural emissions are a larger portion of overall PM_{10} emissions in some areas in California, the state is addressing PM_{10} from agriculture by incorporating conservation management practices developed with growers and U.S. Department of Agriculture into PM_{10} implementation (U.S. EPA 2013).

Arkansas, Missouri, Mississippi, and Louisiana have not adopted state standards for particulate matter emissions.

ii. Burning

California has adopted limitations on rice straw burning activities for purposes of smoke management. Arkansas, Missouri, Mississippi, and Louisiana have not adopted similar state requirements.

Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991

In California, rice growers are required to comply with the Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991 and the subsequent regulations of the Conditional Rice Straw Burn Permit Program, which limit the amount of rice straw that may be burned in any given year. Since September 2001, the Conditional Rice Straw Burn Permit Program has limited rice straw burning to less than 25 percent of an individual grower's planted acreage, not to exceed 125,000 acres in the Sacramento Valley Air Basin. Today, rice growers must secure Burn Permits (for up to 25 percent of their rice acreage) to burn straw (ARB 2001).

Conditional Rice Straw Burn Permit Program

Section 41865 of the Health and Safety Code required ARB to adopt regulations for the issuance of conditional rice straw burning permits in the Sacramento Valley Air Basin. County air pollution control officers may grant conditional rice straw burning permits only if the CAC and the applicant have met specified conditions (ARB 2001). Based on daily meteorological conditions, ARB prescribes daily allowable burn acreage for the Sacramento Valley. Rice farmers with an eligible burn permit must call the air district

that issued their burn permit(s) to learn about daily allocation before they can burn the straw.

(d) Biological Resources

Migratory Bird Treaty Act (1918)

The original 1918 statute implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union (now Russia).

Specific provisions in the statute include:

- Establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

The U.S. Fish and Wildlife Service updates the species list for the Migratory Bird Treaty Act periodically based on new taxonomy and new evidence of occurrence in the United States or U.S. territories. It includes nearly all native bird species. A recently updated list (December 2, 2013) is published under 50 CFR Parts 10 and 21.

Safe Harbor Agreements

A Safe Harbor Agreement (SHA) is a voluntary agreement between non-Federal property owners, such as farmers, and U.S. Fish and Wildlife Service (USFWS) where the property owner's actions contribute to the recovery of species listed as threatened or endangered under the federal Endangered Species Act (ESA). In exchange for contributing to the recovery of a listed species, the property owners receive assurances from USFWS that they will not be required to implement additional management activities on their land to avoid or mitigate for potential take (USFWS 2013).

California Endangered Species Act

As discussed in the 2010 FED, California has an endangered species act that prohibits the take of threatened or endangered species, except under the provisions of

a qualifying and approved incidental take permit. For a more detailed description of the act, see Appendix A of the 2010 FED.

Mississippi Code of Regulations

Section 49-5-109 of the Mississippi Code addresses protection of endangered species including maintaining a list of species considered to be endangered within the state. The Code states that it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale or ship, and for any common or contract carrier knowingly to transport or receive for shipment for any species or subspecies of wildlife considered endangered by the state, listed as endangered under ESA, or included on the U.S. List of Endangered Foreign Fish and Wildlife.

Arkansas Endangered Species Program

Protection of endangered species within Arkansas is covered by the federal ESA. Although the state does not have state regulations for the protection of endangered species, there is a voluntary Endangered Species Protection Program that was started in 1988. The primary focus of this program is to protect endangered species from the use of pesticides. This program is implemented through the use of pesticide labels direct users to information on the endangered species habitat (Arkansas State Plant Board 2011c).

Wildlife Code of Missouri

The Missouri Department of Conservation administers the *Wildlife Code of Missouri (the Code),* which covers endangered species. All federal species listed as threatened or endangered are also listed as state endangered in the *Code.* In addition, Department staff may add other species on the state-endangered list if the survival of those species is in jeopardy within the state. Section 252.240 of the Code states that the importation, transportation, or sale of any endangered species of fish or wildlife, or hides or other parts thereof, or the sale or possession with intent to sell any article made in whole or in part from the skin, hide or other parts of any endangered species of fish or wildlife is prohibited (Missouri Department of Conservation 2014).

Louisiana State Statute

Section 1904 of the Louisiana Statutes states it is unlawful for any person to export, take, possess, process, sell or offer for sale, deliver, carry, transport or ship, or violate any regulation pertaining to the conservation of any threatened or endangered wildlife species considered threatened or endangered according to ESA or determined by the

secretary of the Louisiana Department of Wildlife and Fisheries to be endangered or threatened.

2. Beneficial Impacts

In accordance with ARB's Certified Regulatory Program, as well as considering the legislative intent of AB 32 and the latitude under CEQA to recognize environmental co-benefits (beneficial impacts), this EA incorporates discussion of potential beneficial environmental impacts when those impacts are considered reasonable and foreseeable, and they are relevant to the decisions to be made by ARB regarding the proposed Rice Cultivation Protocol. In most instances, it is not practical to quantify these impacts in a programmatic analysis such as this, because of the broad, general nature of the available information. At a project-specific level of evaluation, the quantification of beneficial impacts would typically be feasible. Any reasonably foreseeable beneficial impacts associated with the proposed Compliance Offset Protocol will be included in the impact assessment for each resources area listed below.

3. Resource Area Impacts

The environmental assessment in this EA is necessarily programmatic in nature, because reasonably foreseeable compliance responses can be described by type of activity, but the specific location or magnitude cannot be precisely predicted yet. Site-specific or project-specific aspects of environmental impacts, both in-state and out-of-state, cannot be precisely described at this time, because the specific location, type, and number of offset projects that would occur under this protocol are dependent upon a variety of factors that are not within the control of ARB, including economic costs, offset demand, permitting requirements, environmental constraints, and other market constraints. Therefore, this EA addresses broadly defined types of impacts, but does not have the ability to describe the environmental effects of offset projects with specific locations, project sizes and characteristics, or site-specific environmental conditions. In light of these uncertainties, the EA uses a conservative approach (i.e., seeking to avoid a risk of understating effects) in its evaluation to satisfy the good-faith, full-disclosure intent of CEQA. Based on ARB's review of the proposed Rice Cultivation Protocol, staff determined that it would not result in any potentially significant effects on the physical environment, as discussed below.

