Board of Forestry and Fire Protection

INITIAL STATEMENT OF REASONS

"SOUTHERN SUBDISTRICT AND MARIN CO. STOCKING AMENDMENTS, 2020"
DRAFT DOCUMENT
Title 14 of the California Code of Regulations (14 CCR),
Division 1.5, Chapter 4
Subchapter 4
Articles 3 & 13
Amend: § 913.8
§ 926.1
§ 926.8
§ 926.25
§ 927.9
§ 927.10
§ 927.16

INTRODUCTION INCLUDING PUBLIC PROBLEM, ADMINISTRATIVE REQUIREMENT, OR OTHER CONDITION OR CIRCUMSTANCE THE REGULATION IS INTENDED TO ADDRESS (pursuant to GC § 11346.2(b)(1))…NECESSITY (pursuant to GC § 11346.2(b)(1) and 11349(a))….BENEFITS (pursuant to GC § 11346.2(b)(1))

The Z'berg-Nejedly Forest Practice Act of 1973 (FPA) describes many of the broad forest management goals and policies of the state, including Public Resources Code (PRC) § 4512(c), which states "The Legislature finds and declares that it is the policy of this state to encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, sequestration of carbon dioxide, and recreational opportunities alike in this and future generations."

The FPA further describes the relationship between forest management and atmospheric sequestration of carbon dioxide through PRC § 4512.5(d), which states "..there is increasing evidence that climate change has and will continue to stress forest ecosystems, which underscores the importance of proactively managing forests so that they can adapt to these stressors and remain a net sequesterer of carbon dioxide."

PRC § 4551 describes the mechanism through which forest policy is implemented through the authorization of the Board of Forestry and Fire Protection (Board) to "…adopt district forest practice rules and regulations for each district in accordance with the policies set forth in Article 1 (commencing with Section 4511) of this chapter and pursuant to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code to ensure the continuous growing and harvesting of commercial forest tree species and to protect the soil, air, fish, wildlife, and water

resources, including, but not limited to, streams, lakes, and estuaries." The FPA further states, within PRC § 4554.5, that "[those] rules and regulations shall be continuously reviewed and may be revised."

Southern Subdistrict Stocking Standards

Included in the FPA is PRC § 4561, which sets forth "resource conservation standards", which are minimum standards intended to "…ensure that a cover of trees of commercial species, sufficient to utilize adequately the suitable and available growing space, is maintained or established after timber operations." The section goes on to outline various prescriptive standards for minimum tree occupancy required under described site-specific conditions.

PRC § 4561.2 authorizes the Board to "… adopt alternative stocking standards that meet the purposes of Section 4561 if those alternative standards reasonably address the variables in forest characteristics, achieve suitable resource conservation, and contribute to specific forest health and ecological goals as defined by the board."

In September of 2019, the Board defined such ecological goals and adopted alternative stocking standards for the Northern, Southern, and Coast forest districts under the authority of PRC § 4561.2 (Office of Administrative Law [OAL] Rulemaking Matter 2019-1003-01S). Those forest health and ecological goals, summarized below, were based on a review of the available and applicable literature on the subjects and were necessary in order to address the changes to forest conditions which have occurred since the initial creation of the statutory minimum resource conservation standards. The alternative stocking standards which were adopted to address those defined specific forest health and ecological goals, while addressing variability in forest characteristics and achieve suitable resource conservation.

Those forest health and ecological goals, along with the rulemaking action which substantiated those goals and amended the regulatory minimum resources conservation standards within 14 CCR §§ 912.7, 932.7, and 952.7, further support the proposed action here.

Additionally, within the FPA, PRC § 4531 requires that Board "…divide the state into not less than three districts. In establishing these districts, the board shall take into account differing physical characteristics, including, but not limited to, climate, soil type, and principal forest crops. Insofar as possible, the board shall group together lands that have substantially similar characteristics and that will best be served by substantially similar regulations. Boundaries of such districts may be altered from time to time as the board determines is necessary." The Board has defined these forest districts within Article 1 of Subchapter 3 of Chapter 4 of Title 14 of the California Code of Regulations (CCR), and has further clarified additional "subdistricts", which are subsets of those larger districts (14 CCR §§ 895.1 and 909.1). Included within these subdistricts is the southern subdistrict of the coast forest district, and included with the regulatory provisions for this southern subdistrict are specific regulatory stocking standards to be met upon completion of timber operations.

Since the initial creation of the southern subdistrict specific regulatory stocking standards, several factors have significantly influenced forest health and management practices throughout the state. Since the initial adoption of these regulations, the socioecological goals of forest management have significantly expanded and have influenced forest stocking and planting procedures. Issues surrounding atmospheric carbon sequestration, the risk and threat of loss and damage from wildfires, growing forest pest conditions, ongoing and potentially long-term drought conditions, climate change, and forest heterogeneity and diversity all serve to influence forest management practices and will impact associated stocking and planting procedures. The **problem** that the proposed action seeks to address is that current regulations do not address any of these changing conditions within the southern subdistrict of the coast forest district and do not provide for optimal stocking conditions in light of those conditions. The proposed action was developed in response to these changing ecological conditions and improved seedling survival rates. This proposal will allow for new point count standards following timber operations within the entirety of the southern subdistrict of the coast forest district which are consistent with those of the larger coast forest district, of which the southern subdistrict is a part.

The amendments seek to address the specific forest health and ecological goals identified by the Board and clarify how those goals will achieve suitable resource conservation. **The forest health and ecological goals identified by the Board include**:

- Increased carbon sequestration
- Reduction in fire risk, fuels loading
- Increased resilience to forest pests
- Increased resilience to drought / increased water yield
- Appropriate stocking for resilient forests in a changing climate
- Avoidance of large-scale disturbances which promote homogeneity in forests

Marin County Stocking Standards

In addition to those regulations related to subdistricts, the Board has adopted certain county-specific forest practice regulations. Included in these county rules are those specific to the county of Marin within 14 CCR §§ 927 *et seq.* These Marin county regulations include requirements for stocking within 14 CCR § 927.10. The Marin county stocking standards were adopted by the Board in 1984 upon a recommendation from the county of Marin, pursuant to PRC § 4516.5, which requires that the Board adopt such regulatory recommendations, provided that those recommendations are consistent with the intent and purpose of the FPA, and are necessary to protect needs and conditions of the county making those recommendations. The **problem** is that, upon review of these regulations pursuant to PRC § 4553 and in light of the Board's determinations related to alternative stocking standards within OAL Rulemaking Matter Number 2019-1003-01S (described above), the Board has determined that the forest health and ecological goals which necessitated adoption of the alternative stocking

standards are suitable and appropriate for application throughout the Coast Forest District, and the Marin county stocking standards are inconsistent with these goals.

Eucalyptus Management

The FPA requires, within PRC § 4551.5, that the rules and regulations adopted by the Board under the authority of PRC § 4551 "shall apply to the conduct of timber operations…", which is defined within PRC § 4527 as meaning "…the cutting or removal, or both, of timber or other solid wood forest products…from timberlands for commercial purposes." Timberlands are then further defined within PRC § 4526 as meaning "…land, other than land owned by the federal government and land designated by the board as experimental forest land, which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees. Commercial species shall be determined by the board on a district basis." The Board has determined and identified such commercial species within 14 CCR § 895.1.

Prior to 2013, the Board had identified Eucalyptus trees as a commercial species within the Coast and Southern Forest Districts, and in 1987, the Board adopted regulations related specifically to the harvesting and of Eucalyptus within the Southern Subdistrict of the Coast Forest District in 14 CCR § 913.8(d) (Board of Forestry and Fire Protection Rulemaking File Number 91). In 2013, however, the Board recognized that Eucalyptus has little to no commercial value in the state and that the Forest Practice Rules were not the appropriate or suitable vehicle to regulate its management or harvesting, or lack thereof. In light of this recognition, the Board amended 14 CCR § 895.1 to remove Eucalyptus from the list of commercial species. The **problem** is that, while the Board removed Eucalyptus from the list of commercial species, the provisions for evenaged silvicultural management of Eucalyptus within 14 CCR § 913.8(d) were overlooked and are currently inconsistent with the Forest Practice Act and Rules. This inconsistency stems from the fact that, as non-commercial species, Eucalyptus is unable to statutory stocking standards, which require that "…a cover of trees of commercial species…is maintained or established after timber operations"(PRC § 4561), or current regulatory stocking standards, which provide that "…[t]he resource conservation standards of the Rules may be met with Group A and/or B commercial species" (14 CCR § 912.7(d)). The propagation of Eucalyptus stands with evenaged silvicultural systems does not satisfy these provisions and its inclusion within 14 CCR § 913.8 is an erroneous oversight within regulation.

