RICHARDSON GROVE OPERATIONAL IMPROVEMENT PROJECT

Responses to Comments on the Addendum to the Final Environmental Impact Report

Humboldt County, California
01 – HUM – 101 PMs 1.1 / 2.2
01-46480 / 0100000266

January 2023

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

RICHARDSON GROVE OPERATIONAL IMPROVEMENT PROJECT

Responses to Comments on the Addendum to the Final Environmental Impact Report

Humboldt County, California

01 – HUM - 101 PMs 1.1 / 2.2

01-46480 / 0100000266

STATE OF CALIFORNIA
Department of Transportation

Approved By: Brandon Larsen Date: 01/26/2023

Matthew K. Brady Brandon Larsen District 1 Deputy Director Planning and Local Assistance for Matthew Brady
District 1 Director
California Department of Transportation

For individuals with sensory disabilities, this document can be made available in Braille, in large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please call or write to Caltrans District 1, Attn: Myles Cochrane, Public Information Officer, 1656 Union Street, Eureka, CA, 95501; or call (707) 498-4272 voice, use the California Relay Service 1 (800) 735-2929 (TTY), 1 (800) 735-2929 (Voice) or 711; or via email at Myles.Cochrane@dot.ca.gov

RICHARDSON GROVE OPERATIONAL IMPROVEMENT PROJECT

Responses to Comments on the Addendum to the Final Environmental Impact Report Humboldt County, California

The California Department of Transportation (Department) circulated the Addendum to the Final Environmental Impact Report for the Richardson Grove Improvement Project (FEIR Addendum) for public comment in compliance with the writ issued in *Bair v. California Department of Transportation*, Humboldt County Superior Court Case No. CV170543. The writ called for Caltrans to receive comments on the limited new information provided in the FEIR Addendum. The FEIR Addendum was circulated for a 45-day period from October 5, 2021, to November 19, 2021. The 2010 Final Environmental Impact Report (FEIR) for the project was also publicly provided for background and context in connection with the circulation of the FEIR Addendum. The 2015 Final Report: An Evaluation of Potential Effects on Old-Growth Redwoods from Implementation of the Richardson Grove Operational Improvement Project (2015 Tree Report), Letters of Concurrence from the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), Natural Environment Study Addendum (NES Addendum), and other technical studies and supporting information were also available on the Caltrans Richardson Grove Operational Improvement Project website. These documents can be accessed at: https://dot.ca.gov/caltrans-near-me/district-1/d1-projects/d1-richardson-grove-improvement-project.

This document contains the Department's responses to comments submitted on the FEIR Addendum, as required by the California Environmental Quality Act (CEQA).

COMMENTS RECEIVED ON THE FEIR ADDENDUM

At the conclusion of the circulation of the FEIR Addendum, the Department received 288 written comment letters: 220 of these were a form letter seeking abandonment of the project based on concerns about old-growth redwoods. The remaining 68 were a combination of comments in opposition to, in support of, or neutral to the project. One agency, the California Department of Parks and Recreation (State Parks), submitted a letter stating it had reviewed the FEIR Addendum and had no comments on the Department's CEQA analysis. Four non-governmental organizations submitted comment letters that expressed concerns about the project: Bay Area Coalition for Headwaters (BACH), the InterTribal Sinkyone Wilderness Council, Save the Redwoods League, and the last was a collaboration of the

Environmental Protection and Information Center (EPIC), Center for Biological Diversity, Natural Resources Defense Council, and Californians for Alternatives to Toxics.

Only comments relating to the FEIR Addendum circulated by order of the court are addressed in this document. Though not required, this document also contains responses to some comments outside the scope of the FEIR Addendum for informational purposes only. Categories of comments received, which are outside the scope of the FEIR Addendum, include:

- Topics addressed in the FEIR, including responses to comments on the 2008 Draft Environmental Impact Report (Draft EIR).
- Topics that were resolved in previous rounds of litigation or that address information disclosed in prior environmental documents or could have been submitted during the comment period on the Draft EIR, including:
    - Scoping, setting, and baseline for the project
    - Project Alternatives
    - Project impact analyses that are not the subject of the FEIR Addendum

RESPONSE TO COMMENTS

RESPONSES TO GENERAL COMMENTS

Comments received from more than one commenter on a general topic have been consolidated. In this section, each of these aggregated comment statements is presented, followed by a detailed response.

- ***Climate change may result in less fog, less availability of water, more wildfires, and other stressors in the future, which may compound impacts on old-growth redwood trees.***

General Response 1:

Under CEQA, the Department must analyze the potential impacts of *the project*. The potential impacts of the larger, global issue of climate change and climate change impacts on redwood trees is outside the scope of this analysis under CEQA. Nevertheless, information and materials raised by commenters have been considered by project staff and a certified arborist as they relate to the project. The Department's CEQA determination regarding project impacts to old-growth redwoods has not changed.

According to scientific literature, the future effects of climate changes on old-growth redwoods cannot be predicted with certainty (Burns 2016). For example, some climate studies indicate warming trends will increase in Northern California coast redwood habitats and that the prevalence of coastal fog has been decreasing. Although some research corroborates the short-term benefits of fog inundation for old-growth redwoods (Burgess et al., 2004; Simonin et al., 2009), in recent years upper canopy research has demonstrated that declining fog may contribute to documented increases in redwood biomass by allowing increased solar radiation that promotes greater photosynthesis (Johnstone and Dawson, 2010; Sillett et al., 2015). This research also demonstrates that old-growth redwoods are growing with efficiency by sequestering increased atmospheric carbon (Sillett et al., 2015). In summary, though fog is declining, redwoods appear to be growing faster, sequestering more carbon, and not retreating from native forests.

These findings, with respect to the larger issue of potential, unknown climate change effects, were echoed by a recent article in *Redwoods* magazine, a publication of Save the Redwoods League. The article states, in part, "As of 2019, we find no evidence of redwoods retreating from native forests as the climate changes. These iconic trees are growing at faster-than-expected rates, thereby enhancing arboreal habitats for other species . . . and playing an outsized role in global climate mitigation despite their limited geographic distribution" (Burns and Sillett, 2019).

The proposed project would make minor changes to the existing alignment of U.S. Highway 101 (US 101). The FEIR concluded the proposed project would have a less than significant impact on old-growth redwood trees in the project area. The 2015 Tree Report found the "limited root disturbance would be inconsequential to the appearance, stability, and continued health of the old-growth redwoods in Richardson Grove" (Yniguez 2015). The FEIR Addendum confirmed the determination from the FEIR. The information and materials from commenters regarding climate change and coast redwoods do not change the Department's CEQA determination.