(a) Aesthetics

i. Impact Analysis

Rice fields are typically located in rural agricultural areas subject to a limited number of viewers, consisting mainly of local rural residents or travelers along state highways and smaller rural roadways. Generally, a growing season begins in the spring when fields are flooded and planted; rice will then mature into a marsh-type landscape, consisting of expansive flat land with visible standing water. Fields are drained when water supplies are not available and to accommodate tilling of the soil and leveling of the field. In California and the Mississippi Delta, rice is harvested during the fall (mid-September through October or early-November, on occasion). In the Gulf Coast region, two series of crops are produced (one in late July or August, and the second in October or November). During the winter months, fields are flooded to break down the remaining rice straw, and become habitat for waterbirds (including ducks, geese, shorebirds, etc.) and other migratory birds (see Biological Resources discussion, below).

Under the protocol, rice fields would be flooded for shorter durations during the growing season (under Dry Seeding Activities and Early Drainage in Preparation for Harvest Activities) or would be subject to varying levels of water in fields rather than a constantly flooded condition (under the Alternate Wetting and Drying Activities). Flooding during winter would not change as a result of this proposed Rice Cultivation Protocol. These activities would not substantially change the rice cycle of alternating between flooded fields and mature rice fields with periods of drained, dry land. Changes to the landscape would occur for a minimal number of days throughout the year, and would not substantially alter the visual character of the fields, except to potentially be visually perceived as similar size and scale to those typical of existing rice farming activities. Therefore, proposed project activities would not result in changes to scenic vistas, scenic resources, or the visual character of the affected area. No additional sources of light or glare would be implemented as part of these proposed project activities and glare from water ponded on the rice fields may be reduced slightly. Impacts on aesthetics associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(b) Agriculture and Forest Resources

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would occur in areas that are currently zoned for agriculture and these activities would be consistent with agriculture land use designations. The proposed project activities constitute variations of existing agricultural practices, so they would not introduce any new influences that could result in land use change on or around the participating properties. Therefore, these changes to farming activities would not result in the conversion of Prime Farmland, Unique Farmland, Farmland of Statewide Importance, Williamson Act lands, as defined in California statute and regulations, or land zoned for agriculture in any states included in the eligible growing regions.

Proposed project activities could not be implemented in forest lands, and are not expected to incentivize or otherwise encourage conversion of forest land to other uses, because the economic benefit opportunities for participating property owners are not substantial enough to encourage conversion of forest land to rice cultivation. Projects eligible to participate in the proposed Rice Cultivation Protocol must have 5 years of baseline data for rice farming before commencing project activities, and would occur within lands that can support rice (i.e., lands consisting of very low draining soil, which is not typical of forested areas). No incentives to begin growing rice on land not currently in production have been identified. Therefore, impacts to agriculture and forest resources associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(c) Air Quality

i. Impact Analysis

Rice cultivation practices generally use equipment that either directly interacts with the farmland (e.g., tractors), or utilizes aerial distribution of materials (e.g., crop dusters). Implementation of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would shorten the duration of flooding. These proposed project activities may change to a small degree the timing of

practices currently used; however, the same types of equipment and similar level of air quality emissions would be expected for both Alternate Wetting and Drying and Early Drainage in Preparation for Harvest Activities.

Cultivation equipment may change for implementation of Dry Seeding Activities by switching from the use of aerial seeding (i.e., by crop dusters) to drill seeding on the land (e.g., by combines driving through fields); however, the amount of fuel required for aerial seeding and drill seeding would not be sufficiently different to alter air basin pollutant concentrations. Therefore, changes to air pollutant impacts (both toxic air containments and criteria pollutants) resulting from modified cultivation practice would be negligible.

Thus, impacts to air quality associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would be **less than significant.**

ii. Mitigation Measures

Mitigation is not warranted.

(d) Biological Resources

i. Impact Analysis

Avian Species

California Rice-Growing Region

Rice fields in the California Rice-Growing Region are located along the Pacific Flyway and provide important habitat for resident and migratory bird species, including raptors, shorebirds, seabirds, long-legged waders, geese, ducks and other waterbirds. Many of the bird species supported by the rice fields are special-status species, including bald eagle (*Haliaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), and greater sandhill crane (*Grus canadensis*). The rice fields in California are typically flooded during the rice growing season, which is generally from April to September, and are usually flooded again from November through February to accelerate decomposition of rice straw.

Some avian species use the rice fields for nesting and feeding habitat during the rice growing season (April-September). Other avian species, including migratory waterbirds, rely on the flooded rice fields during the non-growing season for migratory resting areas,

feeding habitat, and winter season residential habitat (November-February). Limiting the proposed project activities to the rice growing season would avoid potential impacts to wintering habitat for migratory waterbirds during the non-growing season.

Because the proposed project activities would occur during the rice growing season, avian species that use the rice fields for resting, nesting, and feeding during the rice growing season have the highest potential to be affected by changes to the flooding practices. Dry Seeding and Early Drainage in Preparation for Harvest Activities are the two proposed project activities that would be eligible in California under the Rice Cultivation Protocol.

The Dry Seeding Activities would have a minimal effect on avian species, because the timing of seeding already fluctuates a great deal with existing seasonal and meteorological variations. Therefore, Dry Seeding Activities would likely be within the normal seasonal variations of planting the rice fields and would not substantially change the habitat suitability of those fields. Avian species would not need to adapt to any substantially different seeding and flooding conditions.