SPECIFIC PURPOSE OF EACH ADOPTION, AMENDMENT OR REPEAL (pursuant to GOV § 11346.2(b)(1)) AND THE RATIONALE FOR THE AGENCY'S DETERMINATION THAT EACH ADOPTION, AMENDMENT OR REPEAL IS REASONABLY NECESSARY TO CARRY OUT THE PURPOSE(S) OF THE STATUTE(S) OR OTHER PROVISIONS OF LAW THAT THE ACTION IS IMPLEMENTING, INTERPRETING OR MAKING SPECIFIC AND TO ADDRESS THE PROBLEM FOR WHICH IT IS PROPOSED (pursuant to GOV §§ 11346.2(b)(1) and 11349(a) and 1 CCR § 10(b)). ***Note: For each adoption, amendment, or repeal provide the problem, purpose and necessity.***

The Board is proposing action to amend 14 CCR § 913.8, 926.1, 926.8, 926.25, 927.9 & 927.16, and repeal 14 CCR § 927.10.

The **purpose** of the proposed action is:

1) To address the specific forest health and ecological goals identified by the Board to improve forest resilience to drought, fire, forest pests and diseases and increase carbon sequestration rates to defend against global climate change. This is accomplished by amending the point count minimums in the stocking standards of the Southern Subdistrict within 14 CCR § 913.8 to a lower standard which is consistent with the Boards recent amendments to similar stocking standards for the larger coast forest district within 14 CCR § 912.7. The proposed lower standards provided for suitable resource conservation by reducing competition between trees for the essential resources of sunlight, water and nutrients needed for photosynthesis, and eliminates the need for expensive pre-commercial thinning treatments and resulting fuel buildup that can contribute to wildfire risk and carbon release. Contemporary research indicates the following (*see citation and source references below*).

    - Less competition between trees at lower, more appropriate densities may result in lower mortality rates and hence faster net growth of trees that can sequester more carbon.
    - It is important to reduce the densities of smaller diameter trees, as they can be associated with high severity, large-scale fires that result in the vast majority of carbon storage loss and greenhouse gas emissions on forested land.
    - A reduction in overall forest density helps create forests which are less susceptible to forest pest and disease outbreaks, reducing the amount of forest carbon stored in the dead pool.
    - The current stocking standards encourage excess site occupancy in many areas, exacerbating conditions that can lead to extensive and severe wildfires that result in loss of life, structures, critical habitat and productive forestland.
    - The current stocking standards encourage excess site occupancy in many areas, helping create conditions that are susceptible to forest pest and disease outbreaks far beyond those associated with normal, cyclical outbreaks.

- The current stocking standards encourage excess site occupancy in many areas, contributing to conditions that increase inter-tree competition for water, reduce tree vigor and limit forest-water yield.
- The current stocking standards require retention of seedlings and trees at densities that will be unsustainable for future forests in a changing climate. Effects of climate change on California forests include increased competition for water, longer fire seasons with more severe behavior, and greater susceptibility to insect and disease outbreaks.
- Appropriately stocked forests are more resilient and resistant to a variety of stressors, which may help prevent large-scale, extreme disturbances that create large, homogenous patches of forest type, age and structure.

2) To standardize regulatory stocking standards throughout the entirety of the southern subdistrict, and to make the southern subdistrict point-count stocking standards consistent with those of the larger coast forest district which were adopted by the Board in September of 2019.
3) To eliminate erroneously remnant provisions of 14 CCR § 913.8(d) related to evenaged silvicultural management of Eucalyptus within the southern subdistrict.
4) To address clarity issues, where they exist, within the regulations.

The **effect** of the proposed action is to address those forest health and ecological goals as described within this document to provide for increased forest resilience and suitable resource conservation by adjusting point count standards for the southern subdistrict to a level that reduces competition between trees for the essential resources of sunlight, water and nutrients needed for photosynthesis and requisite for forest resilience to natural stressors. The proposed action would eliminate the need for expensive pre-commercial thinning treatments and the resulting fuel buildup created by such treatments which can contribute to wildfire risk and carbon release. Implementation of the proposed action will help to increase rates of carbon sequestration and reduce the long-term probabilities of large-scale wildfire that can result in homogeneous forest structure across the landscape by reducing tree mortality from drought, insect, and disease. The proposed action is consistent with the legislature's findings and declaration in PRC § 4512.5(d) for "proactively managing forests so that they can adapt to these stressors and remain a net sequesterer of carbon dioxide."

The proposed action will also make point-count stocking standard requirements consistent throughout the entirety of the coast forest district, eliminate unnecessary, outdated, and potentially confusing provisions related to the evenaged management of Eucalyptus within the southern subdistrict, and generally improve the clarity of the regulations.

The **benefit** of the proposed action is to provide a mechanism pursuant to PRC § 4512.5(d) to proactively manage forest stocking, so that forests can adapt to these stressors and become more resilient while increasing rates of carbon sequestration to help offset climate change that contributes to these stressors.

General note on amendments to § 912.8
In general, the purpose of the amendments is to reduce the requirements for stocking in the southern subdistrict of the coast forest district while utilizing the established point count method. The purpose of this reduction is to achieve the Board's forest management goals of increased carbon sequestration, the reduction in fuels loading and fire risk, an increased resilience to forest pests, an increased resilience to drought/ increased water yield, achieving an appropriate stocking for a resiliency in a changing climate, and avoidance of large-scale disturbances which promote homogeneity in forests.

In terms of increasing carbon sequestration, the reduction in the southern subdistrict point count stocking standards will result in less competition between trees which exist at lower, more appropriate densities, and will result in lower mortality rates and hence faster net growth of trees which are able to sequester additional carbon. Additionally, a reduction in densities of smaller diameter trees, which are associated with high severity, large-scale fires that result in the vast majority of carbon storage loss and greenhouse gas emissions on forested land, will reduce these losses and emissions. Furthermore, a reduction in overall forest density helps to create forests which are less susceptible to pests and disease outbreaks, reducing the amount of forest carbon stored in the dead pool.

In terms of reducing the current fuel load and fire risk, evidence suggests that current stocking standards encourage excess site occupancy in many areas, exacerbating conditions which can lead to extensive and severe wildfires which result in loss of life, structures, critical habitat, and productive forestland. The proposed reduction in the southern subdistrict point count stocking standards will address and minimize these conditions.

The proposed reduction in the southern subdistrict point count stocking standards will also provide increased resilience to drought conditions throughout the region and result in increased water yield across forested landscapes therein. Current evidence suggests that the current stocking standards encourage excess site occupancy in many areas, helping to create the conditions that increase inter-tree competition for water, reduce tree vigor, and limit a forest-water yield. Reduction of these planting standards will alleviate these issues and improve overall forest-health and water yield.

Currently, stocking standards require planting at densities which will be unsustainable for future forests in a changing climate. Effects of climate change on California forests include increased competition for water, longer fire seasons with more extreme fire behavior, and greater susceptibility to insect and disease outbreaks. The proposed reduction in these standards will alleviate these conditions and will result in forests which are more resistant and resilient to the effects of climate change.

The proposed reduction in southern subdistrict point count stocking standards will result in an appropriately stocked forest which is more resilient and resistant to a variety of stressors, as previously discussed, which will help to prevent large-scale, extreme

disturbances which may result in large, homogenous patches of forest type, age, and structure, which may further exacerbate conditions which are currently problematic.

Additionally, goal specific discussion and citation can be found within “Citations and Source References” within this document.

Amend § 912.8(a)(1)
The proposed amendment eliminates a requirement that the timber stand which remains in a logging area following the completion of timber operations contains at least 50% (by number of trees) of the trees between 12 and 18 inches dbh which existed prior to commencement of those timber operations. The purpose of this amendment is to reduce the post-harvest density requirements of smaller diameter trees, as they can be associated with high severity, large-scale fires that result in the vast majority of carbon storage loss and greenhouse gas emissions on forested land. The elimination of this requirement is consistent with the forest health and ecological goals as identified within this document, and the elimination of this provision is necessary in order to clarify the removal of this requirement for post-harvest stand composition.