- ***The completion of State Route 299 at Buckhorn Summit changes and satisfies the Purpose and Need of this project.***

General Response 2:

This comment relates to the project purpose and need and the range of alternatives; topics that were not part of the FEIR Addendum and are outside the scope of the recirculation. As stated in the FEIR, the purpose of this project is to allow direct Surface Transportation Assistance Act (STAA) truck travel on US 101 connecting Humboldt County and Del Norte counties with areas to the south, and to address the curvature and superelevation of the subject 1.1-mile stretch of US 101 for operational and goods movement. This need has not changed and is not served by the completion of the Buckhorn Summit project on State Route 299 (SR 299). Even with the Buckhorn Summit Project complete and STAA trucks allowed on SR 299, a truck trip between the Bay Area and Eureka would be roughly 180 miles and over three hours longer roundtrip via the Interstate 5/SR 299 route than on US 101.

In addition, SR 299 experiences frequent closures from wildfires, rockslides, and winter storms, occasionally for weeks at a time.

- ***Impacts to marbled murrelet and northern spotted owl related to post-2010 project information***

General Response 3:

This comment relates to impacts that were not part of the FEIR Addendum and are outside the scope of the recirculation. Potential project-related impacts to marbled murrelet (MAMU), MAMU critical habitat, and northern spotted owl (NSO) were analyzed in the FEIR, which determined the impacts would be less than significant. The FEIR Addendum does not change these conclusions. As discussed in the June 2016 NES Addendum (Caltrans 2016d), the Department conducted post FEIR protocol-level surveys of both species in collaboration with State Parks and USFWS as part of the federal regulatory process; none were detected in the project area.

Accordingly, USFWS removed the sunrise and sunset project work restrictions. In March 2017 the Department concluded, and USFWS concurred, that the appropriate determination for MAMU, NSO, and MAMU critical habitat is "may affect, not likely to adversely affect." A Letter of Concurrence from USFWS for this conclusion was received on March 29, 2017. Due to the probable absence of MAMU and NSO in the project area, the CEQA conclusion in the FEIR, which indicated that neither species would be significantly impacted by the proposed project, remains unchanged.

- ***Dangerfield (2020) and Dangerfield et al. (2021) studies regarding road construction and road use impacts on old-growth redwoods***

General Response 4:

The FEIR, FEIR Addendum, and the 2015 Tree Report discuss in detail the impacts of construction of the project on old-growth redwoods, concluding impacts to be "less than significant". In response to comments, the Dangerfield studies were assessed by project staff, including a professional arborist, licensed professional engineer, and environmental specialists. The Dangerfield studies do not change the CEQA determination for impacts to old-growth redwood trees and had various flaws, including that Dangerfield's assumption of the date of the original construction of US 101 near Pepperwood is off by five or more years, undermining the basis of the tree-ring analysis and usefulness of the conclusions; the basic premise upon which the studies are based, that construction of US 101 marked the first major disturbance of existing old-growth redwoods in the study area near Pepperwood, is also inaccurate; and the scale of historical US 101 construction was of such a far greater scope and magnitude than the Richardson Grove Operational Improvement Project that the two are not comparable.

Both Dangerfield studies state they examined, "How previous landcover changes and road installations" have affected coastal redwoods by analyzing tree-ring growth patterns before and after a "known disturbance event."; i.e., "the expansion of Highway 101 *in the 1950s*". The studies also claim this construction "*bisected several old-growth stands of Humboldt Redwoods State Park*" [Emphasis added.] (Dangerfield 2020; Dangerfield et al., 2021).

Both studies state the highway construction at Pepperwood took place from 1956 to 1960 and use those dates in analyzing old-growth redwood tree-ring growth patterns. The northernmost "highway-adjacent" trees sampled in the Dangerfield studies are located at approximately post miles 44.7 and 44.9. The project plans for the then-new section of US 101 to be built at this location were not approved until April 1965. Construction of the new highway was not completed until late 1967. Therefore, the tree-rings identified in the studies as corresponding to the dates of highway construction pre-date construction by five or more years.

A portion of US 101 to the south, near Dyerville, not Pepperwood, was under construction in 1956. Dyerville is located at approximately post mile 35.7, nine miles south of Pepperwood.

The studies also incorrectly assumed that the construction of US 101 disturbed an existing old-growth redwood stand at the study location near Pepperwood by bisecting it. However, the construction of the new section of US 101 did not "bisect" an old-growth redwood forest,

as stated in the studies. Rather, the highway was built on the exact site where old-growth redwoods had already been disturbed and impacted by extensive logging beginning at least as early as 1941, close to the trees that had been selected and evaluated as the northernmost "highway-adjacent trees" in the studies (Figures 1 through 5).