Early Drainage in Preparation for Harvest Activities have the potential to reduce the habitat suitability during the growing season for avian species that rely on flooded habitat by reducing the time that flooded land is available; however, early drainage may also provide more habitat variability for avian species that do not rely on flooded habitat conditions. Although these activities could have an adverse effect on water-dependent avian species, it would not be substantial, because the implementation of the proposed project activities would be voluntary and would not be adopted as an industry-wide practice. Also, avian species are mobile and have adapted to existing variability of agricultural practices and changes in weather, occasionally moving between suitable flooded habitats, when needed. In addition, the timing of planting and harvesting of rice varies seasonally, and rice fields are regularly rotated between rice crops, other crop types, and fallowing.

For avian species nesting in rice fields, to minimize potential effects on habitat for late broods (i.e., families with recently hatched young), the proposed Rice Cultivation Protocol requires that at least ten percent of a participating rice field's perimeter is not to be shared with a public road, a field also employing Early Drainage in Preparation for Harvest, or land zoned for commercial, industrial, residential, planning, special, or mixed use. This requirement serves to protect habitat connectivity and would further reduce any potential effects on late broods.

Although potential impacts to waterbirds would be avoided or minimized, the Butte Sink Wildlife Management Area, located within the California Rice-Growing Region, would be excluded from the program under the proposed Rice Cultivation Protocol to further avoid potential effects on waterbirds. The Butte Sink Wildlife Management Area is a critically important bird habitat area. It has the highest concentration of waterfowl per acre in the world, and is managed for the purpose of providing feeding and resting habitat for wintering waterfowl; providing habitat and management for endangered, threatened, or sensitive species of concern; protecting and providing habitat for neotropical migratory land birds; preserving a natural diversity and abundance of flora and fauna; and alleviating crop depredation (USFWS 2014). By excluding this important and sensitive area from any proposed rice cultivation offset project activities, potential adverse effects in this area would be avoided.

Therefore, because variability in the timing and availability of flooded rice habitat is common, and voluntary compliance responses under the proposed Rice Cultivation Protocol would occur on a limited rather than widespread basis, implementation of these activities would be within the natural variability of rice farming and would not cause a significant effect on bird populations.

Mid-South Rice-Growing Region

Mississippi River Delta

Rice fields in the Mississippi River Delta portion of the Mid-South Rice-Growing Region are located along the Mississippi Flyway and provide important habitat for resident and migratory bird species including raptors, shorebirds, seabirds, long-legged waders, geese, ducks and other waterbirds. Some of the bird species supported by the rice fields are special-status species, including king rail (*Rallus elegans*). The rice season in this growing region is typically limited to one rice crop that is generally flooded from mid-March to September. In some areas a second rice crop is grown or the rice fields are re-flooded for waterbirds following the September harvest.

Some avian species use the rice fields for nesting and feeding habitat during the rice growing season (March-September). Other avian species, including migratory waterbirds, rely on the flooded rice fields for migratory resting areas, feeding habitat, and winter season residential habitat during the second growing season or winter flooding. Limiting the proposed project activities to the first rice growing season would avoid potential impacts to wintering habitat for migratory waterbirds present during the second rice growing season or winter flooding.

Because the proposed project activities would only occur during the first growing season, avian species that use the rice fields for resting, nesting, and feeding from March through September have the highest potential to be affected by changes to the flooding practices. Alternate Wetting and Drying and Early Drainage in Preparation for Harvest Activities are the two proposed project activities that would be eligible in the Mid-South Rice-Growing Region under the Rice Cultivation Protocol. Alternate Wetting and Drying Activities would potentially have the greatest effect on the suitability of the affected rice fields, because they would result in ongoing changes to water levels in the rice fields during the nesting season. Drawdown of the flooded rice fields during the nesting season could result in nest predation or abandonment or require movement of broods to other suitable habitat, thereby exposing them to predators. Early Drainage in Preparation for Harvest Activities have the potential to reduce the habitat suitability during the first rice growing season for avian species that rely on flooded habitat by reducing the time that flooded habitat is available; however, early drainage may also provide more habitat variability for avian species that do not rely on flooded habitat conditions.

Although these activities could have an adverse effect on avian species, it would not be substantial, because the implementation of the proposed project activities would be voluntary and would not be adopted as an industry-wide practice; therefore, rice farms implementing the practices would likely constitute a small fraction of existing habitats within the region at any one time. Avian species are mobile and many have adapted to occasionally moving between suitable flooded habitats, when needed, in response to changing agricultural activity and natural processes. In addition, the timing of planting and harvesting of rice varies seasonally, and rice fields are regularly rotated between rice crops, other crop types, and fallowing.

Therefore, because variability in the timing and availability of flooded rice habitat is common, and voluntary compliance responses under the proposed Rice Cultivation Protocol would occur on limited rather than widespread basis, implementation of these activities would be within the natural variability of rice farming, and would not cause a significant effect on bird populations.

Gulf Coast Louisiana

Rice fields in the Gulf Coast Louisiana portion of the Mid-South Rice-Growing Region are located along the Mississippi Flyway and provide important habitat for resident and migratory bird species including raptors, shorebirds, seabirds, long-legged waders, geese, ducks, and other waterbirds. Some of the bird species supported by the rice fields are special-status species, including bald eagle (*Haliaeetus leucocephalus*) and

king rail (*Rallus elegans*). In the Gulf Coast region, two rice crops are often grown in the same rice growing season: the first is generally flooded from April until late July or August, and the second is generally flooded from August through October or November.

Similar to the Mississippi River Delta, some avian species use the rice fields for nesting and feeding habitat during the first rice growing season. Other avian species, including migratory waterbirds, rely on the flooded rice fields for migratory resting areas, feeding habitat, and winter season residential habitat during the second rice growing season. Limiting the proposed project activities to the first rice growing season would avoid potential impacts to wintering habitat for migratory waterbirds present during the second rice growing season.

