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Attorney for Petitioners and Plaintiffs

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

BESS BAIR; et al.

Plaintiffs,

v.

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION, CINDY McKIM, in her official capacity as Director of the State of California Department of Transportation,

Defendants.

Case No.3:10-cv-04360 WHA

DECLARATION OF JOE R. McBRIDE IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION

DATE:
TIME:
COURTROOM: 9, 19th Floor

I, JOE R. McBRIDE, declare as follows:

1. I am a consulting professional forester, California License No. 1306 and am a Professor of Forestry and Landscape Architecture at the University of California, Berkeley. My professional qualifications are discussed in more detail herein and a true and correct copy of my current resume is attached hereto as **Exhibit 1**. I make this declaration based on my personal knowledge, expertise, experience, and the materials and activities described herein and in **Exhibit 2** attached hereto, and if called as a witness, I would and could testify to the following:

I. INTRODUCTION

2. The following declaration presents the results of my analysis of the proposed modifications of Highway 101 by the California Department of Transportation ("Caltrans") through an old growth redwood stand in area including Richardson Grove State Park (the "Project"). My analysis is based on a review of pertinent documents (see list attached hereto as **Exhibit 2**), a site reconnaissance, and my experience and expertise in the field of redwood forest ecology and impact evaluation. This report was prepared in response to a request by the Plaintiffs in the above captioned action to conduct an analysis of the potential impact of the Project and the manner in which Caltrans assessed that potential impact. The site reconnaissance upon which this report is based took place on April 9, 2011 and is described below.

II. PROFESSIONAL QUALIFICATIONS

3. I am a registered professional forester in California (license #1306), Fellow of the Society of American Foresters, Charter Member of the California Association of Environmental Professionals, member of the International Society of Arboriculture and a recipient of the Research Award of the International Society of Arboriculture.

4. My education includes a B.S. in Forestry from the University of Montana, M.S. (Forestry) and Ph.D. (Botany) degrees from the University of California, Berkeley.

5. I am a Professor of Forestry and Landscape Architecture at the University of California where I teach courses in forest ecology, forest operations management, urban forestry, and ecological analysis. Among the forest ecology courses I have taught is a course in

physiological ecology that examines physiological processes in trees in relation to the environment. Because of the relevance of the redwood tree to forestry in California, many aspects of this course dealt with the physiology of the redwood. In the forest operations management course I teach much attention is paid to forest road construction, the installation and replacement of culverts, and the impacts of heavy equipment on forest soils. A large section of the urban forestry course I teach is focused on arboriculture, in particular the response of trees to the stresses of the urban environment. The ecological analysis course is concerned with the analysis of natural factors (including soils) from the standpoint of plant growth for landscape architects.

6. I have published over 292 scientific articles and reports, including 35 environmental impact reports focused on impacts to vegetation and 46 vegetation management plans. Of these 81 reports, 15 concerned properties supporting redwood forests. These reports were prepared for private land owners, private companies, homeowners associations, conservation organizations, environmental consulting firms, County Planning Departments, City Planning Departments, , California State Department of Parks and Recreation, Golden Gate National Park Conservancy, Presidio Trust, U.S. National Parks Service, U.S. Army, and U.S. Attorney General's Office. Of the 211 scientific articles I have published, 17 concerned redwood trees and redwood forests. Among these was an annotated bibliography of the human impacts to redwoods in California Parks. A true and correct copy of my current resume is attached hereto as **Exhibit 1**.

III. STATEMENT OF MY ASSIGNMENT REGARDING RICHARDSON GROVE STATE PARK

7. I was requested to conduct an evaluation of the potential impacts of the Project to the trees and overall health of the forest along Highway 101 in the Project area and particularly in Richardson Grove State Park. I was asked to look at the potential impacts resulting from the proposed changes in road alignment and associated proposed actions including cut and fill of soil, culvert work, and tree removal. My assessment of these actions focused, in particular, on

the manner in which these action would impact trees by severing both structural and feeder roots, block the movement of oxygen and carbon dioxide into and out of the soil, and change patterns of wind movement and light within the forest stands.