Amend § 912.8(a)(1) & 927.9(a)(1)
The proposed action prohibits, in the southern subdistrict of the coast forest district and in commercial thinning or selection methods used in Marin County, the cutting of conifers which are more than 75 feet from the nearest leave tree, or tree which will remain following the completion of timber operations, which is 12 inches dbh or larger and located within the logging area. The purpose of this amendment is to clarify this pre-existing requirement as previously the provision prohibited the cutting of trees which were more than 75 feet from “a” leave tree, which may have caused confusion regarding implementation as “a” leave tree could be interpreted as any leave tree throughout the logging area. This amendment clarifies that this provision is intended to ensure that trees which remain on the landscape following the completion of timber operations within the logging are no more than 75 feet from only the nearest leave tree within the logging area, not that they must be no more than 75 feet from any or all other trees within the logging area. This amendment is necessary to clarify this provision.

The proposed action eliminates a provision which identifies that an average top stump diameter, outside bark, shall be considered 1 inch greater than dbh. This appears to be a remnant provision which existed prior to other, more prescriptive methods of determining stump diameter, which exist elsewhere in the regulations, including within 14 CCR § 913.8(a)(1)(B)4., which requires that average stump diameter of sprouts be measured 1 foot above the average ground level of the original stump from which the sprouts originate. Currently, the provision lacks clarity and its removal is necessary in order to improve the clarity of the provisions as a whole.

Amend § 912.8(a)(1)(B)(1), (2) & (3)
The purpose of the amendment is, within the southern subdistrict of the coast forest district, to reduce the minimum necessary point count for stocking requirements following the completion of timber operations to 200, 125, or 100 countable trees

(defined within 14 CCR § 895.1, and provided quantitative value herein) per acre, for site classes I and 2, 3, and 4 and 5, respectively. Additionally, the proposed amendment makes adjustments to the point values of trees between 4 and 12 inches dbh and those greater than 12 inches dbh in order to maintain consistency between these stocking standards for the southern subdistricts, and those which were adopted by the Board in September of 2019 within 14 CCR § 912.7(b)(1) for the coast forest district and which were intended to address the forest health and ecological goals described within this document. The purpose of these amendment here is to address those similar forest health and ecological goals. These values represent appropriate standards to both address the variability of productivity and general forest characteristics throughout the southern subdistrict of the coast forest district, as well as to maintain suitable stocking and resource conservation while contributing to the forest health goals as stated above. These values address the variability in forest conditions through an acknowledgment of the lower potential productivity and carrying capacity of lower quality sites throughout the southern subdistrict. This reduction in stocking levels is based upon an evaluation of current literature which has identified those levels as suitable and appropriate to achieve the stated goals. These amendments are necessary in order to clarify the prescriptive standards which are necessary to achieve these goals and to implement and enforce the regulation and alternative stocking implemented pursuant to PRC § 4561.2.

Repeal existing § 913.8(a)(2)(C)[portions],(D)&(E)
The proposed action repeals the provisions which provide prescriptive values for trees between 12 to 18, 18 to 24, and over 24 inches dbh for use in calculating stocking under the point count method within the southern subdistrict of the coast forest district. The purpose of these repeals is to maintain consistency between the point-count stocking standards of the southern subdistrict of the coast forest district and those of the larger coast forest district as amended by the Board in September of 2019 within 14 CCR § 912.7(a)(1). The purpose of the September 2019 amendments to 14 CCR § 912.7 was to address defined forest health and ecological goals, which are the same forest health and ecological goals as identified within this document. The regulatory stocking scheme for the calculation of point values within the larger coast forest district represent appropriate standards to both address the variability of productivity and general forest characteristics throughout the entirety of the Coast Forest District, including the southern subdistrict, as well as to maintain suitable stocking and resource conservation while contributing to the forest health goals as stated within this document. The elimination of these values is based upon an evaluation of current literature which has identified those levels as suitable and appropriate to achieve the stated goals. These amendments are necessary in order to clarify the prescriptive standards which are necessary to achieve these goals and to implement and enforce the regulation and alternative stocking implemented pursuant to PRC § 4561.2.

Amend § 913.8(a)(2)(G)
The proposed amendment allows that Group B species, as identified within 14 CCR § 895.1, which are designated for management may be used to count for stocking within the southern subdistrict, and that the provisions of 14 CCR § 912.7(d), which identify the

prescriptive and performance-based process by which stocking may be determined when utilizing Group B species, are to be utilized when Group B species are proposed for counting for stocking within the southern subdistrict. The purpose of this amendment is to allow for the utilization of Group B species to count for stocking, under the process which already exists and has proven effective. This amendment is necessary to clarify the method by which Group B species may be counted for stocking, and the use of the existing requirements within 14 CCR § 912.7(d) are appropriate and suitable for use within the southern subdistrict.

In conjunction with the utilization of the established process for Group B management within 14 CCR § 912.7, the proposed action eliminates the existing requirement that, when hardwoods are to be counted to meet stocking requirements, at least 20% of the harvested area shall be planted with 200 conifer trees per acre. The purpose of this amendment is to maintain consistency with a pre-existing, appropriate, and suitable process, as well as to eliminate this prescriptive requirement of planting 200 conifer trees per acre, which would result in an increase in small diameter trees, which is inconsistent with the forest health and ecological goals established within this rulemaking effort. This amendment is necessary to clarify the elimination of this prescriptive requirement in favor of the pre-existing process which exists within 14 CCR § 912.7(d).

Repeal existing § 913.8(d)
The proposed action eliminates the provisions which allow for, and provide requirements for, the evenaged management of Eucalyptus within the southern subdistrict. As described within the introduction to this issue, while the Board removed Eucalyptus from the list of commercial species within 14 CCR § 895.1, the provisions for evenaged silvicultural management of Eucalyptus within 14 CCR § 913.8(d) were overlooked and are currently inconsistent with the Forest Practice Act and Rules. The purpose of the repeal of these provisions is to ensure consistency between the Forest Practice Act and Rules by clarifying that the evenaged silvicultural management of Eucalyptus, which is not identified as a commercial species, is not subject to the provisions of the FPA or FPRs and is necessary to ensure this consistency.

Amend § 927.10
The proposed action eliminates the Marin county specific basal area and point count regulatory stocking requirements, which then subjects timber operations within the county of Marin to those regulations related to the southern subdistrict as a whole, of which the county of Marin is a part. The purpose of this amendment is to ensure that the forest health and ecological goals which are described within this document, are addressed throughout the entirety of the southern subdistrict, and to simplify, to some extent, the regulatory scheme related to stocking standards within the southern subdistrict. By eliminating the basal area and point count stocking standards which are specific to the county of Marin, stocking following the completion of timber operations within the county will now address those forest health and ecological goals through the implementation of the standards within 14 CCR § 913.8, which are appropriate and

suitable for the entirety of the southern subdistrict. This amendment is necessary to clarify the elimination of these county specific standards.

This action was developed in consultation with the county of Marin, in compliance with PRC § 4553. The county of Marin reports that they do not object to the regulatory updates proposed by the Board and supports the goals of achieving healthier, more resilient forests.

Non-Substantive Amendments
Non-substantive amendments have been made throughout, which include capitalization of terms defined pursuant to 14 CCR § 895.1, correct us of abbreviations as identified pursuant to 14 CCR § 895, using both written and Arabic numbers when numeric values appear, re-numbering provisions due to regulatory re-structuring, eliminating outdated references to metric units, which are no generally no longer utilized within the field of forestry, and improved grammar.

ECONOMIC IMPACT ANALYSIS (pursuant to GOV § 11346.3(b)(1)(A)-(D) and provided pursuant to 11346.3(a)(3))
The **effect** of the proposed action is to decrease the costs associated with forest management through the reduction of stocking control treatments.

Business are not expected to expand or contract because of the proposed action. Although the proposed action does nominally decrease costs for certain forest management activities, it is not expected that the proposed action will result in expansion or contraction of businesses.

The number of businesses impacted, including small business, is unknown. Small businesses means independently owned and operated, not dominant in their field of operations and having annual gross receipts less than $1,000,000. No businesses are expected to be created or eliminated.

The geographic extent is Statewide.

The proposed action will have a small positive affect on the ability of California business to compete with other States by reducing costs for some forest management activity in California as compared to other States. This benefit will result from savings in stocking control activities, however these activities occur minimally within the southern subdistrict of the coast forest district, so it follows there will be little effect on investment in the State.

There are no reporting requirements associated with the proposed action.

The proposed action does not afford the incentive for innovation in products, materials or processes.

