Board of Forestry and Fire Protection

INITIAL STATEMENT OF REASONS

“STOCKING AND SILVICULTURAL STANDARDS AMENDMENTS, 2019”

Title 14 of the California Code of Regulations (14 CCR),
Division 1.5, Chapter 4
Subchapter 4, 5 & 6
Article 2, 3, 6
Subchapter 7
Article 7

Amend:	**§ 912.7, 932.7, 952.7**
	§ 913.2, 933.2, 953.2
	§ 913.3, 933.3, 953.3
	§ 913.4, 933.4, 953.4
	§ 916.9, 936.9, 956.9
	§1072.6
	§1080.1
Adopt:	**§ 912.7(e), 932.7(e), 952.7(e)**

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 19731973 (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 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."

Additionally 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."

Since the initial creation of the regulatory stocking standards, several factors have significantly influenced forest health and management practices throughout the state. When the minimum resource conservation regulations were initially adopted, planted seedling survival rates were extremely poor, often resulting in extremely high failure rates and driving a need to plant trees at greater densities in order to ensure adequate site occupancy and survival of seedlings. Before 1953, only 31 percent of the plantings in the state successfully became established[1], whereas today, a combination of improved nursery and planting technology and practices, have resulted in seedling establishment rates of as high as 95 percent. Additionally, 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 <u>problem</u> that the proposed action seeks to address is that current regulations do not address any of these changing conditions 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 Resource Conservation Standards for Minimum Stocking by Forest District and new point count standards for various regeneration methods, intermediate treatments, special prescriptions, riparian zones in watersheds with listed anadromous salmonids, and substantially damaged timberlands. The proposed action also revises the existing stocking sampling methods to reflect those quantitative changes to the point count standards. Furthermore, the proposed action creates a performance-based option for basal area stocking standards

[1] Zillgitt, Walter M. Forest Tree Planting, U.S. Forest Service., Forest Resource Report 14; 273-286, illus. 1958

where a Registered Professional Forester (RPF) may provide site specific forest stand and timberland conditions, then explain and justify how the proposed alternative stocking standard contributes to the forest health and ecological goals defined by the board as contained in this proposal. The Director may then inspect the area of the proposed alternative to determine that the alternative achieves suitable resource conservation.

Additionally, several of the regulatory silvicultural methods, as specified in 14 CCR § 913, 933, and 953 *et. seq.*, which are similarly intended to implement the goals of PRC §§ 4512 and 4513 and which specify prescriptive requirements for the harvesting and retention of trees, do not currently provide prescriptive standards which address these changing ecological conditions or otherwise align with the ecological goals intended to promote the state's policies related to healthy forest management in light of changing conditions. Furthermore, there are some clarity issues within these regulations.

The amendments and adoption help 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

SPECIFIC <u>PURPOSE</u> 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 <u>NECESSARY</u> 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 <u>PROBLEM</u> 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 § 912.7 [932.7, 952.7], § 913.2, [933.2, 953.2], § 913.3, [933.3, 953.3], § 913.4, [933.4, 953.4], § 916.9, [936.9, 956.9], § 1072.6, & §1080.1

The **<u>purpose</u>** 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 primarily by amending the point count minimums in the Resource Conservation Standards to a lower standard. 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. The proposal also allows site specific basal area stocking levels to be proposed if existing stocking standard minimums could lead to reduced forest health. Contemporary research indicates the following (*see citation and source references below*).

- Less competition between trees planted 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 less susceptible to forest pest and disease outbreaks, reducing the amount of forest carbon stored in the dead pool.
- The current stocking standard encourages overplanting 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 standard encourages overplanting 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 standard encourages overplanting in many areas, helping to create conditions that increase inter-tree competition for water, reduce tree vigor and limit forest-water yield.
- The current stocking standard requires planting 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 align the prescriptive requirements of specific silvicultural prescriptions with the above stated ecological goals in order to address the state's changing ecological conditions and promote the state's forest policy goals.
3) To address clarity issues, where they exist within the silvicultural methods.

The ***effect*** of the proposed action is to provide for increased forest resilience and suitable resource conservation by adjusting point count standards 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. The proposal would also allow an RPF to propose site specific basal area stocking levels down to the current minimum Resource Conservation Standards, if the existing standards for the various regeneration methods, intermediate treatments, or special prescriptions would lead to reduced forest health, increase in fire risk, or reduced rates of carbon sequestration. 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 have the effect producing prescriptive silvicultural methods which are clear and which accurately reflect those standards which are intended to promote the state's forest policy goals and achieve improved forest and environmental quality.