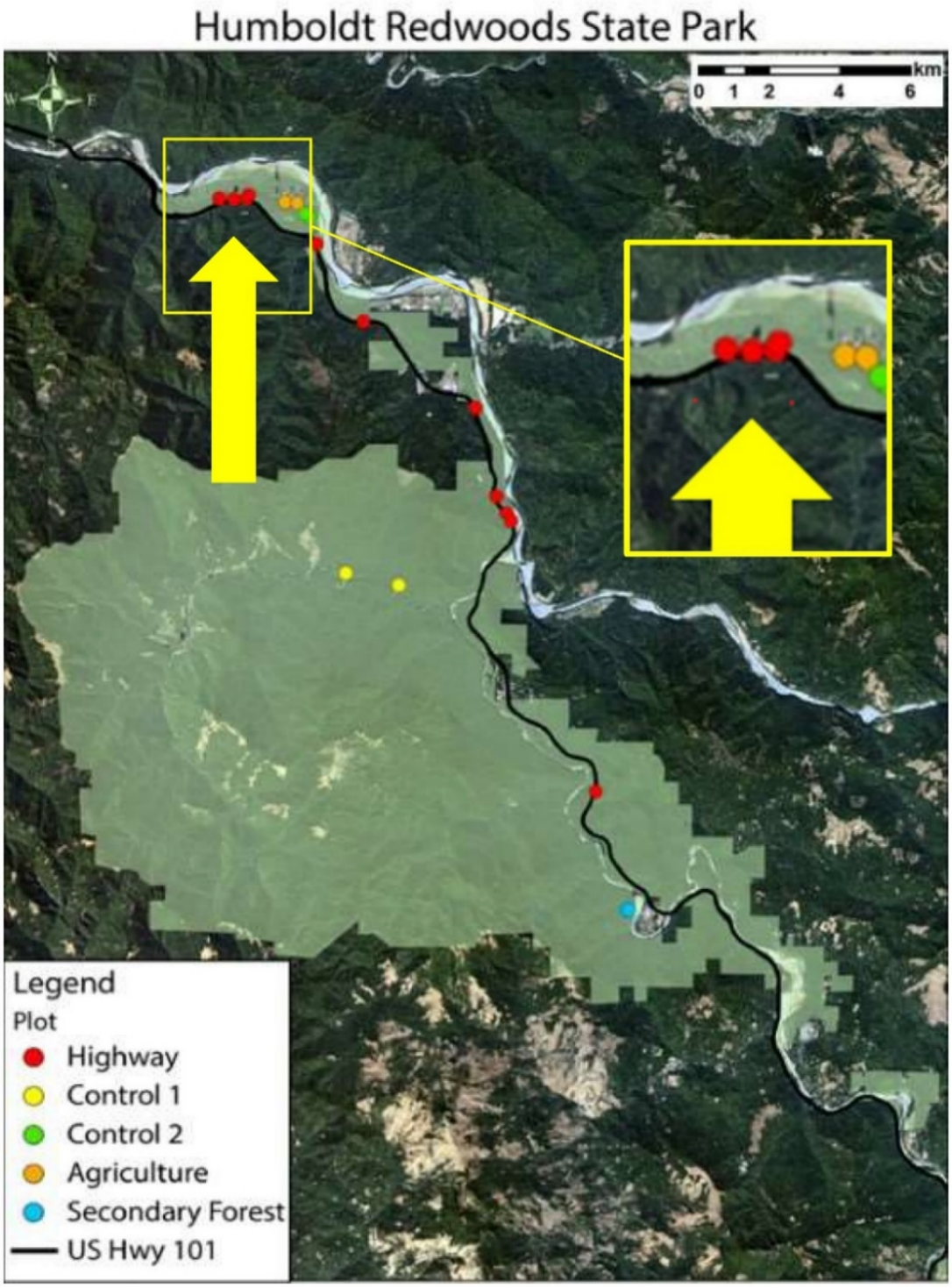

Figure 1. Detail of map from Dangerfield 2021 showing study plot locations in Humboldt Redwoods State Park near Pepperwood. Yellow arrow and yellow-outlined callout have been added by the Department for this discussion and indicate the northernmost highway-adjacent trees studied by Dangerfield. (Dangerfield 2021)

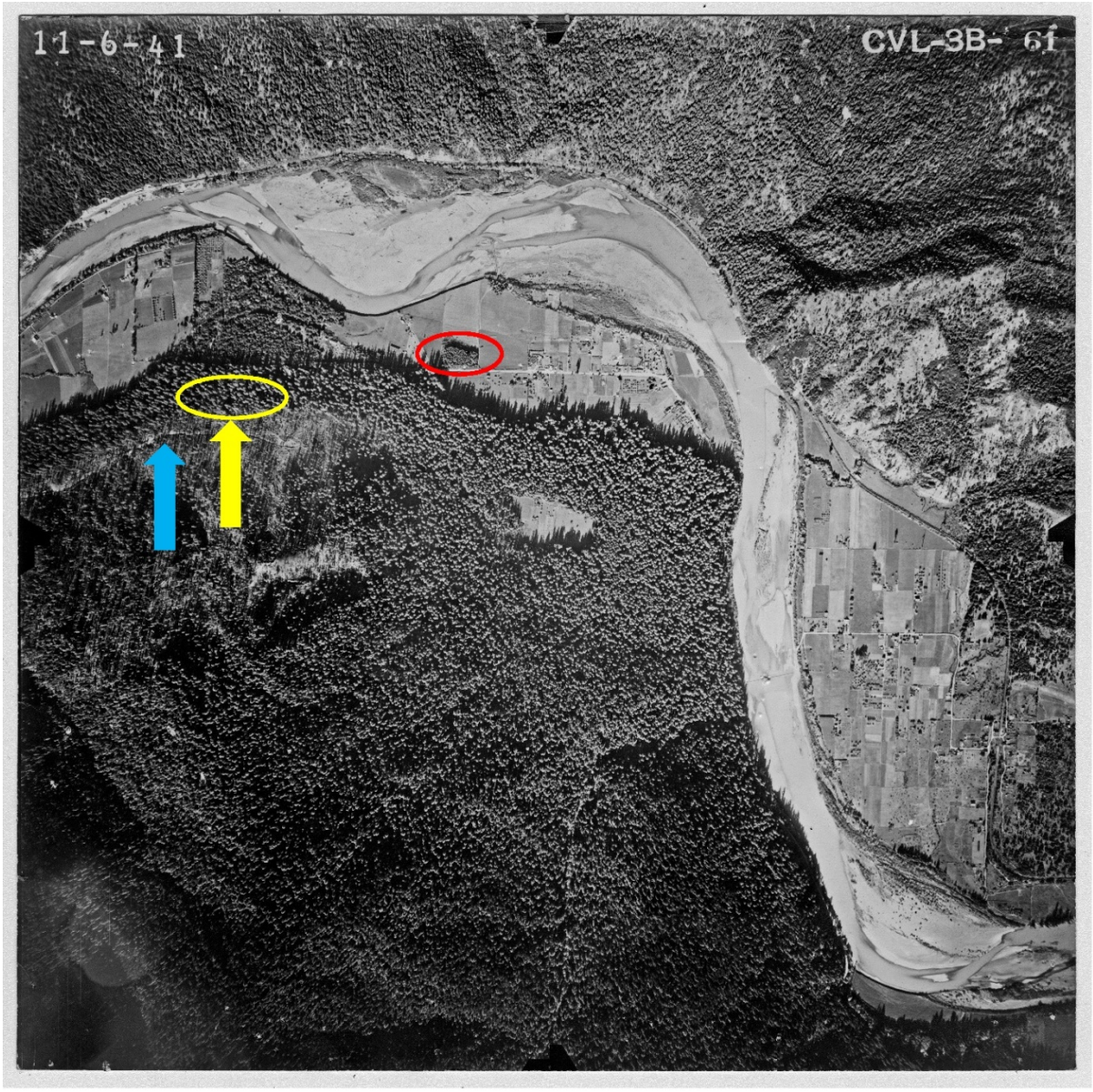

Figure 2. 1941 aerial photo of the Pepperwood area. The yellow arrow and ellipse indicate the approximate area of the highway-adjacent trees from Figure 1. Note the visual evidence of logging below the ellipse. The blue arrow indicates a logging road. As this and subsequent photos were taken from slightly different locations, altitudes, and angles, the red ellipse indicates a stand of trees that may be used for location comparison between Figures 2, 3, 4, and 5. This stand of trees is obscured in Figure 1 but is located approximately at the orange dots in the callout. (UC Santa Barbara Photo Collection)