The proposed action will have a neutral effect on health, welfare, and worker safety, but will benefit the State's environment through the increase in forest resilience to drought, insects, disease, wildfire and increased rates of carbon sequestration.

STATEMENTS OF THE RESULTS OF THE ECONOMIC IMPACT ASSESSMENT (EIA)

The results of the economic impact assessment are provided below pursuant to **GOV § 11346.5(a)(10)** and prepared pursuant to **GOV § 11346.3(b)(1)(A)-(D)**. The proposed action:

- Will not create jobs within California (GOV § 11346.3(b)(1)(A)).
- Will not eliminate jobs within California (GOV § 11346.3(b)(1)(A)).
- Will not create new businesses (GOV § 11346.3(b)(1)(B)).
- Will not eliminate existing businesses within California (GOV § 11346.3(b)(1)(B)).
- Will not affect the expansion or contraction of businesses currently doing business within California (GOV § 11346.3(b)(1)(C)).
- Will yield nonmonetary benefits (GOV § 11346.3(b)(1)(D)). For additional information on the benefits of the proposed regulation, please see anticipated benefits found under the "Introduction Including Public Problem, Administrative Requirement, or Other Condition or Circumstance the Regulation is Intended to Address".

TECHNICAL, THEORETICAL, AND/OR EMPIRICAL STUDY, REPORT, OR SIMILAR DOCUMENT RELIED UPON (pursuant to GOV SECTION 11346.2(b)(3))

The Board of Forestry and Fire Protection relied on the following list of technical, theoretical, and/or empirical studies, reports or similar documents to develop the proposed action:

1) Allen, C. D., and D. D. Breshears. 1998. Drought-induced shift of a forest-woodland ecotone: Rapid landscape response to climate variation. Proceedings of the National Academy of Sciences USA 95: 14839–14842
2) Bales, R.C., Battles, J.J., Chen, Y., Conklin, M.H., Holst, E., O'Hara, K.L., Saksa, P., Stewart, W. 2011. Forest and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project. Sierra Nevada Research Institute report number 11.1
3) Beaty, R. M., & Taylor, A. H. 2008. Fire history and the structure and dynamics of a mixed conifer forest landscape in the northern Sierra Nevada, Lake Tahoe Basin, California, USA. Forest Ecology and Management, 255(3-4), 707-719.
4) Christensen, G.A., Gray, A.N., Kuegler, O., Tase, N.A. and Rosenberg, M. 2018. AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2006- 2016. Final Report. California Department of Forestry and Fire Protection agreement no. 7CA02025. Calfire and BOF, Sacramento, CA, p. 390.
5) Collins, B. M., Everett, R. G., Stephens, S. L. 2011. Impacts of fire exclusion and recent managed fire on forest structure in old growth Sierra Nevada mixed-conifer forests. Ecosphere, 2(4): Article 51. 14 p.

6) D'Amato, A. W., Bradford, J. B., Fraver, S., & Palik, B. J. 2013. Effects of thinning on drought vulnerability and climate response in north temperate forest ecosystems. Ecological Applications, 23(8), 1735-1742.
7) Earles, J.M., North, M.P., Hurteau, M.D. 2014. Wildfire and drought dynamics destabilize carbon stores of fire-suppressed forests. Ecological Applications, 24(4), 732-740.
8) Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
9) Fulé, P. Z., Covington, W. W., & Moore, M. M. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. Ecological Applications, 7(3), 895-908.
10) Gray, B., Jin, Y., Mount, J., Stephens, S.L., & Stewart, W. 2017. Improving the Health of California's Headwater Forests. Public Policy Institute of California.
11) Gray, M. 2018. Stand Inventory Methods & Counts – Meeting the Standards & Opportunity to Reform. Spring CFLA Workshop. Presentation. (Unpublished from Presentation delivered at the 2018 Spring CLFA workshop re: the Elliot Ranch Thinning Study.)
12) Harrod, R. J., McRae, B. H., & Hartl, W. E. 1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. Forest Ecology and Management, 114(2-3), 433-446.
13) Hawthorne, S. N., Lane, P. N., Bren, L. J., & Sims, N. C. 2013. The long term effects of thinning treatments on vegetation structure and water yield. Forest ecology and management, 310, 983-993.
14) Hornbeck, J.W., Adams, M.B., Corbett, E.S., Verry, E.S., Lynch, J.A. 1993. Long-term impacts of forest treatments on water yield: a summary for northeastern USA. J. Hydrol. 150, 323-344. In: Lane, P.J. and Mackay, S.M. 2001. For. Ecol. Mgmt. 143, 131-142
15) Jenkins, M. J., Page, W. G., Hebertson, E. G., & Alexander, M. E. 2012. Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management. Forest Ecology and Management, 275, 23-34.
16) Koga, S., Zhang, S. Y., & Bégin, J. 2002. Effects of precommercial thinning on annual radial growth and wood density in balsam fir (Abies balsamea). Wood and Fiber Science, 34(4), 625-642.
17) Lydersen, J. M., North, M. P., & Collins, B. M. 2014. Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored frequent fire regimes. Forest Ecology and Management, 328, 326-334.
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34) Stern, H. 2019. Senate Bill 462, Community colleges: Urban and Rural Forest and Woodlands Restoration and Fire Resiliency Workforce Program. California State Senate. Published 2/21/2019. Amended April 30, 2019.

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38) York, R. 2019. Seedling Survival Rates at UC Berkeley Blodgett Research Station. Unpublished data.
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40) CAL FIRE Data on Timber Harvest Plans submitted within the Southern Subdistrict of the Coast Forest District, 2014-2018.

REASONABLE ALTERNATIVES TO THE PROPOSED ACTION CONSIDERED BY THE BOARD, IF ANY, INCLUDING THE FOLLOWING AND THE BOARD'S REASONS FOR REJECTING THOSE ALTERNATIVES (pursuant to GOV § 11346.2(b)(4)(A) and (B)):

- **ALTERNATIVES THAT WOULD LESSEN ANY ADVERSE IMPACTS ON SMALL BUSINESS AND/OR`**
- **ALTERNATIVES THAT ARE LESS BURDENSOME AND EQUALLY EFFECTIVE IN ACHIEVING THE PURPOSES OF THE REGULATION IN A MANNER THAT ENSURES FULL COMPLIANCE WITH THE AUTHORIZING STATUTE OR OTHER LAW BEING IMPLEMENTED OR MADE SPECIFIC BY THE PROPOSED REGULATION**

Pursuant to **GOV § 11346.5(a)(13)**, the Board must determine that no reasonable alternative it considers, or that has otherwise been identified and brought to the attention of the Board, would be more effective in carrying out the purpose for which the action is proposed, would be as effective and less burdensome to affected private persons than the proposed action, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law.

Alternative #1: No Action Alternative
The Board considered taking no action, but the no action alternative was rejected because it would not address the problem.

Alternative #2: Make Existing Regulation Less Prescriptive
This action could include greatly simplifying the stocking standards by eliminating standards by site, aspect, and or environmental factors to establish a statewide minimum as is common in many states. This would not address resource conservation standards in a manner which took into account variable forest characteristics, which is required by statute, so it was rejected as an alternative.

Alternative #3: Proposed Action
Alternatives 1 and 2 would not be more effective or equally effective while being less burdensome or impact fewer small businesses than the proposed action. Specifically, alternatives 1 and 2 would not be less burdensome and equally effective in achieving the purposes of the regulation in a manner that ensures full compliance with the authorizing statute or other law being implemented or made specific by the proposed regulation than the proposed action.

Additionally, alternatives 1 and 2 would not be more effective in carrying out the purpose for which the action is proposed and would not be as effective and less burdensome to affected private persons than the proposed action or would not be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law than the proposed action. Further, none of the alternatives would have any adverse impact on small business. Small business means independently owned and operated, not dominant in their field of operations and having annual gross receipts less than $1,000,000.

Prescriptive Standards versus Performance Based Standards (pursuant to GOV §§11340.1(a), 11346.2(b)(1) and 11346.2(b)(4)(A)):
Pursuant to **GOV §11340.1(a)**, agencies shall actively seek to reduce the unnecessary regulatory burden on private individuals and entities by substituting performance standards for prescriptive standards wherever performance standards can be reasonably expected to be as effective and less burdensome, and that this substitution shall be considered during the course of the agency rulemaking process.

The proposed action is as prescriptive as necessary to address the problem. It allows point count minimums that eliminate unnecessary thinning treatments later during stand development and provides for maximum exposure of planted trees to sunlight, water and nutrients to promote resilience.