8. My assignment also included a request to assess the methods used by the Caltrans arborist and the arborist retained by the Save-the-Redwoods League to assess the potential impact of the Project on the trees and the adequacy of the documents produced by Caltrans in association with the Project.

9. I reviewed reports and reviews on the road realignment project, including, in particular, the Environmental Impact Report/Environmental Assessment and Programmatic Section 4(f) Evaluation and Finding of No Significant Impact ("EA/FONSI") and its appendices. After a review of these documents I determined it was essential to visit the site in order to examine the trees identified for removal and trees within areas designated for soil cutting and filling along the highway in the Project area. I was then asked to write this declaration based on my review of the documents listed in **Exhibit 2** and the site visit.

IV. ASPECTS OF REDWOOD PHYSIOLOGY AND ECOLOGY RELEVANT TO THE PROPER ASSESSMENT OF THE PROJECT'S IMPACT

10. The redwood forest extends along the coast of California in areas where summer fog occurs. At some locations, summer fog moves inland along river courses and provides environments that support redwoods. Coastal fog is necessary to reduce summer temperatures, increase soil moisture, and prevent desiccation (the drying of redwood foliage and small branches). The redwood forest is noted in the summer for the condensation of fog on limbs and branches of the redwood trees that drips down to the forest floor contributing to the maintenance of soil moisture in the season that is without rainfall. Fog water that condenses on the foliage of redwood will be absorbed, thus reducing the need for water from the soil. Fog also reduces the loss of water via transpiration from the foliage by decreasing the water potential gradient between the leaves and the surrounding atmosphere.

11. Redwoods are noted for their relatively shallow, platform root systems that

provide structural support. The feeder roots that absorb both oxygen, water, and mineral nutrients are also found very close to the soil surface. Compaction of the soil results in the elimination of soil pore space that is critical to both water movement and the exchange of oxygen and carbon dioxide in the soil. Oxygen must enter the soil from the atmosphere above the ground and pass through the pore space to reach the roots. Carbon dioxide which is produced by respiration of the roots exits the soil through the same soil pore network. When soil pore network is destroyed by compaction or the soil is buried by compacted fill, the roots are deprived of oxygen and the carbon dioxide produced by root respiration is trapped. These conditions result in anaerobic respiration and the acidification of the soil as carbon dioxide forms carbonic acid around the roots. Under these conditions root mortality can take place. Root mortality, in turn, leads to a reduction in the trees capacity to absorb of oxygen, water, and soil nutrients. This can result in the decline in the health and vigor of the tree as well as the structural support the tree gets from its root system, leading to wind throw.

12. Soil pore space is also important to the downward movement of moisture derived from fog drip in the summer. Compacted soil and soils covered with layers of fill compromises the value of fog drip to the tree. The pore network in the soil primarily delivers water and oxygen in a downward direction from the atmosphere above the ground and rain and fog drip fallen on the soils surface. Horizontal transport of water, with the exception of soil adjacent to streams is very limited. Oxygen may move horizontally in the soil depending on the horizontal connectivity of the pore space, but in most cases oxygen moves vertically down into the soil following the pores that deliver water to the roots. The destruction of the pore space in redwood forest soils associated with soil compaction in redwood parks results in a reduction of radial growth of redwoods and the dying back of the tops of trees. This phenomenon was first report by Meinecke in 1929. Zinke (1962), Sturgeon (1964), and Standish (1972) have also reported on the negative impacts of soil compaction to the health and growth of redwood trees.

13. Stone and Vasey (1968) observed that redwood trees will send up vertical roots when their roots are buried by silt deposits resulting from the flooding of stream flat stands of

redwood. Zinke (1964) pointed out the growth of new platform roots when the base of redwood trees are buried in natural silt deposits. It should be pointed out that the material described in these studies was not compacted fill soil, nor soil of a clay texture. This root growth phenomena would not occur in compacted fill used in highway construction because of the absence of a network of pores in the compacted material.