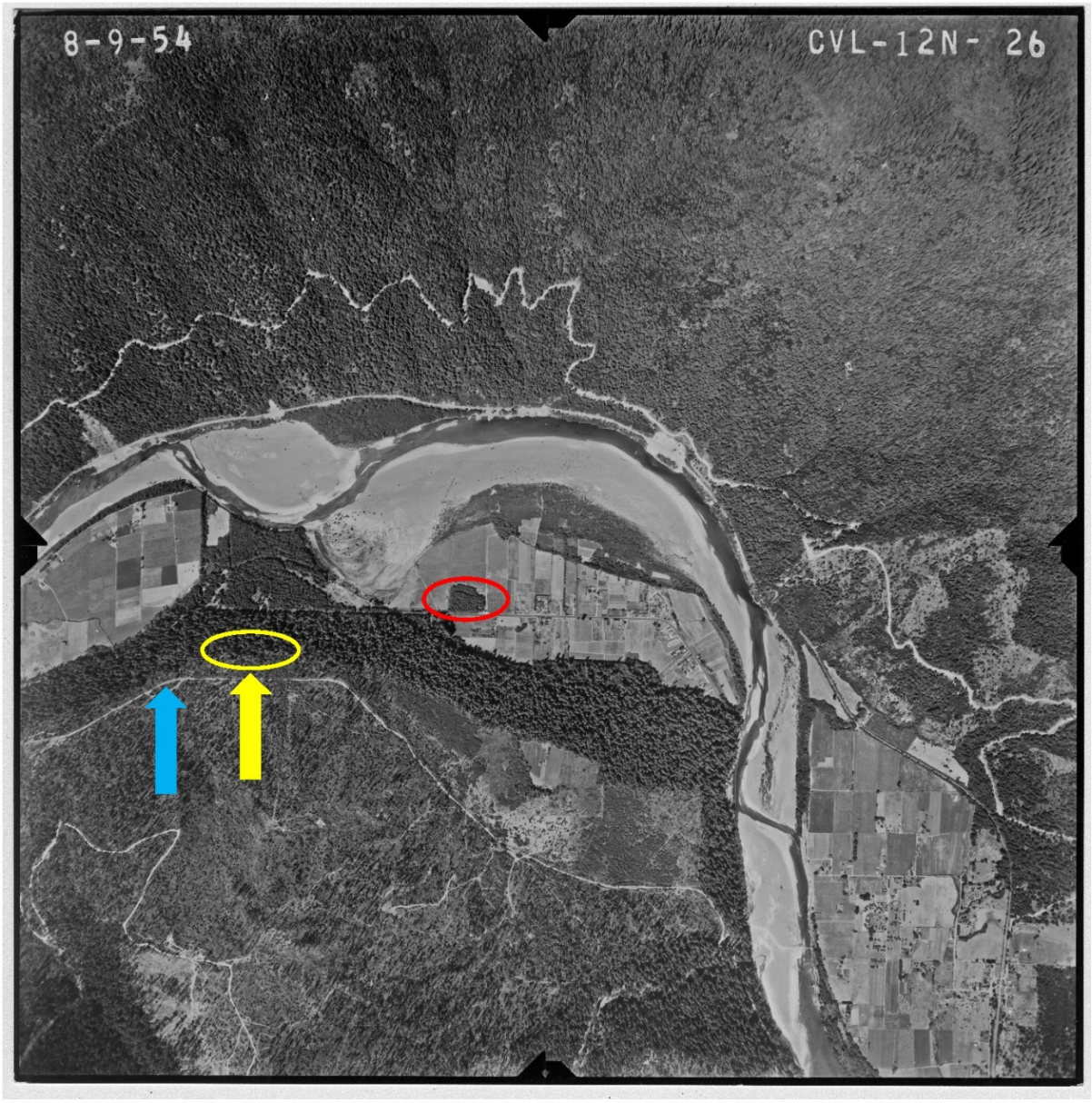

Figure 3. 1954 aerial photo of the Pepperwood area. The yellow arrow and ellipse indicate the approximate area of the highway-adjacent trees from Figures 1 and 2. Note the visual evidence of logging below the ellipse has expanded from that shown in Figure 2. The blue arrow indicates the logging road. The red ellipse indicates a stand of trees that may be used for location comparison between Figures 2, 3, 4, and 5. (UC Santa Barbara Photo Collection)