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. This revised regulatory mechanism is also likely to yield a economic benefit to the state as reduced seed and seedling planting requirements will reduce costs associated with transportation, storage, labor, and additional treatments necessary to plant and manage seedlings of higher densities.

Aggregated Explanation

The proposed amendment of Title 14 CCR § 912.7, [932.7, 952.7], § 913.2, [933.2, 953.2], § 913.3, [933.3, 953.3], § 913.4, [933.4, 953.4], § 916.9, [936.9, 956.9], §1080.1 do the following:

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- Creates new Resource Conservation Standards for Minimum Stocking for point count by Forest District, and by various Regeneration Methods, Intermediate Treatments, Special Prescriptions, Riparian Areas in Watersheds with Listed Salmonids, and Substantially Damaged Timberlands.
- Addresses forest health and ecological conditions as defined by the Board 4561.2 per PRC.
- Provides for suitable resource conservation per PRC § 4561.2.

The proposed adoption of Title 14 CCR § 912.7(e) [932.7(e), 952.7(e)]

- Provides for an RPF to propose performance-based alternatives down to the current basal area Resource Conservation Standards for Minimum Stocking for any regeneration method, intermediate treatment, or special prescription.

General note on amendments to § 912.7(b), 932.7(b), 952.7(b)
In general, the purpose of the amendments is to reduce the requirements for stocking 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 minimum resource conservation standard will result in less competition between trees which are planted 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 the overplanting 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 minimum resource conservation standards will address and minimize these conditions.

The proposed reduction in minimum resource conservation standards will also provide increased resilience to drought conditions throughout the state and result in increased water yield across forested landscapes. Current evidence suggests that the current stocking standards encourage overplanting 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.

Finally, the proposed reduction in stocking 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.

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

Amend § 912.7(b)(1)(A)

The purpose of the amendment is, within the Coast Forest District, to reduce the minimum necessary point count for minimum stocking requirements of seedlings less than 4 inches in diameters, as well as to make adjustments to the point values on lands of site class 1, 2, 4, and 5 to maintain the same relative quantity and representation of those size classes across those site classes. Additionally, the amendment reduces the minimum necessary point count for minimum stocking requirements for all size classes of trees on site class III. The minimum necessary average per acre count of trees less than 4 inches in diameter has been reduced to 200 on site 1 and 2 lands, to 125 on site 3 lands, and 100 on site 4 and 5 lands. These values represent appropriate standards to both address the variability of productivity and general forest characteristics throughout the Coast Forest District, as well as to maintain suitable stocking and resource conservation while contributing to the forest health goals as stated above. 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.

Amend § 912.7(b)(1)(B) and (C)

The purpose of the amendment is the reduction in point value for trees greater than 4 inches in diameter to maintain the same relative quantity and representation of those size classes across the landscape on site 1 and 2 grounds, which are necessary in order to accommodate the reduction in the minimum average point count. Previously, where 300 points were necessary in order to achieve minimum stocking on site 1 grounds, an average of 100 trees between 4 and 12 inches, or 50 trees greater than 12 inches (or some combination thereof), were required per acre in order to achieve minimum stocking. The revision to the point values of these size classes is intended to maintain this representation, as the same number of trees of those size classes is still required to achieve minimum stocking utilizing the point count system when the minimum average point count per acre is 200 on site 1 ground. The same arithmetic adjustment holds true for site 4 and 5 grounds, simply reduced in ratio to accommodate the lower standards for those areas.

The additional purpose of the amendment is to reduce the point value for trees greater than 4 inches in diameter on site 3 grounds within the Coast district which is intended to address the productivity potential of those areas as well as to address the variables in forest characteristics which exist within those areas. These values represent appropriate standards to both address the variability of productivity and general forest characteristics throughout the Coast Forest District, as well as to maintain suitable stocking and resource conservation while contributing to the forest health goals as stated above. 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.

Amend §§ 932.7(b)(1), 952.7(b)(1)
The purpose of the amendment is to reduce the Resource Conservation Standards for Minimum Stocking to more appropriate densities for each Forest District to address the Board's stated forest health and ecological goals of improving resilience to drought, fire, forest pest and disease stressors while increasing carbon sequestration rates. These amendments, within the Northern and Southern Forest Districts, reduce the minimum necessary point count for stocking requirements of seedlings less than 4 inches in diameter. The minimum necessary average per acre count of trees less than 4 inches in diameter has been reduced to 125 on site 1, 2, and 3 lands, and 100 on site four and five lands. These values represent appropriate standards to both address the variability of productivity and general forest characteristics throughout the Districts, as well as to maintain suitable stocking and resource conservation while contributing to the forest health goals as stated above. 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.