Because the proposed project activities would occur during the first rice growing season, avian species that use the rice fields for resting, nesting, and feeding from April through August have the highest potential to be affected by changes to the flooding practices. Alternate Wetting and Drying and Early Drainage in Preparation for Harvest Activities are the two proposed project activities that would be eligible in the Mid-South Rice-Growing Region. Potential impacts of both Alternate Wetting and Drying Activities and Early Drainage in Preparation for Harvest Activities in this growing region would be similar to those discussed above for the Mississippi River Delta portion of the Mid-South Rice-Growing Region.

Overall, potential impacts to avian species, including special-status species, as a result of Dry Seeding Activities, Early Drainage in Preparation for Harvest, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

Pesticides/Herbicides

As discussed below under Hazards, no substantial changes in the type, frequency, or volume of herbicide or pesticide applications are expected, and all projects implemented under the Rice Cultivation Protocol must be implemented in accordance with all applicable federal, state, and local regulations related to pesticide and herbicide application. Therefore, Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would have a **less-than-significant** impact on biological resources due to use of pesticides/herbicides.

Habitat Conservation Plans

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities that occur in an area subject to a Habitat Conservation Plan under the federal ESA, or a California Natural Communities Conservation Plan under the California Endangered Species Act would be bound by the legal restrictions of those conservation plans. Any activities would be required to comply with federal, state and local laws and regulations that are in effect, and any potential adverse effect related to the Rice Cultivation Protocol with respect to applicable conservation plans would be minimized. Thus, impacts to conservation plans as a result of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

Wetlands

All proposed project activities would occur within rice fields. Rice fields do not qualify as jurisdictional wetlands under Section 404 of the Clean Water Act or relevant state regulations. Therefore, protected wetlands, including those defined by Section 404 of the Clean Water Act, would not be affected by implementation of the Rice Cultivation Protocol. Impacts to wetlands as a result of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

Giant Garter Snake

The giant garter snake (*Thamnophis gigas*) is a special-status species that is known to occupy flooded rice fields and surrounding lands in the Sacramento Valley of California. The species was listed as threatened by the State of California in 1971 and by USFWS in 1993. Conservation efforts have included establishment of guidelines and mechanisms to minimize and mitigate take, conduct habitat and population surveys, develop management plans for public lands, and acquire conservation lands.

Giant garter snakes are active from spring to mid-fall, requiring herbaceous emergent vegetation for foraging habitat and escape cover and vegetated banks and open areas containing small mammal burrows, cracks, and crevices for basking and short-term refuge habitat. In winter, they require upland areas above the normal high water line during their inactive period. Because of the direct loss of natural habitat, the giant garter snake relies heavily on rice fields in the Sacramento Valley, which serve as a proxy for natural wetland habitat, but also uses managed marsh areas in Federal National Wildlife Refuges and State Wildlife Areas. Habitat loss and fragmentation,

flood control activities, changes in agricultural and land management practices, predation from introduced species, parasites, and water pollution continue as threats to the viability of the species (DWR 2011).

Giant garter snakes are most active from early spring through mid-fall. Activity is dependent on weather conditions and may be variable from year to year, but follows a general pattern involving emergence in the spring and winter retreatment in the fall. The breeding season for the giant garter snake begins soon after emergence from overwintering sites and extends from March into May, and may resume briefly during September. Females grow young internally, and give birth to live young, typically from late July through early September. Brumation (a period of dormancy in reptiles, similar to hibernation in other animals) generally begins in late October; the snakes retreat to burrows and crevices during this time (DWR 2011).

Under the proposed Rice Cultivation Protocol, credits could be obtained in California through dry seeding and associated delayed flooding (Dry Seeding Activities), or through early drainage in preparation for harvest (Early Drainage in Preparation for Harvest Activities). Because the giant garter snake relies upon rice fields as habitat, in addition to irrigation canals, drainage ditches, and other wetland areas, changes to the environment could result in disturbance to giant garter snake habitat and individuals. Any impacts would be related to disturbance in lifecycle associated with flooding of rice fields, and not related to ground-disturbing activities.

Delayed flooding associated with Dry Seeding Activities under the proposed Protocol is most likely to occur in April and May (occasionally through early June, depending on the weather), which may coincide with giant garter snake emergence. Generally, giant garter snakes remain in ditches and canals until later in the year, when food prey (i.e., small fish or frogs) become available to them in rice fields. Female giant garter snakes grow young internally and give birth to live young from late July through early September. Because of the timing of lifecycle events, delayed flooding/dry seeding by 7 – 10 days would not disturb the typical behaviors associated with giant garter snake, because they are not likely to be present in rice fields during initial flooding and planting (i.e., individuals would inhabit canals and ditches during this period).

Early Drainage in Preparation for Harvest Activities would result in an approximately 7-10 day advance drying of rice fields compared to baseline conditions. Standard avoidance and minimization measures applicable to giant garter snake during construction projects (i.e., far greater disturbance than would result under the protocol) include a requirement to begin draining a rice field 15 days prior to disturbance (USFWS 2014). Because longer periods of dewatered habitat are considered to constitute an

impact avoidance or minimization measure, Early Drainage in Preparation for Harvest Activities under the Rice Cultivation Protocol could serve as a benefit to giant garter snake populations, because they would be given additional time to evacuate rice fields and enter canals and ditches prior to harvest (Hansen 2014). Additionally, giant garter snakes' ability to forage for prey would not be hindered compared to baseline conditions, because prey would continue to be available in canals and ditches as a result of the draining of the rice fields.

There are no giant garter snakes in the Mid-South area.

Because no individual giant garter snakes would be harmed or taken as a result of Dry Seeding or Early Drainage in Preparation for Harvest Activities and habitat changes would not be adverse, this impact would be **less than significant.**

ii. Mitigation Measures

Mitigation is not warranted.