Pursuant to **GOV § 11346.2(b)(1)**, the proposed action does not mandate the use of specific technologies or equipment.

Pursuant to **GOV § 11346.2(b)(4)(A)**, the abovementioned alternatives were considered and ultimately rejected by the Board in favor of the proposed action. The proposed action does not mandate the use of specific technologies or equipment, but does prescribe specific actions.

FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE RELIED UPON TO SUPPORT INITIAL DETERMINATION IN THE NOTICE THAT THE PROPOSED ACTION WILL NOT HAVE A SIGNIFICANT ADVERSE ECONOMIC IMPACT ON BUSINESS (pursuant to GOV § 11346.2(b)(5))
The fiscal and economic impact analysis for these amendments relies upon contemplation, by the Board, of the economic impact of the provisions of the proposed action through the lens of the decades of experience practicing forestry in California that

the Board brings to bear on regulatory development. Data was also utilized from practitioners of forestry participating in the William Main Group which includes foresters representing consulting groups, non-industrial, industrial, state and federal government entities.

Provided that the regulations for special harvesting methods within the southern subdistrict within 14 CCR § 913.8 require that stocking be met immediately upon completion of timber operations, it is known that, except for rare and economically insignificant circumstances, no artificial regeneration, or planting of seedlings, is utilized for meeting stocking requirements as identified within 14 CCR § 913.8 within the southern subdistrict, and no additional or modified costs or impacts are expected to occur as a result of the proposed action.

The proposed action may have an economic benefit to business throughout the southern subdistrict, however, related to the costs of treating young or precommercial stands, where they exist. The following are data provided by contributors within the William Main group that indicates that the overall economic result would be a lower cost per acre for treatments where timber operations result in the retention of a large number of pre-commercial trees.

Activity	450 TPA $/Tree	450 TPA $/Acre	200 TPA $/Tree	200 TPA $/Acre	Time Min./ Tree	Rate $/Hour
Release Spray (direct, protecting seedlings) Labor	n/a	$157.50	n/a	$70.00	0.5	$42.00
PCT (assuming no natural seeding & no slash treatment, just cut down tree)	n/a	$84.38	n/a	$37.50	0.25	$45.00
Total	--	**$241.88**	--	**$107.50**	--	--

The above data represent the cost for average timber operations. Though there is significant variation which occurs geographically throughout the southern subdistrict of the coast forest district, the Board has determined that these values are representative of costs for an average landowner and are appropriate for the evaluation of impacts of these regulations throughout the subdistrict.

Considering the savings information above (roughly $135 per acre), and the 5-year average Timber Harvest Planning Document submissions to CAL FIRE for the southern subdistrict from 2014-2018, some general estimates can be made regarding the cost analysis of the proposed action. Within the southern subdistrict, approximately 750 acres are harvested annually within the southern subdistrict of the coast forest district. Due to forest conditions and the above described regulatory requirements for stocking upon completion of timber operations, the majority of these acres are unlikely to require any form of additional treatment as a result of the proposed action. However, it can be conservatively estimated that 5% of acres harvested may result in stands of pre-commercial timber which require some form of treatment, which will result in a total

savings of $5,407 annually for individuals and businesses as a result of the proposed action. Dues to the composition of land ownership within the southern subdistrict in that it is a mix between those individual landowners and businesses which will conduct these operations, it is likely that both will experience these savings, but the Board is unable to estimate the total number of businesses affected by the proposed action.

DESCRIPTION OF EFFORTS TO AVOID UNNECESSARY DUPLICATION OR CONFLICT WITH THE CODE OF FEDERAL REGULATION (pursuant to GOV § 11346.2(b)(6)

The Code of Federal Regulations has been reviewed and based on this review, the Board found that the proposed action neither conflicts with, nor duplicates Federal regulations. There are no comparable Federal regulations for timber harvesting on State or private lands.

Citations and Source References:

STATED ECOLOGICAL GOAL: Increased carbon sequestration

How does the proposed rule change support the above stated goal?

1) Less competition between trees at lower, more appropriate densities may result in lower mortality rates and hence faster net growth of trees that can sequester more carbon. *Support*:
    a. Trees sequester carbon as they grow, making growth rates a critical aspect in carbon sequestration.
        i. Citation: Van Kooten, G.C., Binkley, C.S. and Delcourt, G. 1995. Effect of carbon taxes and subsidies on optimal forest rotation age and supply of carbon services. *American Journal of Agricultural Economics*, *77*(2), pp.365-374.
    b. A healthy, faster-growing forest with fewer trees will sequester more carbon in the long-term than an overstocked stand that will stagnate early on.
        i. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
        ii. Citation: Stephenson, N.L., Das, A.J., Condit, R., Russo, S.E., Baker, P.J., Beckman, N.G., Coomes, D.A., Lines, E.R., Morris, W.K., Rüger, N. & Alvarez, E. 2014. Rate of tree carbon accumulation increases continuously with tree size. Nature, 507(7490), 90-93.
    c. At current stocking densities (300 TPA), a PCT is vital for reducing competition between trees. If a PCT is not conducted, or even if it is not conducted within the optimal window of 5-10 years, there is considerable evidence that the unthinned stand will experience large reductions in annual growth increments.
        i. Source: Gray, M. 2018. Stand Inventory Methods & Counts – Meeting the Standards & Opportunity to Reform. Spring CFLA Workshop. Presentation. (Unpublished from Presentation delivered

at the 2018 Spring CLFA workshop re: the Elliot Ranch Thinning Study.)

ii. Citation: Zhang, J., Finley, K. A., Johnson, N. G., & Ritchie, M. W. 2019. Lowering Stand Density Enhances Resiliency of Ponderosa Pine Forests to Disturbances and Climate Change. Forest Science.

d. Precommercially thinned stands showed enhanced vigor and growth, as well as a larger mean diameter among dominant trees in precommercially thinned vs. unthinned stands.
    i. Citation: Koga, S., Zhang, S. Y., & Bégin, J. 2002. Effects of precommercial thinning on annual radial growth and wood density in balsam fir (Abies balsamea). Wood and Fiber Science, 34(4), 625-642.
    ii. Source: Plummer, J. 2008. Effects of precommercial thinning on structural development of young coast redwood–Douglas-fir forests (Doctoral dissertation, Humboldt State University).
e. Lower stand densities may be more desirable if the goal is to produce faster growing trees.
    i. Citation: Koga, S., Zhang, S. Y., & Bégin, J. 2002. Effects of precommercial thinning on annual radial growth and wood density in balsam fir (Abies balsamea). Wood and Fiber Science, 34(4), 625-642.
    ii. Citation: Oliver, W. W., & Edminster, C. B. 1988. Growth of ponderosa pine thinned to different stocking levels in the western United States. In: Schmidt, WC, comp. Proceedings-Future Forests of the Mountain West: A Stand Culture Symposium; 1986 September 29-October 3; Missoula, MT. Gen. Tech. Rep. INT-GTR-243. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Research Station. p. 153-159. (Vol. 243, pp. 153-159).
f. In certain stands where carbon stocks have shifted from very large trees into small-diameter trees some studies have measured approximately 25% less carbon storage in the higher density stands where stand growth has stagnated.
    i. Citation: North, M., Hurteau, M., & Innes, J. 2009. Fire suppression and fuels treatment effects on mixed-conifer carbon stocks and emissions. Ecological applications, 19(6), 1385-1396. doi:10.1890/08-1173.1

2) <u>Reduction in densities of smaller diameter trees, which are associated with high severity, large-scale fires that result in the vast majority of carbon storage loss and greenhouse gas emissions on forested land</u>. *Support*:
    a. Surface and ladder fuels, which include small trees at high densities, constitute 80 to 90 percent of the mainspring for hazardous forest fire behavior.
        i. Source: Stern, H. 2019. Senate Bill 462, Community colleges: Urban and Rural Forest and Woodlands Restoration and Fire

Resiliency Workforce Program. California State Senate. Published 2/21/2019. Amended April 30, 2019.