Additionally, the purpose of the amendment is the reduction in point value for trees greater than 4 inches in diameter to maintain similar relative quantity and representation of those size classes across the landscape conditional upon site class, and are necessary in order to accommodate the reduction in the minimum average point count. Previously, where 300 points were necessary in order to achieve minimum stocking on site 1 grounds, an average of 100 trees between 4 and 12 inches, or 50 trees greater than 12 inches (or some combination thereof), were required per acre in order to achieve minimum stocking. The revision to the point values of these size classes has been adjusted to the nearest integer intended to maintain this representation, as the similar number of trees of those size classes is still required to achieve minimum stocking utilizing the point count system when the minimum average point count per acre has been adjusted. These amendments are necessary in order to maintain this quantity and representation of trees while allowing for adjustment of standards for trees less than 4 inches in diameter.

Amend § 913.2(a)(2)(B)2., 933.2(a)(2)(B)2., 953.2(a)(2)(B)2.
The purpose of the amendment is to clarify that, within the Group Selection Silvicultural Method, the revised point count standards shall be utilized in determining stocking for the un-even aged regeneration method of Group Selection utilizing established standards and methods. This is necessary in order to maintain clarity and consistency between the provisions in light of the amendments to the minimum resource conservation standards.

Amend § 913.3(a)(1)(B), 933.3(a)(1)(B), 953.3(a)(1)(B)
The purpose of the amendment is to lower the trees per acre (tpa) standard by site class for the Commercial Thin, Intermediate Treatment when the average diameter of the trees are less than 14" diameter at breast height (dbh) as described in subsection (B). The resulting changes will create one standard tpa by Forest District. The proposed tpa changes are intended to address the Board's stated forest health and ecological goals, as described above, of improving resilience to drought, fire, forest pest and disease stressors while increasing carbon sequestration rates. The purpose of the amendments to the tpa requirements are to simplify commercial thinning requirements and simultaneously achieving the stated ecological goals. The modification of a flat 100 tpa requirement for the Coast District and 75 for the Northern and Southern Districts from the previous site dependent condition is supported by current extant literature with the purpose of maintaining maximum site productivity across site 1 lands and the promotion of productivity in those lands. These amendments are necessary to clarify the tree per acre requirements for commercial thinning as well as to further implement the Boards stated ecological goals as described within this document.

Amend § 913.4, 933.4, 953.4
The purpose of the proposed amendment is to provide for the applicability of the utilization of the Fuelbreak/Defensible Space Special Prescription when trees or vegetation are removed to both create or maintain a shaded fuelbreak in specific areas. The amendment is also intended to provide an opportunity for the utilization of this Special Prescription when vegetation and fuels treatment is intended to achieve specific goals which are identified by an RPF with the written concurrence of a public fire agency and are determined by the Director to be consistent with the purposes of the Act. This amendment allows for the implementation of this prescription in areas which may not have been pre-designated in an established fire prevention plan, as is required by the definition of a Community Fuelbreak Area pursuant to 895.1, but are otherwise necessary in order to reduce the potential for wildfires and the damage they may cause, so long as the proposed vegetation or fuel treatments will achieve specific objectives which are agreed upon by a Professional Forester and a public fire agency, and those proposed treatments will be consistent with the purposes of the FPA. These amendments are necessary in order to implement projects which will avoid potentially damaging wildfires, which may result in ecological damage which is inconsistent with the ecological goals identified here elsewhere. These amendments are necessary to clarify the conditions under which specific treatments may be carried out which meet specified objectives, but do not otherwise satisfy the regulatory requirements of the objectives of a Community Fuelbreak Area, as per 14 CCR § 895.1.

Amend § 916.9, 936.9, 956.9

The purpose of the amendment is to lower the trees per acre (tpa) standard contained in provision (t)(7)(D) pertaining to Protection and Restoration of the Beneficial Functions of the Riparian Zone in Watersheds with Listed Anadromous Salmonids and the harvesting of dead and dying conifer trees in specific areas. The proposed amendment reduces the minimum tpa requirement for planting when harvesting dead or dying trees in a WLPZ or ELZ/EEZ of a watershed with Listed Anadromous Species where stocking is not met upon completion of timber operations, down to 200 from the existing standard of 300 tpa. This proposed change addresses the Board's and the state's forest management goals in requiring lower stocking standards, and the prescriptive change was determined to address the variability in forest characteristics which are inherent within these sensitive watercourse areas while still achieving the Boards goals and suitable resource conservation. This proposal is necessary in order to implement those identified goals and to provide the prescriptive standard to the regulated public as well as provide an enforceable standard to the Department.