14. The shallow platform structural roots of redwood trees make trees subject to wind throw when portions of a trees root system are cut or broken. Meinecke (1929), Zinke (1962), Sturgeon (1964), and Standish (1972) all report on the negative impacts of road building on redwood trees. Hartesveldt (1963) reported similar impacts associated with road building in the giant sequoia forests in Yosemite National Park. Giant sequoias have shallow platform root systems similar to those of redwood trees. The impacts reported in all of these studies included the severing and breaking of structural roots, soil compaction, and the exposure of trees to increased light intensity, crown temperatures, and wind which has resulted in tree failure. "Tree failure" is the technical term for a tree losing its structural support and falling under its own weight or being thrown by the wind.

15. To assess the potential for the above described impacts to occur in a redwood stand as the result of roadwork that includes soil cutting and filling in the vicinity of large old growth redwoods, cutting of structural roots, soil compaction, and increased exposure of tree canopies to wind, one must examine each tree and make conclusions about the site specific impacts each tree will suffer. A tree by tree analysis of all trees in the area of potential impact is required.

V. STATEMENT OF MY ACTIVITIES

A. Documents Reviewed.

16. Prior to and after the site visit I reviewed the documents listed **Exhibit 2** attached hereto. Special attention was paid to the EA/FONSI and the report of the Caltrans' and Save-the-Redwoods League' arborists. Portions of the other documents that concerned the potential impact of the project on trees and tree roots were also studied.

B. Site Visit.

17. On April 9, 2011 I visited the Project site and examined the trees along the portion of highway 101 proposed for realignment in Richardson Grove State Park. Using the maps in the EA/FONSI (Appendix L. Layout Maps - Richardson Grove Operational Improvement Project - Caltrans), I located each tree identified by Caltrans in Appendix L as potentially impacted by the Project, initially working from north to south along the east side of the highway, then in the opposite direction along the west side of the highway. In doing so I identified additional trees that were growing in the impact zone that were not shown on the Caltrans map and which were shown on the Caltrans map but which were not identified as impacted, but which in my opinion would be impacted. I walked around each mapped and unmapped tree to examine its base and to understand the approximate depth of fill and location of cutting that was proposed. I also examined each tree that was to be cut down to evaluate the impact of their removal on the forest and adjacent trees. I also took notice of culverts that were identified for repair or replacement and the impact of road realignment and the effect faster moving trucks would have on wind velocities along the highway. During this reconnaissance I noted trees that were not shown on the map included in theEA/FONSI, but were within areas designated for cutting and/or filling. I also noted discrepancy in the diameters reported for several trees. I measured these tree using a diameter tape for trees under 20' in circumference and with a 100' tape for larger trees. The diameter of a tree and, in particular, a redwood tree is relevant to determining the impact of proposed soil cutting and filling in the vicinity of the tree because structural roots generally extend out a distance of three times the diameter of the tree.

C. Table of Tree Impacts.

18. During my field observations, as I examined each tree, I recorded my observations for each tree. I then consolidated those observations in **Table A**. **Table A** reflects my assessment of the impacts to the individual trees based on my field observations and the information from the EA/FONSI regarding the depth of fill and the location of soil cutting around and adjacent to each tree. A true and correct copy of **Table A** is attached hereto as

Exhibit 3.

19. I recorded notes about each tree based on an individual examination of each tree. My assessment of the impacts to the trees was based on my field observations and the information regarding the depth of fill and the location of the proposed cutting of the soil around and adjacent to each tree described in the EA/FONSI. This assessment is shown in attached **Table A** as **Exhibit 3**.