b. California forests are experiencing increased tree densities, pockets of smaller average tree diameters, and increasing surface fuel loads – all of which increase the likelihood of high severity, large-scale fires. The problem is most prevalent in areas where fire suppression is (and has been) the dominant fire policy.
    i. Citation: Collins, B. M., Everett, R. G., Stephens, S. L. 2011. Impacts of fire exclusion and recent managed fire on forest structure in old growth Sierra Nevada mixed-conifer forests. Ecosphere, 2(4): Article 51. 14 p.
    ii. Citation: Parsons, D. J., & DeBenedetti, S. H. 1979. Impact of fire suppression on a mixed-conifer forest. Forest Ecology and Management, 2, 21-33.
    iii. Citation: Stephens, S.L., Collins, B.M., Biber, E. and Fulé, P.Z. 2016. US federal fire and forest policy: emphasizing resilience in dry forests. *Ecosphere*, *7*(11).
c. The long term trend of much more rapid increases in wildfires in forest ecosystems on federal lands (Starrs et al. 2018) are closely correlated with increasing biomass (and therefore fuel) densities on federal lands (Christensen et al. 2018).
    i. Citation: Starrs, C.F., Butsic, V., Stephens, C. and Stewart, W. 2018. The impact of land ownership, firefighting, and reserve status on fire probability in California. *Environmental Research Letters*, 13 (2018) 034025.
    ii. Citation: Christensen, G.A., Gray, A.N., Kuegler, O., Tase, N.A. and Rosenberg, M. 2018. AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2006- 2016. Final Report. California Department of Forestry and Fire Protection agreement no. 7CA02025. Calfire and BOF, Sacramento, CA, p. 390.
d. Wildfires are the largest source of carbon storage loss and greenhouse gas emissions from forested lands in California. Specifically, “of the estimated 150 million metric tons of carbon lost from forests from 2001-2010, approximately 120 million metric tons of carbon was lost through wildland fire. Wildfire also is the single biggest source of black carbon emissions.”
    i. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.

3) <u>Reduction in overall forest density helps create forests less susceptible to forest pest and disease outbreaks, reducing the amount of forest carbon stored in the dead pool.</u>

a. Overstocked forests are more susceptible to forest pest and disease outbreaks at levels far beyond those associated with normal, cyclical outbreaks.
    i. Citation: Gray, B., Jin, Y., Mount, J., Stephens, S.L., & Stewart, W. 2017. Improving the Health of California's Headwater Forests. Public Policy Institute of California.
    ii. Citation: Jenkins, M. J., Page, W. G., Hebertson, E. G., & Alexander, M. E. 2012. Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management. Forest Ecology and Management, 275, 23-34.
    iii. Citation: Menzie, C., Deardorff, T.L., Ma, J. and Edwards, M. 2015. Risk Factors that Contribute to the Occurrence of Catastrophic Wildfires in California. In World Environmental and Water Resources Congress 2015 (pp. 2617-2627).
    iv. Citation: Stephens, S. L., Collins, B. M., Fettig, C. J., Finney, M. A., Hoffman, C. M., Knapp, E. E., North, M.P., Staffor, H., & Wayman, R. B. 2018. Drought, tree mortality, and wildfire in forests adapted to frequent fire. Bioscience, 68(2), 77-88.
    v. Citation: Van Gunst, K. J., Weisberg, P. J., Yang, J., & Fan, Y. 2016. Do denser forests have greater risk of tree mortality: A remote sensing analysis of density-dependent forest mortality. *Forest Ecology and Management*, *359*, 19-32.
b. Large scale disturbances caused by insects and diseases shift carbon stocks out of the live forest carbon pool and into the dead pool – where it can decay more quickly and be released back into the atmosphere.
    i. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.

STATED ECOLOGICAL GOAL: Reduction in fire risk, fuels loading

How does the proposed rule change support the above stated goal?

1) <u>The current stocking standard encourages excess site occupancy in many areas, exacerbating conditions that can lead to extensive and severe wildfires that result in loss of life, structures, critical habitat and productive forestland.</u> *Support*:
    a. Current point-count stocking standards in California require planting at much higher levels than would have been supported in pre-fire-suppression-era California forest types, despite seedling survival rates being higher than ever before.
        i. Citation: Fulé, P. Z., Covington, W. W., & Moore, M. M. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. *Ecological Applications*, *7*(3), 895-908.
        ii. Citation: Harrod, R. J., McRae, B. H., & Hartl, W. E. 1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. Forest Ecology and Management, 114(2-3), 433-446.

iii. Citation: McDonald, P. M. 1991. Container seedlings outperform barefoot stock: Survival and growth after 10 years. New forests, 5(2), 147-156.
iv. Citation: Menzie, C., Deardorff, T.L., Ma, J. and Edwards, M., 2015. Risk Factors that Contribute to the Occurrence of Catastrophic Wildfires in California. In World Environmental and Water Resources Congress 2015 (pp. 2617-2627).
v. Citation: Stephens, S.L. 2000. Mixed conifer and red fir forest structure and uses in 1899 from the central and northern Sierra Nevada, California. Madroño, 47(1), 43-52.
vi. Citation: Van Mantgem, P. J., Stephenson, N. L., Knapp, E., Battles, J., & Keeley, J. E. 2011. Long-term effects of prescribed fire on mixed conifer forest structure in the Sierra Nevada, California. *Forest Ecology and Management*, *261*(6), 989-994.
vii. Source: York, R. 2019. Seedling Survival Rates at UC Berkeley Blodgett Research Station. Unpublished data.

b. Surface and ladder fuels, which include small trees at high densities, constitute 80 to 90 percent of the mainspring for hazardous forest fire behavior.
    i. Source: Stern, H. 2019. Senate Bill 462, Community colleges: Urban and Rural Forest and Woodlands Restoration and Fire Resiliency Workforce Program. California State Senate. Published 2/21/2019. Amended April 30, 2019.

c. California forests are experiencing increased tree densities, smaller average tree diameters, increasing surface fuel loads and shifts in tree species from fire tolerant to fire-intolerant – all of which increase the likelihood of high severity, large-scale fires.
    i. Citation: Stephens, S.L., Collins, B.M., Biber, E. and Fulé, P.Z. 2016. US federal fire and forest policy: emphasizing resilience in dry forests. *Ecosphere*, *7*(11).
    ii. Citation: Beaty, R. M., & Taylor, A. H. 2008. Fire history and the structure and dynamics of a mixed conifer forest landscape in the northern Sierra Nevada, Lake Tahoe Basin, California, USA. Forest Ecology and Management, 255(3-4), 707-719.
    iii. Citation: Lydersen, J. M., North, M. P., & Collins, B. M. 2014. Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored frequent fire regimes. Forest Ecology and Management, 328, 326-334.
    iv. Citation: Scholl, A. E., & Taylor, A. H. 2010. Fire regimes, forest change, and self-organization in an old-growth mixed-conifer forest, Yosemite National Park, USA. Ecological Applications, 20(2), 362-380.
    v. Citation: Menzie, C., Deardorff, T.L., Ma, J. and Edwards, M., 2015. Risk Factors that Contribute to the Occurrence of Catastrophic Wildfires in California. In World Environmental and Water Resources Congress 2015 (pp. 2617-2627).

d. Loss of life, structures, critical habitat and productive forest land are all issues associated with high-severity fires.
    i. Citation: State Board of Forestry and Fire Protection. 2018. 2018 Strategic Fire Plan. Sacramento, CA. 40p.
    ii. Citation: Lydersen, J. M., North, M. P., & Collins, B. M. 2014. Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored frequent fire regimes. Forest Ecology and Management, 328, 326-334.

STATED ECOLOGICAL GOAL: Increased resilience to forest pests

How does the proposed rule change support the above stated goal?