Amend § 1072.6

The purpose of the proposed amendments to the point count stocking sampling procedure is to modify the size of the sampling plots required for conducting a stocking survey in order to correspond to the amendments to the minimum resource conservation standards within 14 CCR § 912.7, 932.7 and 952.7. These modifications are simple arithmetical adjustments intended to sample the presence or absence of trees at the per-acre quantities which are required by the minimum resource conservation standards. This sampling approach relies upon a binomial statistical distribution due to the sample plots being a stocked/nonstocked outcome. Given the established 40 minimum plots per 14 CCR § 1072.1, the potential type I and II errors can be calculated, and that error balanced to select the minimum number of passing plots, which establishes the statistical validity of the stocking sampling procedure. This approach is not affected by the proposed changes to the regulations, which is why the approach applied in the current regulations to different levels of stocking. The proposed amendment is necessary in order to adjust the size of the plots required in order to accurately sample for the prescriptive level of trees on a per-acre basis and are further necessary to clarify this prescriptive requirement to practitioners in order to implement and enforce the amendments made to the minimum resource conservation standards.

Amend § 1080.1

The purpose of the proposed amendment is to require that, on sites 1, 2, and 3 lands, stocking following timber operations conducted following substantial damage to timberlands must consist of at least ten countable trees planted for each live tree harvested but need not exceed the average point count standards required within the Board regulations related to minimum resource conservation standards and amended as part of this proposed action. This amendment is necessary in order to accommodate the amendments made to the minimum resource conservation standards and to clarify this requirement as applicable to the operations conducted on substantially damaged timberlands, as well as to provide and implementable and enforceable standard within regulation.

Adopt § 912.7(e)(1), 932.7(e)(1), 952.7(e)(1)
The purpose of the proposed adoption is to allow an RPF to propose an alternative stocking standard for any proposed regeneration method following certain conditional and disclosure requirements. The proposed adoption addresses the Board's stated forest health and ecological goals of improving resilience to drought, fire, forest pest and disease stressors while increasing carbon sequestration rates for any Regeneration Method, Intermediate Treatment, or Special Prescription with basal area stocking standards not to fall below the existing Resource Conservation Standards for Minimum Stocking. This amendment is necessary to provide the performance standards by which alternative stocking proposals will be evaluated by the department.

Adopt § 912.7(e)(2), 932.7(e)(2), 952.7(e)(2)
The purpose of the proposed adoption is to allow an RPF the option to propose an alternative to the established regulatory stocking standards if the RPF provides site specific forest stand and timberland information, the management objectives for the stand, stand treatments post-harvest that may be implemented to ensure site occupancy, and a discussion to include how the proposed alternative contributes to the specific forest health and ecological goals defined by the board contained in this proposal. The information required to be supplied by the RPF reflect similar content and structure of the requirements contained in 912.7(d) [932.7(d), 952.7(d)] and are considered suitable and appropriate for the proposed action. The proposed adoption addresses the Board's stated forest health and ecological goals of improving resilience to drought, fire, forest pest and disease stressors while increasing carbon sequestration rates for any Regeneration Method, Intermediate Treatment, or Special Prescription with basal area stocking standards not to fall below the existing Resource Conservation Standards for Minimum Stocking. This amendment is necessary to provide the performance standards by which alternative stocking proposals will be evaluated by the department.

Adopt § 912.7(e)(2), 932.7(e)(2), 952.7(e)(2)
The purpose of the proposed adoption is to require that the Director inspect an area proposed for alternative stocking and verify that the proposal contributes to stated forest health and ecological goals, and to require approval if the proposal achieves the intent of the FPA and FPR and there will not be an immediate or long-term significant harm to the natural resources of the state. This is necessary in order to clarify the Director's responsibilities in review and approval of proposed alternatives pursuant to 14 CCR § 912.7, 932.7, 952.7(e).

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 the following:

- Nominally decrease the costs associated with forest management through the elimination of un-necessary stocking control treatments, reduced planting costs and planting stock purchases.

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. But this benefit is nominal as savings in stocking control activities and reduced plantings may be counteracted by an increase in stand investments to secure stocking through vegetation control treatments, 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.
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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.)
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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.

There are no other viable alternatives considered. Without regulatory changes, forest health issues will persist leading to carbon release resulting from tree mortality and high severity wildfire induced by overstocked forests in an ecosystem evolved under low to moderate intensity fire with frequent fire return intervals.