VI. STATEMENT OF INADEQUACIES OF THE EA/FONSI

A. Methods Use by Caltrans to Assess Impact.

20. Based on my review of the Caltrans documents I am concerned that Caltrans did not specifically evaluate the impact to each tree within the impacted zone along highway 101. A tree by tree analysis should have been conducted and the potential impact to each tree reported, as discussed above. Only redwood trees over 30" in diameter were listed in Table 10 of the EA/FONSI, which describes the depth of soil cutting and fill that would take place around particular trees. However, there was no specific statement of the physiological and structural impacts of these actions on a tree by tree basis. The general statements made by the Caltrans arborist and the arborist hired by the Save-the-Redwoods League reported are inadequate because of their lack of reference to individual trees. For example, tree number 32 on my **Table A** (**Exhibit 3**) would experience a cut of 20" and a fill of 41" in the zone of its structural roots, but this impact is not distinguished from the impact of no cutting and filling of only 2" in the structural root zone of tree number 70 on my **Table A**. More specificity is required than was demonstrated by the arborists involved in the project. The Caltrans documents lack necessary specificity to demonstrate that Caltrans conducted an adequate evaluation of the impacts. The brevity of the arborist's report limits its utility in understanding the potential impacts of the project to individual trees. In general, the EA/FONSI and arborists' reports demonstrate that attention was not paid to the variation in the potential impacts to each tree, and distinctions were not specifically made between the impacts of soil cutting and filling, soil compaction, and increased exposure of individual trees to greater wind velocity.

B. <u>Shortcomings of the Documents Produced by Caltrans Concerning the Project's Impact</u>.

1. Failure to Adequately Identify All Trees Potentially Impacted by the Project and to Describe the Extent of Soil Cutting and Fill in the Vicinity of Each Tree.

21. The Caltrans' documents I reviewed were inadequate in terms of their failure to map all trees and to report the amount of cut and fill that would take place around and adjacent to these trees as well as others. The EA/FONSI states that construction activity would occur within the structural root zone of 74 redwood trees. However, my reconnaissance located a total of 108 trees in the structural root zone of which construction activities would occur, a discrepancy of 34 trees (referred to herein as "unmapped trees"). Nine trees of these trees within the impact zone did not appear on Caltrans maps, at all, including a 91" diameter redwood (tree Number 10 on **<u>Table A</u>** at **<u>Exhibit 3</u>**); the other twenty-five appeared on Caltrans' map but were not identified on the map as impacted. Fifteen of these unmapped trees were redwoods and nineteen of the unmapped trees were species other than redwood. Table 10 of the Caltrans' report provided information on 68 redwood trees over 30" in diameter. This omits information on smaller redwood trees and trees of other species as if impacts to these trees are irrelevant. A full report was called for to understand the impact on all of the trees in the impact zone.

22. To address these mapping shortcomings, I have mapped the 108 trees in the structural root zone of which construction activities would occur. I have marked on a set of the Appendix L maps each of these 108 trees, by number, using those numbers which correspond to my **<u>Table A</u>** at **<u>Exhibit 3</u>**. A true and correct copy of this mapping is attached hereto as **<u>Exhibit 4</u>**.

23. The EA/FONSI is also difficult to decipher with two tables (Table 9 and 10) using different numbers to identify the same trees, making it very difficult to cross reference the information in the two tables. It is very difficult to determine the amount of soil cutting and fill that Caltrans proposes to conduct in the vicinity of each tree, for at least two reasons. First, there is no cross reference to assist locating the trees as identified on Table 9 and the trees identified

on Table 10 and the corresponding amounts of adjacent soil cutting and filling. Second, as noted above, because Caltrans failed to identify at least 34 trees where activities would occur; it is impossible to know what extent of cut and fill may actually happen around these trees. True and correct copies of Tables 9 and 10 from the EA/FONSI are attached hereto as **Exhibit 5**.

24. Furthermore, neither of the tree numbers from either table are shown on the maps, and the maps in some cases did not correspond with the information presented in Table 10. For example, tree Number 99 on my **Table A** at **Exhibit 3** (tree # 60 in Table 10) is indicated to have a cut of 7" within the structural root zone and no fill; however, the map (Sheet Number 11) shows fill around 30% of the circumference of the tree and no indication of any cut. This makes it very difficult to understand the impact of the Project to individual trees based on these documents.