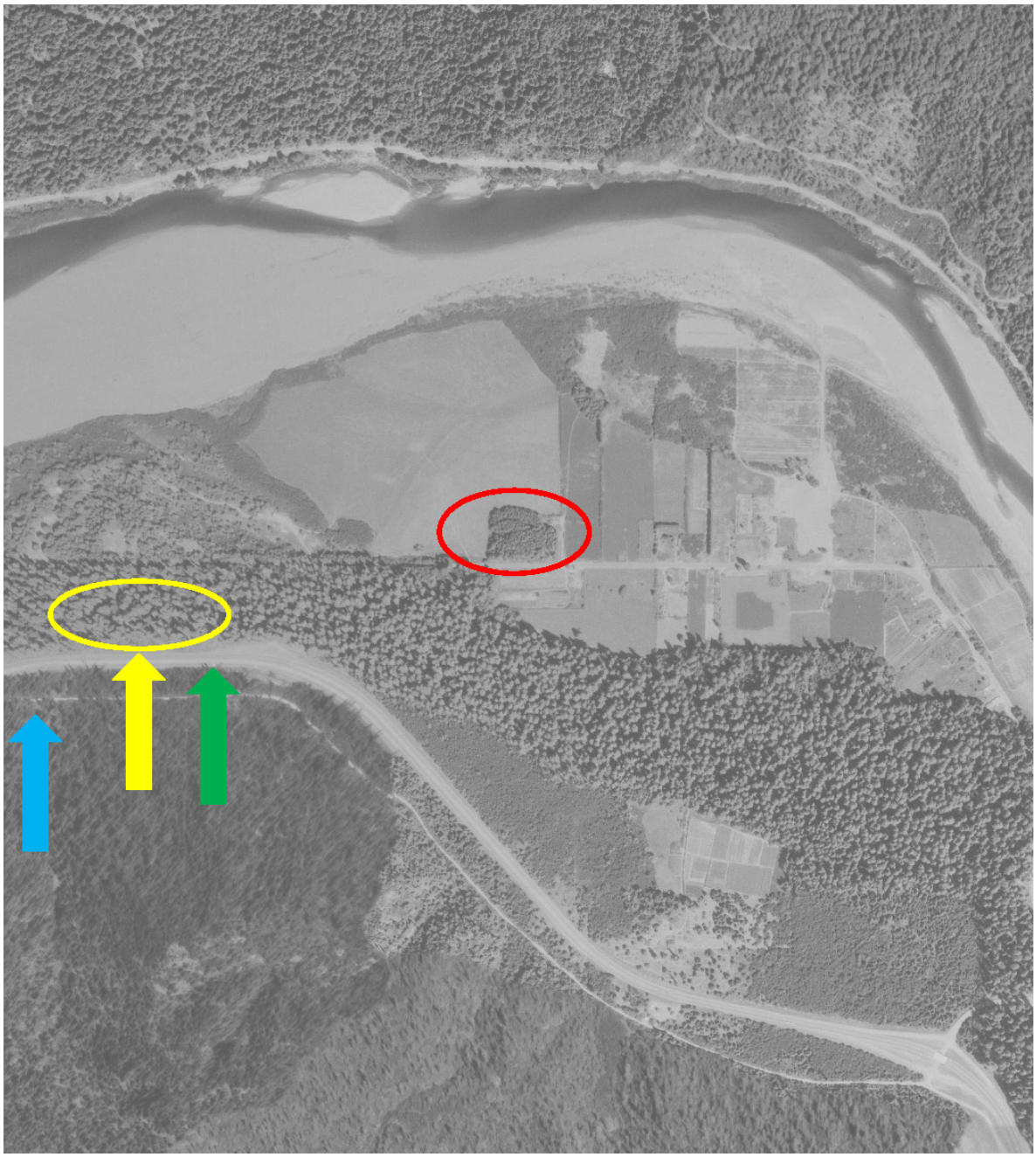

Figure 4. 1968 aerial photo of the Pepperwood area. The yellow arrow and ellipse indicate the approximate area of the highway-adjacent trees from Figures 1, 2, and 3. Note the visual evidence of logging below the ellipse shown in Figure 2 is still evident. The blue arrow indicates the logging road. The red ellipse indicates a stand of trees that may be used for location comparison between Figures 2, 3, 4, and 5. This section of US 101, indicated by the green arrow, was constructed between 1965 and 1967. The Barkdull Road Interchange is in the lower right corner. (Historic Aerials by NETRonline)

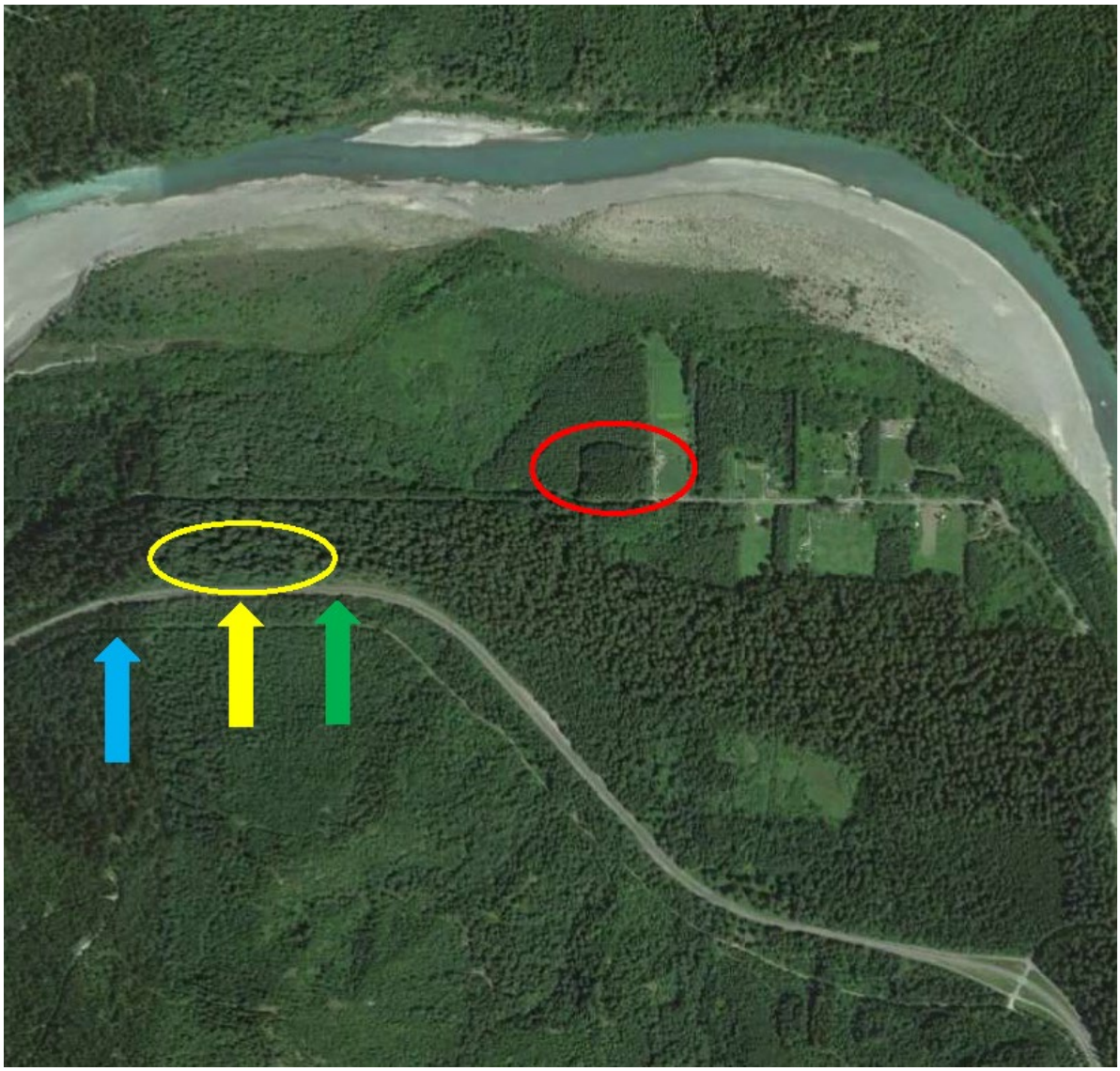

Figure 5. 2019 aerial photo of the Pepperwood area. The yellow arrow and ellipse indicate the approximate area of the highway-adjacent trees from Figures 1, 2, 3, and 4. The blue arrow indicates the logging road. The red ellipse indicates a stand of trees that may be used for location comparison between Figures 2, 3, 4, and 5. This section of US 101, indicated by the green arrow, was constructed between 1965 and 1967. The Barkdull Road Interchange is in the lower right corner. (Google Earth 2019 https://earth.google.com/web/@40.44919009,-123.98683795,27.46638072a,4807.67010054d,35y,0h,0t,0r)

The northernmost highway-adjacent trees in the Dangerfield studies were exposed to the edge effects (including increased air and soil temperatures, decreased humidity, and increased wind) of adjacent heavy logging for about 24 years *before* the new section of US 101 was constructed. As the 2021 Dangerfield study states, "While dieback can occur naturally in redwoods due to age and accumulation of damage from other disturbances or even previous periods of extreme drought . . . *we did not attempt to date the dieback in the trees we sampled to differentiate between old and new dieback events*." [Emphasis added.] The Dangerfield studies do not evaluate whether, or to what extent, the prior logging operations on and directly adjacent to the site of US 101 construction contributed to crown dieback or a reduction in tree-ring growth increments of sampled trees.