(e) Cultural Resources

i. Impact Analysis

Implementation of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would shorten the duration of flooding or alternate between dry conditions and flooding on existing rice fields and would not involve any new construction or excavation. Switching from wet seeding to dry seeding may involve the use of more drill seeding by land equipment, instead of broadcast seeding from crop dusters. However, the proposed project activities would occur within existing rice fields where there has been extensive prior disturbance, including grading and tilling. Dry seeding would result in similar levels of ground disturbance as under existing rice cultivation practices. Therefore, impacts to cultural resources associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(f) Energy Demand

i. Impact Analysis

Rice cultivation practices generally use equipment that either directly interacts with the farm land (e.g., tractors or irrigation pumps), or uses aerial distribution of materials (e.g., crop dusters). Implementation of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would shorten the duration of flooding or alternate between dry conditions and flooding on existing rice fields. These activities would change the timing of practices currently used; however, the same types of equipment and similar levels of energy consumption would be expected. Because fields are generally irrigated using gravity flow, these actions would not have a substantial effect on energy demand overall. Thus, impacts associated with energy demand would be **less than significant.**

ii. Mitigation Measures

Mitigation is not warranted.

(g) Geology, Soils, and Mineral Resources

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would occur on land where rice cultivation currently occurs. There is the potential for existing rice fields to be located near active faults; however, no structures would be built under the proposed Rice Cultivation Protocol. Implementation of proposed Rice Cultivation Protocol activities would be similar to rice cultivation activities currently occurring, none of which would increase the risk of a fault rupture. Additionally, rice fields are generally located on reclaimed floodplains and other areas with level topography that have a low risk for landslides.

The Rice Cultivation Protocol activities could occur on lands that could be susceptible to the presence of expansive soils or unstable soils, particularly in areas of fine-grained sediment accumulation typically associated with valley bottoms and low-lying areas. However, the rice fields where activities would occur are also highly disturbed and have some level of compaction from previous rice cultivation activities. Because implementation of the Rice Cultivation Protocol would alter timing of activities that already occur within rice farms by approximately seven to ten days, there would be no increased risks related to unstable soil conditions.

Soil erosion and loss of top soil could occur more frequently as a result of changes in flooding periods, which Alternative Wetting and Drying Activities proposes. However, changing from a constant level of water to a cycle of flooding and evaporation, in a flat area such as a rice field, would not allow for changes to the composition of the soil. In addition, rice fields are already subject to surface land disturbance activities, such as tilling and disking, construction of levees, land grading activities, and implementation of the proposed project activities would not differ substantially from the existing cultivation practices that are occurring within the rice fields.

Proposed project activities could be located in areas that support regionally or locally important mineral resources. However, these areas are currently in rice cultivation, and are not being used for mineral extraction. In addition, the proposed project activities would be similar to existing activities and would not preclude mineral extraction on the affected properties in the future.

Therefore, impacts to geology, soils and mineral resources associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(h) Greenhouse Gas Emissions

i. Impact Analysis

Rice cultivation practices include the use of field equipment that either directly interacts with the farm land (e.g., tractors), or uses aerial distribution of materials (e.g., crop dusters). This equipment runs on diesel, gasoline, or other fossil fuels that generate GHG emissions when combusted. Implementation of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would shorten the duration of flooding or alternate between dry conditions and flooding on existing rice fields. These activities would change the timing of practices in which field equipment is currently used; however, the same types of equipment and levels of GHG emissions would be expected. Similarly, because rice fields are generally irrigated using gravity flow, proposed project activities under the protocol would not substantially change the levels of GHG emissions associated with irrigation.

The purpose of the Rice Cultivation Protocol is to incentivize voluntary reductions in GHG emissions associated with changes in rice cultivation practices that achieve net GHG emission reductions, compared to baseline conditions. To evaluate the extent to which GHG emissions would change, Offset Project Operators would be required use the quantification methodologies prescribed in the protocol. GHG emissions from primary effect sources – those emissions from the biogeochemical process – would be quantified using the DNDC model for both the baseline and project emissions. The DNDC model is a process-based model that simulates scenario GHG emissions with the scenario-specific input values. Input parameters for the DNDC model include: site and climate; soil; crop type farming management; tillage; fertilization; and irrigation. GHG emissions from secondary effect sources – those emissions from on-site cultivation equipment and rice straw residue management – would also be quantified; however, GHG emission reductions from the secondary effect sources would not be eligible for crediting in the proposed Rice Cultivation Protocol. As discussed in Chapter C.5 of the Staff Report, any GHG emission increase from secondary effects sources as a result of proposed project activities (e.g., nitrous oxide and carbon dioxide) would be debited in the final accounting of methane emission reductions. Thus, the approval of offset projects under the Rice Cultivation Protocol would result in a net reduction in GHG emissions. Furthermore, ARB would not approve any proposed offset project under the Rice Cultivation Protocol that would fail to demonstrate a net reduction in GHG emissions using the quantification methodology described above.

Therefore, impacts on GHG emissions associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the Rice Cultivation Protocol would be **beneficial.**

ii. Mitigation Measures

Mitigation is not warranted.

(i) Hazards and Hazardous Materials

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would be located on existing rice fields that are located in rural agricultural areas. No increase in the number or change in location of rice fields would be incentivized by these activities. The proposed project activities would not occur within one-quarter mile of an existing or proposed school or on a site that is included on a list of hazardous materials sites compiled pursuant to California

Government Code Section 65962.5, because activities would be limited to existing rice farms, which are separated from residential communities where schools are located. In addition, none of the proposed project activities would increase the potential for wildland fires, because rice fields are not subject to substantial wildfire hazard.

No changes in land uses are anticipated as a result of implementing the propose Rice Cultivation Protocol, because they would take place on existing rice farms. Thus, there would be no effects associated with a rice field's proximity to airports or airstrips, schools, or adopted emergency response plans or emergency evacuation plans.