25. To address some of these shortcomings, I have created Table B, which correlates the tree numbers I assigned to trees during my site visit and the corresponding tree numbers in Tables 9 and 10 of the EA/FONSI. A true and correct copy of Table B is attached hereto as **Exhibit 6**.

2. Failure to Give Accurate Size of the Trees.

26. Several of the trees were reported to have incorrect diameters. For example, tree number 17 was reported to have a diameter of 84," while I measured its diameter to be 103". Correct diameters are important if one is to apply the formula suggested in the Caltrans EA/FONSI for determining the radius of structural roots of redwood trees in accessing the impact of soil cutting and culvert repairs adjacent to trees, because according to this formula structural roots extend out three times the diameter of the tree.

C. Failure to Adequately Evaluate Impacts from Soil Cutting and Filling and Proposed Related Mitigation Measures.

27. Caltrans failed to utilize basic knowledge about the impacts on soil compaction on redwood growth and survival. The EA/FONSI failed to reference relevant studies of the impact of soil compaction in redwood growth and survival. This literature shows reduction in

radial and height growth and top dieback in redwood parks and private timberland when soils are compacted and oxygen becomes limited.

28. The EA/FONSI also fails to present information about the impacts from compaction of the fill soils. One cannot assume for the proposed of widening of the road that the fill soils would not be compacted. Typically fill soils are compacted on forest roads designed to carry logging trucks in 6" lifts. A "lift" is a layer of fill placed on the ground and then compacted by a sheep's foot compactor, bull dozer, or hand held soil compactors. A similar process would be used for highway construction. Compaction is necessary so that the fill soil can support the weight of cars and trucks using the road. Pavement is laid over the top layer of compacted soil (or gravel). This provides a stable roadbed, but eliminated pore space that would be important for the movement of oxygen and water to roots under the fill. Compacting of soil is also necessary when culverts are installed to prevent the shifting of the culvert and the collapse of the roadbed. It is, thus, logical to assume that the fill which Caltrans proposes to use in order to widen the road would be compacted. However the EA/FONSI does not anywhere discuss this fact or its impact on surrounding trees.

29. The EA/FONSI also fails to adequately address the impact of proposed culvert work on surrounding trees. Root cutting and soil compaction would occur where culverts are modified and replaced. The report states that roots over 2" in diameter will be cut with a sharp instrument such as an ax and an air spade would be used for excavation. What is not addressed is the loss of feeder and structural roots that would occur as a result of repair and replacement of culverts.

30. The EA/FONSI also fails to adequately discuss the efficacy of proposed mitigation measures. Caltrans proposes to use "brow" logs surrounding certain trees in order purportedly to mitigate the effect of fill work to be done in their vicinity. No references in the literature are presented in the EA/FONSI on the efficacy of using of "brow" logs to alleviate the impacts of filling around trees, and I can find no reference to this procedure in the leading text on arboriculture (Harris et al, 1999). If this procedure has been tested, the results of such testing

should have been referenced.

31. In fact, it is my opinion that the use of this procedure would have negative effects to the trees around which the procedure is employed. This is based on my determination that the use of such "brow" would only provide for the movement of oxygen into the soil at the base of the tree and the pathway for diffusion oxygen to the feeder roots would be increased. The pore networks in the soil through which oxygen passes to reach feeder roots has more of a vertical than horizontal orientation, resulting in a greater travel distance required for oxygen to travel from the exposed soil at the base of the tree, under the "brow" logs, and out to the feeder roots.