In addition to the above, the scale of the 1950s/1960s road construction projects for the then-new US 101 alignment was dramatically different from the scale of the proposed Richardson Grove Operational Improvement Project. In response to comments, details of the 1950s/1960s projects were reviewed and show that those projects constructed the new alignment of what is now US 101 from approximately post miles 22.3 to 46.9. This required construction of more than 24 miles of new highway alignment, whereas the Richardson Grove Operational Improvement Project would only make slight adjustments to a 1.1-mile stretch of existing highway. The scale and magnitude of the two projects and their potential impacts are therefore not analogous.

The three 1950s/1960s projects were constructed through 24 miles of mountainous terrain. At that time, the new four-lane alignment required excavations with depths as great as 65 feet and fills up to 70 feet in depth (measured at centerline) to construct the freeway. The volume of excavation averaged approximately 300,000 to 600,000 cubic yards per mile. Embankment (roadway fill) construction averaged approximately 300,000 to 600,000 cubic yards per mile. In photos of construction below, heavy equipment and massive amounts of excavated soil are plainly seen (Figures 6 and 7).

The 1950s/1960s projects also drastically changed the surface and subsurface hydrology (Figure 8). These monumental, historic projects cut into steep hillsides, redirected drainages, and rerouted segments of the South Fork Eel River.

Figure 6. Representative photo of historic US 101 construction near Dyerville. This and the photos following are illustrative of 1965-1967 Pepperwood area construction, which had comparable terrain, construction methods, and amounts of soil disturbance. (State of California, Division of Highways, 1956)

Figure 7. Representative photo of historic US 101 construction near Dyerville. Note the re-routed portion of the South Fork Eel River in the foreground. (State of California, Division of Highways, 1956)

Figure 8. Representative photo of historic US 101 construction near Dyerville showing culvert installation. For scale, two trucks and a worker can be seen at the center of the right side of photo. (State of California, Division of Highways, 1956)

In contrast, the Richardson Grove Operational Improvement Project would make only slight adjustments to the existing two-lane highway. Excavations would total approximately 1,200 cubic yards over the entire approximately one-mile length of the project. The placing of fill would total under 600 cubic yards. Changes to centerline elevation for the Richardson Grove Project would not exceed one foot. Only minor drainage work would occur, and no work would take place within the bed, bank, or channel of Durphy Creek or the South Fork Eel River.

Photo simulations were prepared in Spring 2010 to illustrate what US 101 would look like after the proposed project was constructed. The full set of simulations has been available on the project website since 2010 (https://dot.ca.gov/-/media/dot-media/district-1/documents/richardson-grove-improvement/rg-photo-simulations-2010-a11y.pdf). One set is provided below for comparison to the above photos of historic construction of US 101 (Figures 9 and 10).

Figure 9. Photo of existing US 101 looking south at approximately post mile 1.4, where the greatest alignment shift in the proposed project would occur.

Figure 10. Photo-simulation of US 101 looking south at approximately post mile 1.4, where the greatest alignment shift in the proposed project would occur, post-project.

Table 1 compares construction impacts between the Richardson Grove Operational Improvement Project and the 1950s/1960s US 101 construction projects discussed in the Dangerfield studies. The table indicates the 1950s/1960s highway projects to be orders of magnitude greater than the Richardson Grove Operational Improvement Project. The massive earth excavations and creation of a new four-lane highway over 90 feet wide are not comparable to the Richardson Grove Project in size, scope, manner, or degree of disruption.

Construction Impacts Comparison	1950s/1960s Projects	Richardson Grove Operational Improvement Project
Cut/Excavation per mile	300,000 to 600,000 cubic yards	1,200 cubic yards
Depths of Cut/Excavation at centerline	Up to 65 feet	Up to 1 foot
Fill/Embankment per mile	300,000 to 600,000 cubic yards	600 cubic yards
Depths of Fill/Embankment at centerline	Up to 70 feet	Up to 1 foot

Table 1. Comparison of Construction Impacts between the 1950s/1960s projects and the proposed project.

After review and analysis, the Department concluded that the Dangerfield studies do not contain relevant and/or useful new information that alters the Department's CEQA determination for the proposed project.

- ***The FEIR Addendum and 2015 Tree Report do not adequately consider hydrology impacts to old-growth redwood trees in the project area. There is no analysis of project impacts on localized hydrology. The Dangerfield studies hypothesize that tree dieback as a result of highway construction was due, in part, to changes in hydrology.***

General Response 5:

As discussed in the FEIR, the project would not substantially change the existing drainage patterns. A 2010 Storm Water Data Report prepared in connection with the final project design also concluded the existing drainage patterns and flow patterns will be perpetuated (Caltrans 2010).

As stated in the FEIR, highway drainage patterns in the project area consist of approximately 58% sheet flow (runoff which flows over the ground in an even layer, not concentrated within a defined channel), 38% roadway drainage, with the remaining 4% being collected by an asphalt concrete dike on the roadside. The proposed project would not make substantial changes to existing drainage patterns, would maintain as much sheet flow as possible, and would make only a small increase in the total amount of impervious surface area. Both the Caltrans arborist and the Save The Redwoods League arborist determined the project would not have a substantial impact on availability of water to the old-growth redwoods adjacent to the roadway in the construction areas. The final conclusion regarding project impacts on old-growth redwoods, including hydrology, was the project would have less than significant impacts on old-growth redwood trees. The FEIR Addendum does not change this conclusion.

The FEIR Addendum discloses minor design changes which reduced the project footprint after the FEIR; these changes reduced the extent of drainage work, as well as the estimated amounts of cut (excavation) and fill (embankment), new impervious surface, and tree removals. The 2015 Tree Report used this reduced footprint in its project analysis. Four culverts would be extended; and one that is outside of Richardson Grove State Park at the northern end of the project area would be replaced, in conjunction with a drain installation. The only other drainage work would involve extending an existing berm to divert water presently draining down a steep, eroded slope to a downdrain, which would connect to an existing culvert. The existing culvert discharges in the same approximate area as the currently uncontrolled slope drainage; the change in available water to surrounding trees would be negligible (Caltrans 2010; Yniguez 2015).