1) The current stocking standard encourages excess site occupancy in many areas, helping create conditions that are susceptible to forest pest and disease outbreaks far beyond those associated with normal, cyclical outbreaks. *Support*:
    a. Current point-count stocking standards in California require planting at much higher levels than would have been supported historically, despite seedling survival rates being higher than ever before.
        i. Citation: Fulé, P. Z., Covington, W. W., & Moore, M. M. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. *Ecological Applications*, *7*(3), 895-908.
        ii. Citation: Harrod, R. J., McRae, B. H., & Hartl, W. E. 1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. Forest Ecology and Management, 114(2-3), 433-446.
        iii. Citation: McDonald, P. M. 1991. Container seedlings outperform barefoot stock: Survival and growth after 10 years. New forests, 5(2), 147-156.
        iv. Citation: Stephens, S.L. 2000. Mixed conifer and red fir forest structure and uses in 1899 from the central and northern Sierra Nevada, California. Madroño, 47(1), 43-52.
        v. Source: York, R. 2019. Seedling Survival Rates at UC Berkeley Blodgett Research Station. Unpublished data.
    b. Overstocked forests are more susceptible to forest pest and disease outbreaks at levels far beyond those associated with normal, cyclical outbreaks.
        i. Citation: Menzie, C., Deardorff, T.L., Ma, J. and Edwards, M. 2015. Risk Factors that Contribute to the Occurrence of Catastrophic Wildfires in California. In World Environmental and Water Resources Congress 2015 (pp. 2617-2627).
        ii. Citation: Stephens, S. L., Collins, B. M., Fettig, C. J., Finney, M. A., Hoffman, C. M., Knapp, E. E., North, M.P., Staffor, H., & Wayman, R. B. 2018. Drought, tree mortality, and wildfire in forests adapted to frequent fire. Bioscience, 68(2), 77-88.

iii. Citation: Gray, B., Jin, Y., Mount, J., Stephens, S.L., & Stewart, W. 2017. Improving the Health of California's Headwater Forests. Public Policy Institute of California.
iv. Citation: Van Gunst, K. J., Weisberg, P. J., Yang, J., & Fan, Y. 2016. Do denser forests have greater risk of tree mortality: A remote sensing analysis of density-dependent forest mortality. *Forest Ecology and Management*, *359*, 19-32.
v. Citation: Jenkins, M. J., Page, W. G., Hebertson, E. G., & Alexander, M. E. 2012. Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management. Forest Ecology and Management, 275, 23-34.

STATED ECOLOGICAL GOAL: Increased resilience to drought / increased water yield

How does the proposed rule change support the above stated goal?

1) The current stocking standard encourages excess site occupancy in many areas, helping to create conditions that increase inter-tree competition for water, reduce tree vigor and limit forest-water yield. *Support:*
    a. Current point-count stocking standards in California require planting at much higher levels than would have been supported historically, despite planted seedling survival rates being higher than ever before.
        i. Citation: Fulé, P. Z., Covington, W. W., & Moore, M. M. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. *Ecological Applications*, *7*(3), 895-908.
        ii. Citation: Harrod, R. J., McRae, B. H., & Hartl, W. E. 1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. Forest Ecology and Management, 114(2-3), 433-446.
        iii. Citation: McDonald, P. M. 1991. Container seedlings outperform barefoot stock: Survival and growth after 10 years. New forests, 5(2), 147-156.
        iv. Citation: Stephens, S.L. 2000. Mixed conifer and red fir forest structure and uses in 1899 from the central and northern Sierra Nevada, California. Madroño, 47(1), 43-52.
        v. Source: York, R. 2019. Seedling Survival Rates at UC Berkeley Blodgett Research Station. Unpublished data.
    b. Stands that have been thinned, or those with fewer, larger trees are less likely to be water-stressed as the spacing will be at levels that reduce inter-tree competition for water
        i. Citation: D'Amato, A. W., Bradford, J. B., Fraver, S., & Palik, B. J. 2013. Effects of thinning on drought vulnerability and climate response in north temperate forest ecosystems. Ecological Applications, 23(8), 1735-1742.
        ii. Citation: McDowell, N. G., Adams, H. D., Bailey, J. D., Hess, M., & Kolb, T. E. 2006. Homeostatic maintenance of ponderosa pine gas

exchange in response to stand density changes. Ecological Applications, 16(3), 1164-1182.

iii. Citation: Sapsis, D., Bede, J., Dingman, J., Enstice, N., Moody, T., Scott, K., Sherlock, J., Tarnay, L. and Tase, N. 2016. Forest fire, drought, restoration treatments, and carbon dynamics: A way forward. California Forestry Note 121, State of California The Resources Agency, California Department of Forestry and Fire Protection. 23 p. Available online at http://calfire. ca. gov/resource_mgt/downloads/notes/NO. 121-Fire_ Drought_Restoration_and_CarbonDynamics. pdf.

c. Tree vigor is strongly influenced by drought, especially in water-limited regions like California.
   i. Citation: Allen, C. D., and D. D. Breshears. 1998. Drought-induced shift of a forest-woodland ecotone: Rapid landscape response to climate variation. Proceedings of the National Academy of Sciences USA 95: 14839–14842
   ii. Citation: D'Amato, A. W., Bradford, J. B., Fraver, S., & Palik, B. J. 2013. Effects of thinning on drought vulnerability and climate response in north temperate forest ecosystems. *Ecological Applications*, *23*(8), 1735-1742.
   iii. Citation: Earles, J.M., North, M.P., Hurteau, M.D. 2014. Wildfire and drought dynamics destabilize carbon stores of fire-suppressed forests. Ecological Applications, 24(4), 732-740.
d. Fewer trees on the landscape will lead to less water being used by plants that will experience early mortality and may help increase forest water yield, or at least shift water use by desired trees.
   i. Citation: Bales, R.C., Battles, J.J., Chen, Y., Conklin, M.H., Holst, E., O'Hara, K.L., Saksa, P., Stewart, W. 2011. Forest and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project. Sierra Nevada Research Institute report number 11.1
   ii. Citation: Hawthorne, S. N., Lane, P. N., Bren, L. J., & Sims, N. C. 2013. The long term effects of thinning treatments on vegetation structure and water yield. Forest ecology and management, 310, 983-993.
   iii. Citation: Hornbeck, J.W., Adams, M.B., Corbett, E.S., Verry, E.S., Lynch, J.A. 1993. Long-term impacts of forest treatments on water yield: a summary for northeastern USA. J. Hydrol. 150, 323-344. In: Lane, P.J. and Mackay, S.M. 2001. For. Ecol. Mgmt. 143, 131-142

STATED ECOLOGICAL GOAL: Appropriate stocking for resilient forests in a changing climate

How does the proposed rule change support the above stated goal?

1) <u>The current stocking standard requires densities that will be unsustainable for future forests in a changing climate. Effects of climate change on California forests include increased competition for water, longer fire seasons with more severe behavior, and greater susceptibility to insect and disease outbreaks.</u>
Support:
    a. Current point-count stocking standards in California require planting at much higher levels than forests experience climate change will be able to support, despite seedling survival rates being higher than ever before.
        i. Citation: Fulé, P. Z., Covington, W. W., & Moore, M. M. 1997. Determining reference conditions for ecosystem management of southwestern ponderosa pine forests. Ecological Applications, 7(3), 895-908.
        ii. Citation: Harrod, R. J., McRae, B. H., & Hartl, W. E. 1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. Forest Ecology and Management, 114(2-3), 433-446.
        iii. Citation: McDonald, P. M. 1991. Container seedlings outperform barefoot stock: Survival and growth after 10 years. New forests, 5(2), 147-156.
        iv. Citation: Stephens, S.L. 2000. Mixed conifer and red fir forest structure and uses in 1899 from the central and northern Sierra Nevada, California. Madroño, 47(1), 43-52.
        v. Source: York, R. 2019. Seedling Survival Rates at UC Berkeley Blodgett Research Station. Unpublished data.
    b. Forests managed at lower densities may be more resistant and resilient to the effects of climate change.
        i. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
        ii. Citation: Giuggiola, A., Bugmann, H., Zingg, A., Dobbertin, M., & Rigling, A. 2013. Reduction of stand density increases drought resistance in xeric Scots pine forests. Forest Ecology and Management, 310, 827-835.
        iii. Citation: Stephens, S. L. 2000. Mixed conifer and red fir forest structure and uses in 1899 from the central and northern Sierra Nevada, California. Madrono, 43-52.
        iv. Citation: Van Gunst, K. J., Weisberg, P. J., Yang, J., & Fan, Y. 2016. Do denser forests have greater risk of tree mortality: A remote sensing analysis of density-dependent forest mortality. Forest Ecology and Management, 359, 19-32.
        v. Citation: Wiechmann, M. L., Hurteau, M. D., North, M. P., Koch, G. W., & Jerabkova, L. 2015. The carbon balance of reducing wildfire risk and restoring process: an analysis of 10-year post-treatment carbon dynamics in a mixed-conifer forest. Climatic Change, 132(4), 709-719.
    c. Climate change exacerbates existing stressors – such as wildfire, insect and pest outbreaks, and drought – on the state's forested landscapes.

i. Citation: Adams, H. D., Guardiola-Claramonte, M., Barron-Gafford, G. A., Villegas, J. C., Breshears, D. D., Zou, C. B., Troch, P.A., & Huxman, T. E. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. Proceedings of the national academy of sciences, 106(17), 7063-7066.
ii. Citation: Allen, C. D., Breshears, D. D., & McDowell, N. G. 2015. On underestimation of global vulnerability to tree mortality and forest die-off from hotter drought in the Anthropocene. Ecosphere, 6(8), 1-55.
iii. Citation: Berner, L. T., Law, B. E., Meddens, A. J., & Hicke, J. A. 2017. Tree mortality from fires, bark beetles, and timber harvest during a hot and dry decade in the western United States (2003–2012). Environmental Research Letters, 12(6), 065005.
iv. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
v. Citation: Hoffmann, W. A., Marchin, R. M., Abit, P., & Lau, O. L. 2011. Hydraulic failure and tree dieback are associated with high wood density in a temperate forest under extreme drought. Global Change Biology, 17(8), 2731-2742.
vi. Citation: Jenkins, M. J., Runyon, J. B., Fettig, C. J., Page, W. G., & Bentz, B. J. 2013. Interactions among the mountain pine beetle, fires, and fuels. Forest Science, 60(3), 489-501.
vii. Citation: Trumbore, S., Brando, P., & Hartmann, H. 2015. Forest health and global change. Science, 349(6250), 814-818.