The management of hazardous materials and hazardous wastes, such as fuels for rice cultivation equipment, pesticides, herbicides, and fertilizers used on-site would require permits from applicable federal, state, and local regulating agencies. Hazardous materials associated with rice cultivation generally include fuels required for rice cultivation equipment, pesticides, herbicides, and fertilizers. Specific applicable federal laws and regulations that would apply include, but are not limited to, the Hazardous Waste Program specified under Subtitle C of the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Hazardous Materials Transportation Act (HMTA), as well as state laws and regulations for hazardous materials, pesticides, and fertilizers, and other applicable laws and regulations.

Activities associated with the proposed Rice Cultivation Protocol are limited to changes in flooding practices on rice fields. There would be no changes related to the need to transport hazardous materials associated with rice cultivation (i.e., fuels necessary for farming equipment, pesticide, herbicides, and fertilizers). While pesticides, herbicides and fertilizer are currently used in rice production, the types of these chemicals would not change as a result of implementing any of the proposed project activities, because the protocol only changes the timing of existing agricultural practices (i.e., timing of field flooding). A rice farming operation would already need to secure required approvals pursuant to pesticide and herbicide application regulations and that the implementation of the proposed project activities would not change the methods for routine transport, storage, use, and disposition of such hazardous materials and resulting wastes. Thus, impacts associated with Dry Seeding Activities, Early Drainage for Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol with respect to hazards and hazardous materials would be **less than significant.**

ii. Mitigation Measures

Mitigation is not warranted.

(j) Hydrology and Water Quality

i. Impact Analysis

Rice cultivation uses a series of canals and ditches to control water levels in the fields. Generally, water levels are maintained throughout the growing season using basic gravity-based irrigation systems. Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would occur on land where rice cultivation currently occurs. Dry Seeding and Early Drainage in Preparation for Harvest Activities would change the timing of initial flooding and final drainage; however, this would not alter the existing practices associated with these activities. That is, there would be no changes associated with techniques to flood fields and waterbodies (e.g., canals, ditches) that would receive drainage water. Similarly, while Alternate Wetting and Drying Activities would allow for a cycle of flooding and evaporation, rather than a consistent water level, practices associated with irrigation and drainage would not be expected to change. Thus, impacts to hydrology and water quality associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant.**

ii. Mitigation Measures

Mitigation is not warranted.

(k) Land Use and Planning

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would occur on land where rice cultivation already occurs. As such, the proposed Rice Cultivation Protocol would not incentivize changes in land use designation, zoning, or use of agricultural lands. Therefore, the proposed project activities would not conflict with the surrounding land uses or physically divide an established community. Implementation of proposed project activities would not be substantially different from the activities currently occurring within the rice-growing regions. Thus, any impacts related to land use and planning associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest

Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant.**

Potential conflicts with habitat conservation plans or natural community conservation plans would not occur, as discussed above in subsection 3.C.d (Biological Resources).

ii. Mitigation Measures

Mitigation is not warranted.

(l) Noise

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities alter the timing of existing rice cultivation activities. There would be no construction-related activities associated with implementation of the Rice Cultivation Protocol, and reducing the duration that rice fields are flooded would not substantially change existing noise levels in rice fields implementing proposed project activities. Rice is cultivated in rural, agricultural areas, where sensitive receptors are essentially limited to farm workers.

Implementation of the protocol would not change the location of existing rice farms. Thus, there would be no impacts associated with airports or airstrips in the vicinity of farms implementing activities proposed under the protocol.

Dry seeding involves distribution of germinated seedlings through the use of tractors or other ground-based agricultural equipment, rather than aerial broadcasting seeding from crop dusters. The aerial noise source of over-flying aircraft used for seed broadcasting would be reduced. Ground-based agricultural equipment for drill seeding, instead of aerial distribution of seeds, would change the sources of short-term noise levels and may temporarily increase ground vibration. However, the potential effects of ground vibration and noise depend on the distances to noise sensitive receptors. As described above, sensitive receptor are generally limited to be farm employees who experience similar levels of noise and vibration as a result of various existing rice cultivation practices, such as tilling and disking soil, fertilizer and pesticide distribution, and harvesting activities. Because these are types of activities comprise the existing noise conditions on rice farms, altering the timing and duration of flooding would not result in any noticeable changes noise or ground vibration levels.

Therefore, impacts related to noise or ground vibration associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(m) Population and Housing

i. Impact Analysis

Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would be located within existing rice fields in rural locations. As described above under Agricultural and Forest Resources, no changes to the size, location or number of rice farms are anticipated as a result of protocol implementation. Thus, no existing houses or people would be displaced as a result of these proposed project activities, and there would be no construction associated with these activities, and implementation would require minimal (if any) additional personnel at existing rice fields. Therefore, impacts to employment, population and housing associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(n) Public Services

i. Impact Analysis

No changes to the size, location or number of rice farms are anticipated as a result of protocol implementation. Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would not result in additional housing or other facilities that would increase demand for public services including fire and police protection, schools, parks, and other public facilities. Therefore, impacts to public services associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(o) Recreation

i. Impact Analysis

Proposed project activities under the Rice Cultivation Protocol may affect wildlife habitat by reducing flooding period during spring and summer timeframe. However, because impacts to wildlife habitat and biological resources would not be substantial (see Section C.3.d, Biological Resources), any associated effects on existing recreational wildlife viewing in these habitat areas or recreational hunting of game birds using rice fields would also be minimized.

The proposed project activities would not have any effect on the use of existing neighborhood or regional parks or other recreational facilities in urbanized areas. Developed parks and facilities are not typically located within rural agricultural areas, and no new or expanded recreational facilities would be constructed as part of the Rice Cultivation Protocol.