D. <u>Failure to Evaluate Effects from Increased Air Movement</u>.

32. Another inadequacy of the EA/FONSI is the lack of any discussion of the effects the realignment of the road and the resulting increased truck size and likely increased speed on the road would have on air movement along in the road's vicinity. These changes would increase turbulent air reaching the foliage of the redwood and other tree species immediately adjacent to the highway. Redwood trees are very sensitive to desiccation (the drying of redwood foliage and small branches). I have noted the development of death of the tops redwoods along highway 101 after a freeway section of the highway was open to traffic in the Humboldt Redwood State Park, which I attributed to the effect of increased wind velocity on trees along that section of 101 and the resulting desiccation of the foliage of the redwoods and ultimately the death of the tops of the trees. The potential for a similar phenomenon to occur in the Project area or, in fact, any impact of increased wind movement on the trees is not addressed in the EA/FONSI and should have been.

E. <u>Failure to Evaluate Effects from Increased Potential for Collisions with Trees.</u>

33. The EA/FONSI also fails to address the potential impact on trees from increased collisions between vehicles and trees resulting from the increased speed of trucks that would likely result from the Project. I observed during the site visit that tree number 28 on **<u>Table A</u>** (**<u>Exhibit 3</u>**) has a large basal scar, presumably as a result of being hit by a vehicle. Redwood bark is quite vulnerable to being knocked off in the spring if hit by a moving vehicle. Redwood

bark serves the following purposes for the health of a redwood tree, the bark: 1) protects the phloem and cambium from drying out; 2) serves as a tissue to protect phloem and cambium of the tree from herbivory; 3) insulates the phloem and cambium from excessive high and low temperatures. Therefore, the consequence of such an occurrence for the health of an affected redwood tree are damage to these important tissues (phloem and cambium). If the phloem is damaged, as a result of the loss of the bark, the sugars produced in the foliage of the tree cannot be trans-located to the roots. This would lead to mortality of the roots and potential problems tree nutrition and tree failure. If the cambium is destroyed as a result of bark being knocked off of the tree, no annual increment of xylem would be produced to transport water and nutrients from the roots to the foliage. For these reason, timber companies often suspend logging for a week or more in the spring to avoid injury to trees. Vehicles moving at higher speed along highway 101 would have a greater potential for accidents and for hitting trees. This should have been addressed in the EA/FONSI but was not.

34. Overall, it is my conclusion that not enough information was presented in the EA/FONSI to adequately evaluate the project or its impacts.

VII. MY OPINION OF PROJECT'S IMPACTS

35. The redwood forest in Richardson Grove State Park supports old growth stands of redwood that are an important part of California's natural heritage. This heritage has nearly disappeared as a result of logging and conversion to agriculture of the original redwood forest. Of the close to 2,000,000 acres of redwood forest in California in 1850, only about 39,000 acres are protected in state and national parks. These old growth stands cannot be replaced and special consideration should be given to any projects that would impact the remaining old growth forests.

36. **Table A** attached hereto as **Exhibit 3** presents the results of my tree-by-tree analysis of the impact of the Project of the 108 trees I have identified in the impact zone of the Project. The sections below summarize these results by category of impacts.

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A. <u>Impacts from Proposed Soil Cutting and Fill</u>.

37. Based on my review of the materials listed in **<u>Exhibit 2</u>**, my site visit, my expertise and my experience, it is my opinion that the trees in the vicinity of the Project would be negatively impacted by soil cutting and filling. The severity of this impact would depend upon the depth of soil cutting and filling in relation to the distance from the tree. These activities would result in a decrease in both structural and feeder roots of the trees in locations where cutting takes place and a decrease in soil moisture and oxygen in the areas of fill. This would, in turn, cause a decrease in the trees capacity to absorb water, oxygen, and soil nutrients as well as the severing of structural roots that support the tree.