The 2015 Tree Report contains a thorough description of the project scope, including disturbed soil area, drainage work, and paving, within the body of the report and in the attached layouts showing the location of the old-growth redwood trees in the project area and individual tree details of proposed work at each tree. The Tree Assessment Criteria from the 2015 Tree Report states:

> For purposes of evaluating the potential effect of construction activity, a substantial detrimental impact would be a change to a tree's structure or environment that significantly diminishes a tree's ability to carry out one of its essential physiological activities—movement of water and nutrients; growth of new wood, leaves, and roots; exchange of gases; and seed production.

The assessment included site visits with project staff and an analysis of potential project impacts for each tree using detailed project plans and based on the criteria described in the

report. The tree analysis takes these minor impacts on localized hydrology into consideration and concludes that the proposed project, including culvert replacement and drain installation, would not threaten the trees' health or stability (2015 Tree Report [Yniguez 2015]).

The old-growth redwoods in the Richardson Grove Operational Improvement Project would continue to access water from existing sources. Water would continue to run off US 101 into the landscape and percolate through forest duff to the roots of coast redwood trees that line the highway. The project would not divert water directly to the South Fork Eel River or to any new drainage systems (Caltrans 2010). The 2015 Tree Report concludes, "Nothing in the Richardson Grove Operational Improvement Project would substantially diminish the ability of these old-growth redwoods to obtain water" (Yniguez 2015).

Excess rainwater already flows into drainage inlets in several places along the uphill (west) side of US 101 to existing culverts beneath the highway. This helps prevent ponding of water on the traveled roadway. The excess water drains into vegetated areas with natural duff where it is available for uptake by nearby old-growth redwoods (Caltrans 2016c).

In places where the roadway section would be widened, three existing culverts would be extended. Old-growth trees near the extended culvert outlets would continue to access water, as they do today (Caltrans 2016c; Yniguez 2015).

A single new 12-inch-diameter slotted drain would intercept sheet flow runoff from a private road outside Richardson Grove State Park (Park), reducing the volume of water flowing onto US 101. The excess water would flow into an existing adjacent culvert that runs underneath the highway and drains into an existing vegetated ditch. This drainage would not be affected by construction of the single retaining wall outside the Park, which was designed as a soldier pile wall with a short section of gabion wall at each end to protect the large redwood trees there (Figure 11) (FEIR). As gabions are steel mesh boxes full of rocks, they are water permeable. Gabions can also be shaped to conform to the profile elevation of the tree (Yniquez 2015).

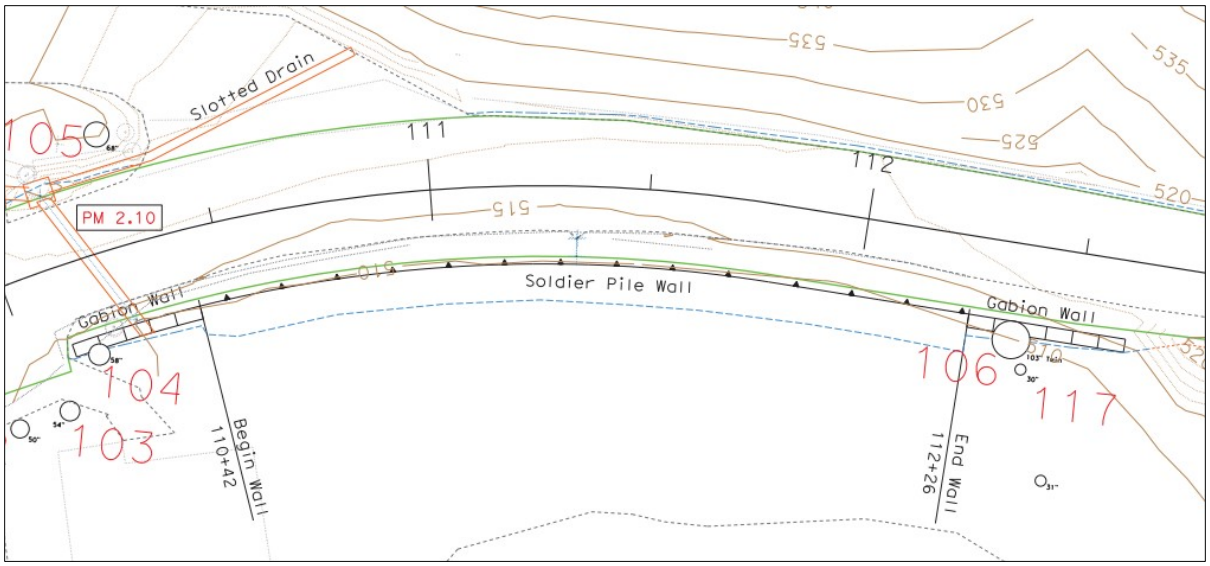

Figure 11. Detail of proposed retaining wall at post mile 2.10 (Yniguez 2015).

The Richardson Grove Operational Improvement Project would not substantially diminish the availability of water or the ability of the old-growth redwoods to obtain water. The FEIR concluded the project would have less than significant impacts on old-growth redwood trees in the project area. The FEIR Addendum does not change this determination. In addition, the minor design changes reduced the scope and extent of proposed drainage work as well as the overall project footprint, reducing impacts to hydrology.

See also General Response 4.

- ***Response to form letters seeking abandonment of the project based on asserted concerns about old-growth redwoods***

General Response 6

Of the 288 comments received, 220 were a form letter, expressing general concern about project impacts on old-growth redwoods from cutting and paving over roots and loss of parts of the grove. The form letter also very generally took issue with the "necessity" for the project and urged other, unspecified alternatives.

To the extent the form letter relates to the project purpose, need, and alternatives, these topics were not part of the FEIR Addendum and are outside the scope of the recirculation. (See also General Response 2.) As to the concern for the loss of "parts" of the old-growth grove, no old-growth redwood trees would be removed for the project. In addition, the form letter

states the proposed project would "straighten a section of Highway 101 through the grove." This is incorrect, as the roadway would be slightly curvier, not straighter, after construction.

The FEIR, FEIR Addendum, and 2015 Tree Report detail project cut, fill, and paving in relation to old-growth redwoods and considered the potential effects associated with road construction and areas where pavement would be added. After a thorough evaluation of potential project impacts, each of these documents concluded that disturbances would be confined to a small portion of the root zones and would be well within the adaptive capabilities of the trees, finding that any impacts to old-growth redwoods would be less than significant. In addition, measures have been incorporated into the project to further reduce these less than significant impacts as described in the FEIR.