Thus, impacts to recreational activities associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(p) Transportation and Traffic

i. Impact Analysis

Trips per day or vehicle miles traveled (VMT) associated with rice cultivation activities would not change substantially as a result of implementing Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities. Timing of light duty vehicle trips related to management of field irrigation could shift based on changes in the timing of field flooding under proposed project activities associated with the protocol; however, the number of trips and associated VMT would not change substantially compared to baseline conditions, because the

acreage of rice cultivation and magnitude of crop harvest in the growing regions would not change.

Implementation of Dry Seeding Activities could result in the use of ground-based agricultural equipment during the planting phase of cultivation instead of crop dusters for broadcast seeing seeding. However, these activities would be temporary and would involve the movement of a relatively small number of vehicles and equipment to and from rice fields on primarily rural roadways with low traffic volumes in agricultural areas. Additionally, reductions in the use of crop dusting would result in a minor reduction in air traffic.

There would be no construction-related traffic associated with the proposed project activities and implementation would require minimal (if any) additional personnel at existing rice fields. In addition, the Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would occur within existing rice fields and would not require any modifications to roadways.

Thus, implementation of the proposed project activities would not generate long-term operational traffic that would conflict with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to design features; or result in inadequate emergency access. Therefore, impacts on transportation and traffic associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(q) Utilities and Service Systems

i. Impacts Analysis

No changes to the size, location or number of rice farms are anticipated as a result of protocol implementation. Implementation of Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and Alternate Wetting and Drying Activities would not result in additional housing or other facilities that would increase demand for utilities and service systems including water supply, wastewater treatment, stormwater systems, and solid waste disposal. Therefore, impacts to utilities and service systems associated with Dry Seeding Activities, Early Drainage in Preparation for Harvest Activities, and

Alternate Wetting and Drying Activities under the proposed Rice Cultivation Protocol would be **less than significant**.

ii. Mitigation Measures

Mitigation is not warranted.

(r) Summary of Impacts and Mitigation Measures

i. Summary Impact Matrix for the Proposed Rice Cultivation Protocol

Table 1. Summary Impact Matrix for the Rice Cultivation Protocol EA

Resource Area	Significance Before Mitigation	Potential Mitigation	Significance After Mitigation
Aesthetics			
	Less than significant	Mitigation is not warranted	Not Applicable
Agriculture Resources			
	Less than significant	Mitigation is not warranted	Not Applicable
Air Quality			
	Less than significant	Mitigation is not warranted	Not Applicable
Biological Resources			
	Less than significant	Mitigation is not warranted	Not Applicable
Cultural Resources			
	Less than significant	Mitigation is not warranted	Not Applicable
Energy Demand			
	Less than significant	Mitigation is not warranted	Not Applicable
Geology, Soils and Minerals			
	Less than significant	Mitigation is not warranted	Not Applicable
Greenhouse Gas Emissions			
	Beneficial	Mitigation is not warranted	Not Applicable
Hazards and Hazardous Materials			

Table 1. Summary Impact Matrix for the Rice Cultivation Protocol EA			
Resource Area	**Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	Less than significant	Mitigation is not warranted	Not Applicable
Hydrology and Water Quality			
	Less than significant	Mitigation is not warranted	Not Applicable
Land Use and Planning			
	Less than significant	Mitigation is not warranted	Not Applicable
Noise			
	Less than significant	Mitigation is not warranted	Not Applicable
Population and Housing			
	Less than significant	Mitigation is not warranted	Not Applicable
Public Services			
	Less than significant	Mitigation is not warranted	Not Applicable
Recreation			
	Less than significant	Mitigation is not warranted	Not Applicable
Transportation and Traffic			
	Less than significant	Mitigation is not warranted	Not Applicable
Utilities and Service Systems			
	Less than significant	Mitigation is not warranted	Not Applicable

D. Mandatory Findings of Significance

Consistent with the requirements of the California Environmental Quality Act (CEQA) Guidelines (17 CCR 15065) and section 18 of the Environmental Checklist in Appendix G to the CEQA Guidelines, this EA addresses the mandatory findings of significance for the proposed Rice Cultivation Protocol.

Consistent with the requirements of the CEQA Guidelines (17 CCR 15065) and Appendix G, Environmental Checklist, Section 18, the 2010 FED addressed the mandatory findings of significance as discussed below. The 2010 FED also included discussions on significant and unavoidable environmental effects and significant and irreversible environmental changes. As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. Outside of California, other federal, state and local agencies would consider the proposed projects in accordance with their laws and regulations. ARB would not be the agency responsible for conducting the project-specific environmental or approval reviews, because it is not the agency with authority for making land use or project implementation decisions.

The 2010 FED, in its entirety, addressed and disclosed potential environmental effects associated with implementation of the Cap-and-Trade regulation, including the Rice Cultivation Protocol. As described in the impact analyses for the 2010 FED, as well as in this EA for the proposed Rice Cultivation Protocol, potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures are disclosed.

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

As stated in the 2010 FED, a finding of significance is required under 17 CCR 15065(a) if a project “has the potential to substantially degrade the quality of the environment.” In practice, this is the same standard as a significant effect on the environment, which is defined in 17 CCR 15382 as “a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.” As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies or other

regulatory bodies at such time the projects are proposed for implementation. Outside of California, other state and local agencies would consider the proposed projects in accordance with their laws and regulations. ARB would not be the agency responsible for conducting the project-specific environmental or approval reviews because it is not the agency with authority for making land use or project implementation decisions.

This 2010 FED, in its entirety, addresses and discloses potential environmental effects associated with implementation of the Cap-and-Trade program in the following resource areas:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy Demand
- Geology, Soils, and Mineral
- Greenhouse Gases
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Employment, Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems

Chapter 4, “Impact Analysis,” of the 2010 FED discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

The Rice Cultivation Protocol is a proposed offset project that would be added to other compliance responses under the Cap-and-Trade Program, as authorized by the Cap-and-Trade Regulation. Based on ARB’s review, staff has determined that implementation of the proposed Rice Cultivation Protocol would not result in any new potentially significant adverse impacts on the physical environment or make any significant impacts identified in the 2010 FED substantially more severe.