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. Additionally, it allows a licensed trained professional to propose stocking minimums to the lowest level allowed by law to address ecological and environmental conditions that lead to tree mortality that contribute to high severity wildfire and carbon release.

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.

The proposed action will have minimum statewide economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states and is not considered to be significant. The following are data provided by contributors within the William Main group for the Northern Forest District that indicates that the overall economic result would be a lower cost per acre for treatments even though $ per tree unit costs may go up in some cases.

Activity	300 TPA		125 TPA		Time	Rate
	$/Tree	$/Acre	$/Tree	$/Acre	Min./Tree	$/Hour
Seed/Seedling/Transporation/Storage	$0.40	$120.00	$0.40	$50.00		
Planting Labor	$0.25	$75.00	$0.30	$37.50		
Release Spray (directed, protecting seedlings) Labor	n/a	$105.00	n/a	$43.75	0.50	$42.00
PCT (assuming no natural seeding & no slash treatment, just cut down tree)	n/a	$56.25	n/a	n/a	0.25	$45.00
TOTAL		**$356.25**		**$131.25**		

From the information above, it is anticipated initial investments in plantation establishment and maintenance will be reduced for those who elect to plant to the newly proposed point count minimums.

For industrial timberland owners, it is anticipated that these lowered point count minimums will be utilized only on a site by site basis since the industrial landowner class typically harvest year to year and have revenues available for pre-commercial thinning (PCT) and vegetative treatments to maintain stand growth. Many industrial owners will elect to plant above the newly proposed point count standard as they are guided by established forest growth and yield objectives and planning documents that may require a higher level of initial stocking.

The greatest anticipated use of the newly proposed point count minimums is the smaller, non-industrial timber owner class who may not harvest year to year and thereby lack the revenue stream for PCT which, if not done in a timely manner, can result in trees which are too big to economically treat. Non-industrial landowners are also not necessarily guided by long term planning documents that may require higher point counts to achieve growth and yield objectives.

Considering the savings information above and the Timber Harvest Planning Document submissions to CAL FIRE in 2018, some general estimates can be made regarding the cost analysis of the proposed action. Using the four most common silvicultural methods that require artificial planting of seedlings, we provide the following estimates for 2018:

Silviculture	Sum of ACRES	ACRES over 5 years THP Life	Total cost savings per ACRE	Total annual economic impact $ per ACRE
Alternative (Clearcut)	7,405	1,481		
Clearcutting	20,582	4,116		
Rehabilitation of Understocked Area Prescription	122	24		
Variable Retention	2,338	468		
Grand Total	**30,447**	**6,089**	**$225**	**$1,370,106.00**

The above data indicate at a maximum, implementation of the proposed action will yield nearly $ 1.4 in cost savings annually for timberland owners submitting THPs. The actual figure will likely be lower depending on variables such as the type of landowner class, site conditions, and Forest District.

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) <u>Less competition between trees planted at lower, more appropriate densities may result in lower mortality rates and hence faster net growth of trees that can sequester more carbon</u>. *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 overplanting 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) <u>The current stocking standard encourages overplanting in many areas, helping create conditions that are susceptible to forest pest and disease outbreaks far beyond those associated with normal, cyclical outbreaks</u>. *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) <u>The current stocking standard encourages overplanting in many areas, helping to create conditions that increase inter-tree competition for water, reduce tree vigor and limit forest-water yield.</u> *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 planting 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.</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) <u>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.</u> *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 Resource Conservation Standards for Minimum Stocking by Forest District and provide new point count standards for compliance sampling and for various regeneration methods, intermediate treatments, special prescriptions, riparian zones in watersheds with listed anadromous salmonids, and substantially damaged timberlands. Additionally, the proposed action creates a performance-based option for basal area stocking standards where a Registered Professional Forester (RPF) may provide site specific forest stand and timberland conditions, then explain and justify how the proposed alternative stocking standard contributes to the forest health and ecological goals defined by the board as contained in this proposal.

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 recognizes the advances in nursery practices, tree genetics and vegetation treatments over the past 45 years, where ninety-five percent (95%) or better seedling survival is the normal result. This increase in seedling survival allows trees to be planted at appropriate stocking densities to be free to grow while foregoing expensive PCT treatments that add additional amounts of surface fuel accumulation, fire risk and timber owner expense. The reduced inter tree competition for the necessary resources in photosynthesis improves tree resilience to forest health and ecological stressors defined by the Board. The proposed action also provides a performance-based option whereby an RPF can propose a site specific, alternative basal area standard not to fall below the current Resource Conservation minimum basal area standards. 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 and is not anticipated to have a significant adverse environmental effect whatsoever.