STATED ECOLOGICAL GOAL: Avoidance of large scale disturbances which promote homogeneity in forests

How does the proposed rule change support the above stated goal?

1) Appropriately stocked forests are more resilient and resistant to a variety of stressors (described in the sections above), which may help prevent large-scale, extreme disturbances that create large, homogenous patches of forest type, age and structure. *Support:*
    a. Forests that are unnaturally dense may be more susceptible to extraordinarily severe, large-scale disturbances.
        i. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
        ii. Citation: Giuggiola, A., Bugmann, H., Zingg, A., Dobbertin, M., & Rigling, A. 2013. Reduction of stand density increases drought resistance in xeric Scots pine forests. Forest Ecology and Management, 310, 827-835.
        iii. Citation: Wiechmann, M. L., Hurteau, M. D., North, M. P., Koch, G. W., & Jerabkova, L. 2015. The carbon balance of reducing wildfire

risk and restoring process: an analysis of 10-year post-treatment carbon dynamics in a mixed-conifer forest. Climatic Change, 132(4), 709-719.

b. A forest comprised of fewer, larger trees (vs. smaller, more densely stocked trees) is less susceptible to unusually large high-severity fires and pest / disease outbreaks.
    i. Citation: North, M., Hurteau, M., & Innes, J. 2009. Fire suppression and fuels treatment effects on mixed-conifer carbon stocks and emissions. Ecological applications, 19(6), 1385-1396. doi:10.1890/08-1173.1
    ii. Citation: Collins, B. M., Everett, R. G., Stephens, S. L. 2011. Impacts of fire exclusion and recent managed fire on forest structure in old growth Sierra Nevada mixed-conifer forests. Ecosphere, 2(4): Article 51. 14 p.
    iii. Citation: Lydersen, J.M., Collins, B.M., Brooks, M.L., Matchett, J.R., Shive, K.L., Povak, N.A., Kane, V.R. & Smith, D.F. 2017. Evidence of fuels management and fire weather influencing fire severity in an extreme fire event. Ecological Applications, 27(7), pp.2013-2030.
    iv. Citation: Forest Climate Action Team. 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Sacramento, CA. 178p.
    v. Citation: Jenkins, M. J., Runyon, J. B., Fettig, C. J., Page, W. G., & Bentz, B. J. 2013. Interactions among the mountain pine beetle, fires, and fuels. Forest Science, 60(3), 489-501.

c. Forests impacted by unnatural levels of pest and disease outbreaks pose a greater threat for large-scale high severity fire.
    i. Citation: Jenkins, M. J., Runyon, J. B., Fettig, C. J., Page, W. G., & Bentz, B. J. 2013. Interactions among the mountain pine beetle, fires, and fuels. Forest Science, 60(3), 489-501.
    ii. Citation: Jenkins, M. J., Page, W. G., Hebertson, E. G., & Alexander, M. E. 2012. Fuels and fire behavior dynamics in bark beetle-attacked forests in Western North America and implications for fire management. Forest Ecology and Management, 275, 23-34.
    iii. Citation: Jenkins, M. J., Hebertson, E., Page, W., & Jorgensen, C. A. 2008. Bark beetles, fuels, fires and implications for forest management in the Intermountain West. *Forest Ecology and Management*, *254*(1), 16-34.

d. Large-scale, high severity fires and other disturbances often result in large, homogenous patches of forest type, age and structure.
    i. Citation: Millar, C. I., & Stephenson, N. L. 2015. Temperate forest health in an era of emerging megadisturbance. Science, 349(6250), 823-826.
    ii. Citation: Stephens, S. L., Burrows, N., Buyantuyev, A., Gray, R. W., Keane, R. E., Kubian, R., Liu, S. Seijo, F., Shu, L., Tolhurst, K.G., & Van Wagtendonk, J. W. 2014. Temperate and boreal forest

mega-fires: characteristics and challenges. Frontiers in Ecology and the Environment, 12(2), 115-122.

iii. Citation: Williams, J. 2013. Exploring the onset of high-impact mega-fires through a forest land management prism. Forest Ecology and Management, 294, 4-10.

POSSIBLE SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS AND MITIGATIONS CEQA

CEQA requires review, evaluation and environmental documentation of potential significant environmental impacts for a qualified Project. Pursuant to case law, the development of Timber Harvest Plans (THP) has been found to be the functional equivalent to an Environmental Impact Report (EIR) under CEQA. Additionally, the Board's rulemaking process is a certified regulatory program having been certified by the Secretary of Resources as meeting the requirements of PRC § 21080.5.

While certified regulatory programs are excused from certain procedural requirements of CEQA, they must nevertheless follow CEQA's substantive requirements, including PRC § 21081. Under PRC § 21081, a decision-making agency is prohibited from approving a Project for which significant environmental effects have been identified unless it makes specific findings about alternatives and mitigation measures

Further, pursuant to PRC § 21080.5(d)(2)(B), guidelines for the orderly evaluation of proposed activities and the preparation of THPs or other written documentation in a manner consistent with the environmental protection purposes of the regulatory program are required by the proposed action and existing rules.

The proposed action will change the point count stocking standards for the southern subdistrict of the coast forest district. The proposed action addresses concern for forest health and resilience to environmental "stressors" defined by the Board and as aligned with the legislature's findings and declaration in PRC § 4512.5(d) for "proactively managing forests so that they can adapt to these stressors and remain a net sequesterer of carbon dioxide."

Historic forest development in California was episodic in nature whereby frequent, low to moderate intensity fire would kill few of the overstory trees but would clear the understory of fuels and thin the forests naturally. The cleared understory would provide a bed for seed released from serotinous cones which can result in a great quantity of naturally regenerated seedlings. Initial densities of emerging seedlings could be 1,000 seedlings per acre or more often leading to overstocked conditions. Likewise, the current stocking standards developed in 1972 lead to overstocking of forests because at that time, nursery practices for tree seedlings were in their infancy and mortality rates for planted seedlings could be as high as fifty percent (50%). This necessitated planting at higher densities to secure the desired stocking levels. Unfortunately, on many timber sites, this also requires a precommercial thinning 7 to 10 years later to ensure planted trees are "free to grow" and not competing with neighboring trees until another harvest can be undertaken. For some plantations, if a PCT treatment does not occur, it can

often lead to stagnating stand growth and overstocked, unhealthy forests. The proposed action provides for reduced inter-tree competition for the necessary resources in photosynthesis improves tree resilience to forest health and ecological stressors defined by the Board. The above provisions will have a positive effect on forest health in an environment of increasing stressors resulting from fire exclusion, overstocked forests and climate change.

The proposed action was developed, using current and applicable scientific literature, with the intent to modify future forest conditions in order to achieve increased carbon sequestration, reduced fire risk and fuels loading, increased resilience to forest pests, increased reliance to drought, increased water yield, more appropriate stocking for resilient forests in a changing climate, and avoidance of large-scale disturbances which promote homogeneity in forests (these goals are further elaborated and substantiated elsewhere within this document). The proposed action will result in these future forest conditions which are better suited to likely future environmental conditions, as well as resilient to the impacts of natural disturbances which may effect the viability of those future forests.

The proposed action will benefit the forested landscapes of the southern subdistrict of the coast forest district, and promotes conditions which are intended to avoid natural environmental disturbance within these forests, and does not have the potential to result in significant adverse environmental effects.