1. Impacts on Biological Resources

The Impact discussion above under III.C.3.d, Biological Resources provides an overview of the potential effects to Avian Species, Pesticides/Herbicides, Habitat Conservation Plans, Wetlands, and Giant Garter Snake. As discussed, because variability in the timing and availability of flooded rice habitat is common, and voluntary compliance responses under the proposed Rice Cultivation Protocol would occur on limited rather than widespread basis, implementation of these activities would be within the natural variability of rice farming, and would not cause a significant effect on bird populations; the application of pesticides and herbicides, and implementation of habitat conservation plans, would continue in compliance with federal, state, and local regulations; protected wetlands would not be affected; and giant garter snakes would not be taken or subjected to adverse habitat effects as a result of implementation of the Rice Cultivation Protocol. The Rice Cultivation Protocol would not substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal.

2. Impact on Cultural Resources

As described in Section II.C.3.e, Cultural Resources, proposed project activities would occur within existing rice fields where there has been extensive disturbance including grading and tilling. Ground disturbance would not substantially change from these baseline conditions. Thus, implementation of the Rice Cultivation Protocol would not have the potential to eliminate important examples of the major periods of California history or prehistory

a. Does the project have impacts that are individually limited, but cumulatively considerable?

The preceding impact analyses determined that there would be no significant impacts associated with implementation of the proposed Rice Cultivation Protocol. Cumulative impacts were discussed in the 2010 FED and are addressed in subsection (5) below. The proposed Rice Cultivation Protocol would not result in contributions to any potentially significant cumulative adverse impacts on the physical environment.

b. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect

human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are all addressed above in this EA. The results of the impact analysis in this EA determined that any impacts in the resource areas would be less than significant and, therefore, no substantial adverse effects to human beings would occur.

3. Cumulative and Growth-Inducing Impacts

The 2010 FED disclosed cumulative impacts for resource topics in general qualitative terms, recognizing the programmatic nature of the FED, as they pertain to reasonably foreseeable development. The cumulative impacts are required to be addressed when the cumulative impacts are expected to be significant and when the project's incremental contribution to the effect is cumulatively considerable. Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. ARB considered in the FED the cumulative impacts analysis of other projects that, like cap-and-trade, are designed to reduce annual emissions of GHGs, and not simply every project that emits GHGs. This approach is "guided by the standards of practicality and reasonableness" and serves the purposes of the cumulative impacts analysis, which is to provide "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (*CBE v. Cal. Res. Agency* (2002) 103 Cal.App.4th 98, 119).

The level of detail in the cumulative and growth-inducing impacts discussion in the FED was guided by what is practical and reasonable, and contained the following elements (ARB 2010):

- An analysis of related future projects or planned development that would affect resources in the project area similar to those affected by the proposed project.
- A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available.
- A reasonable analysis of the cumulative impacts of the relevant projects. An environmental document must examine reasonable feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

Due to the geographic reach of California's Cap-and-Trade Regulation and, consequently, also the reach of the proposed Rice Cultivation Protocol and the programmatic nature of the environmental assessment, the impact analysis is inherently cumulative in nature, rather than site- or project-specific. As a result, the character of impact conclusions in the resource-oriented impact analysis discussions are cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth, as appropriate.

For purposes of the cumulative analysis contained in the 2010 FED, impacts were based on the program's contribution to environmental impacts in combination with the environmental effects of the ongoing, adopted, and reasonably foreseeable Scoping Plan measures, and the State Implementation Plan (SIP), which includes goods movement measures (heavy-duty vehicle efficiency, ship electrification, port drayage truck measures, and vessel speed reduction). The cumulative impact analysis determined the combined effect of the Cap-and-Trade Regulation and other closely related, reasonably foreseeable projects. The discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the program alone. The level of detail in the 2010 FED was guided by what was practical and reasonable.

As disclosed in the 2010 FED, implementation of California's cap-and-trade regulation (which assumed the implementation of new offset protocols in addition to what was analyzed in the 2010 FED) was determined to potentially result in cumulatively considerable impacts. While suggested mitigation was provided for each potentially cumulatively considerable impact, the mitigation would need to be implemented by other agencies. Where impacts could not be feasibly mitigated, the 2010 FED recognized the impact as significant and unavoidable. The Board adopted Findings and a Statement of Overriding Considerations.

Because the environmental effects of the proposed Rice Cultivation Protocol are less than significant or beneficial and the proposed project activities would not change the acreage of rice cultivation or magnitude of crop harvest, implementation of the protocol would not involve considerable contributions to cumulative impacts. Nonetheless, to the extent that the proposed Rice Cultivation Protocol has even minimal contributions to cumulative effects, any potential cumulative impacts were addressed in the 2010 FED as part of the overall Cap-and-Trade Regulation.

4. Alternatives

Under ARB's Certified Regulatory Program, an EA shall address "feasible alternatives to the proposed action [that] would substantially reduce any significant adverse impact

identified" (17 CCR 60005 (b)). Additionally, any ARB action or proposal for which significant adverse environmental impacts have been identified shall not be approved or adopted as proposed, if there are "feasible alternatives available [that] would substantially reduce such adverse impact" (17 CCR 60006). CEQA Guidelines (14 CCR 15126.6 (a)) also indicates the need for an evaluation of "a range of reasonable alternatives to the project, or the location of the project, [that] would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives."

As noted in Section C. of this EA, the proposed Rice Cultivation Protocol would not result in any potentially significant adverse impacts on the environment. Thus, the identification and analysis of potential alternatives to the proposed activities are not required.

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