38. Of the 108 trees that I identified in the impact zone of the Project, my examination identified 37 trees (numbers 6, 7, 9, 11, 12, 14, 15, 16, 17, 22, 23, 24, 29, 32, 38, 47, 55, 57, 63, 68, 69, 74, 75, 76, 77, 78, 82, 84, 85, 86, 87, 91, 93, 95, 96, 97 on **<u>Table A</u>** (**<u>Exhibit 3</u>**) that would be severely impacted in their vicinities by soil cuts 12" and greater and/or fill 12" and greater. In the case of some of these trees the Project calls for both soil cutting and filling to occur in their vicinities, resulting in a double impact of both soil cutting and filling in the zone of their structural roots. This would cause the loss of structural support on the side of the tree that soil cutting took place. Soil cutting would also severe feeder roots necessary for tree nutrition, leading to a decline in the health and vigor of the tree. The fill would also interfere with the movement of oxygen and water into the soil, that is necessary for the metabolism of the root system.

39. Moreover, most of these trees occur in groups where adjacent trees would be severely impacted (e.g., trees numbered 11through 17, trees numbered 74 to 78, trees numbered 84 to 87, on **<u>Table A</u>** (**<u>Exhibit 3</u>**). The demise of these trees as a result of soil cutting and filling would create openings in the forest where increased temperature and wind velocity would stress adjacent trees, potentially causing more tree failures, as a result of the drying out of the upper portions of the tree canopies and more wind pressure on the trees adjacent to the openings.

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B. Impacts from culvert work.

40. Trees adjacent to culverts that are to be replaced or modified would suffer loss of both structural and feeder roots. It would not be possible to remove existing culverts without removing some feeder roots and in some cases structural roots, regardless whether an air spade would be uses as has been proposed. Feeder roots may not be cut by an air spade, but the finer roots easily dry out and die before the areas adjacent to the new culvert can be refilled by soil. The soil around culverts must be compacted in order that the culvert stays in place and the road over the culvert does not collapse. This necessary procedure would destroy the pore space in the soil. Tree numbers 2, 38, 48, 51, 59, 61, and 65 on **Table A** (**Exhibit 3**) can be expected to be negatively impacted due to their proximity to existing culvert that would be replaced or modified, resulting in decreased tree nutrition and die back of the root systems.

C. Impacts from Increased Wind Velocities.

41. In addition to the trees that would be impacted by soil cutting, filling, and culvert replacement and repairs, I have identified 35 trees that would experience increased wind velocities in their vicinities and related desiccation as a result of the road realignment project. This, in combination with the reduction in soil moisture due to soil compaction and the cutting of the feeder roots, described above, would result in the death of the tops of the trees and can lead to tree failure as pointed out in the reports cited above. These include tree numbers 2, 4, 5, 6, 10, 11, 13, 14, 16, 21, 25, 26, 36, 38, 46, 47, 56, 57, 59, 62, 63, 64, 68, 69, 77, 78, 85, 89, 90, 91, 94, 99, 100, 102, and 104 on **Table A** at **Exhibit 3**.

D. Impacts from Removal of 54 Trees.

42. Further impact from the Project would be caused to trees in the Project area by the removal of 54 trees. The EA/FONSI attempts to dismiss these trees because they are for the most part tanoak, Douglas-fir or redwoods of small diameters. However, these trees play an important role in the redwood forest ecosystem. They provide nesting cover and food for wildlife species that are not provided by redwood trees. The small redwoods that would be cut are also potential recruits for canopy trees in the forest.

43. The impact of the cutting of these trees should also not be dismissed since it can cause a domino effect of desiccation and tree failure along the margins of openings in the forest canopy. The ultimate loss of trees would be greater that the number removed in the project due to these negative indirect effects on adjacent trees.

44. The importance of this old growth redwood stand, in view of the important heritage of the redwood forest, requires special consideration before projects that would impact the stand are allowed to go forward. Based on my background, my examination of the individual trees in the Project area, and the materials listed in **Exhibit 2**, it is my opinion that a substantial, irreparable damage would occur to the trees in the Project area as a result of the proposed project. It is my opinion that this would, in turn, cause negative impacts to the overall health of the forest in the vicinity of the Project area.

I declare under penalty of perjury pursuant to 28 U.S. C. § 1746 that the foregoing statements are true and correct and that this declaration was executed on May 6, 2011 in Berkeley, California.

Joe R. McBride

JOE R. McBRIDE