As discussed in the 2015 Tree Report, the project would add less than 5 percent new pavement to the existing pavement within the structural root zones (SRZ) of old-growth trees in the project area (2015 Tree Report [Yniguez 2015]). An aggregate mix called Cement-Treated Permeable Base would be used as a base for new pavement in the roadway. This material was selected because it requires approximately six fewer inches in application depth than other common road base aggregates, is permeable, and requires a lesser degree of compaction next to roots within the structural root zone. It therefore allows greater oxygen diffusion and water percolation than conventional subbase material (2015 Tree Report [Yniguez 2015]).

To protect old-growth redwood roots two inches in diameter or larger from being cut during excavation, the soil within the SRZ of old-growth redwoods would be removed using hand tools such as picks and shovels, hand-held pneumatic devices, or a combination of the two (2015 Tree Report [Yniguez 2015]).

Project analyses concluded that the limited root disturbance would be inconsequential to the stability and continued health of the old-growth redwood trees in Richardson Grove (2015 Tree Report [Yniguez 2015]).

RESPONSES TO INDIVIDUAL COMMENTS

Comments from organizations and individuals have been summarized and are followed by a response.

Bay Area Coalition for Headwaters (BACH)

Comment 1: Some of the studies that Caltrans cites are about other species of trees and the studies cited do not support the determination that excavation would not affect the long-term vitality of old-growth redwood trees.

Research on tree species other than redwoods can provide general and useful background information and was included in the analysis based on the professional opinion of the consulting arborist. The Department's analysis of project impacts was based on a project-specific evaluation of the individual old-growth redwood trees in the project area, as well as on scientific literature on coast redwoods and other tree species. The project's consulting arborist utilized other tree research as background information. The arborist's study was documented in the 2015 Tree Report and analyzed the project impacts, including proposed excavation, on the specific old-growth redwoods within the project area.

The natural remnant range of coast redwoods is limited geographically, however arboricultural and forestry research is conducted throughout the United States and studies that focus on trees of varied species, including both conifers and hardwoods, may be relevant to coast redwoods in some circumstances. For example, research on the compartmentalization of decay in trees undertaken by a United States Forest Service plant pathologist studying conifers and hardwood forests in New Hampshire concluded that compartmentalization is "a dynamic tree defense process that forms boundaries that resist spread of pathogens" (Shigo 1986). Although coast redwoods are not endemic to New Hampshire forests, the compartmentalization of decay in trees occurs in conifers and hardwoods throughout the world, including the coast redwood forests of northern California.

Throughout the literature, arborists are encouraged by researchers and other subject matter experts to consider species and site characteristics when determining the applicability of tree research. The coast redwood is extraordinary in many respects including life span, resistance to decay, dearth of significant disease pathogens and insect pests, and the extraordinary resilience of branches and roots in response to pruning (Yniguez 2015). Therefore, general guidelines for root pruning of other tree species, for example, may overstate the potential effects of root pruning when considering the resiliency and decay resistance of coast redwoods, along with site characteristics and specific measures to limit root disturbance.

The 2015 Tree Report concluded the project would not significantly impact any old-growth redwood trees. The resilience of the trees was only one factor considered by the arborist in evaluating the project impacts. The report examined and rated each tree according to the predicted effects of root disturbance on tree health, as affected by location, depth, and type of excavation (if any); proximity of the work to individual trees; and the amount and depth of added soil or roadway (if any). Based on the examination and rating, the arborist concluded the project would not threaten the health or stability of any old-growth redwood trees even if performed with conventional construction methods. The minimization measures implemented (e.g., the use of hand tools and pneumatic soil excavation, clean severance of roots, etc.) would further reduce the less than significant effects of the project on old-growth redwood trees.

Comment 2: Effects of highway construction on trees are "cumulative" and this is not addressed by the Department.

Under CEQA "An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in Guidelines Section 15065(a)(3)." That section defines "cumulatively considerable" to mean "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." The FEIR documented a cumulative impact analysis of the project under CEQA, which included analysis of cumulative impacts on redwoods, and concluded that the project would have no significant cumulative impacts. The FEIR Addendum does not change this conclusion. Additionally, the FEIR Addendum describes the reduction of the project footprint since 2010, including shallower excavations within the Park and reduced shoulder widening throughout the project limits.

The impact analysis of the project on redwoods used the existing condition as the baseline from which impacts were measured and concluded there would be no significant impacts from the project. This baseline includes the effects of prior highway construction and millions of vehicles crossing over their structural root zones over the course of a century. The few old-growth redwood trees along US 101 in the project area that exhibit crown die-off were trees that had their very large buttress/structural roots cut during the original construction of the highway many decades ago. The existing condition of these "spike top" trees was the baseline for the analysis of impacts to those trees. As explained in the 2015 Tree Report, despite this obvious damage, the trees' crowns have regenerated below the spike top and are vigorous today, as are all the old-growth redwood trees in the project area within the Park (Yniguez 2015).

Comment 3: Redwood trees are subject to increased stressors such as traffic, climate change, drought, fire, and pollution, which are cumulative impacts and also part of the baseline.

The CEQA Guidelines within Section 15130 provide that "An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in Guidelines Section 15065(a)(3)." That section defines "cumulatively considerable" to mean "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." The FEIR conducted a cumulative impact analysis of the project under CEQA, which included analysis of cumulative impacts on redwood trees, which concluded the project would have no significant cumulative impacts. The FEIR Addendum does not change this conclusion.

The baseline against which the project impacts were measured under CEQA was the existing conditions, which would reflect the commenter's listed "stressors" as they relate to the existing condition of the trees. Additionally, the consulting arborist (D. Yniguez) confirmed the healthy condition of the trees, as reported in the 2015 study, in a recent visit to Richardson Grove in May 2022.

See also General Response 1.

Comment 4: There are climate change, drought, population, and traffic stressors on Marbled Murrelet habitat.

See response to BACH Comment 3 and General Responses 1 and 3.

Comment 5: Increased traffic will attract more corvids to the detriment of Marbled Murrelet nests.

This comment relates to traffic impacts, which was not part of the FEIR Addendum and are outside the scope of the recirculation. A traffic impact analysis was conducted and is described in the 2010 FEIR, finding no significant traffic impacts due to the project. The FEIR Addendum does not change this conclusion. See also General Response 3 regarding the Marbled Murrelet.

Comment 6: Potential adverse impacts to listed salmonids outweigh project benefits.

The FEIR analyzed the potential impacts to salmonoids under CEQA and determined less than significant impacts to salmonids and their habitat. The FEIR Addendum does not change this conclusion and confirms the project would have a negligible effect on fish and their habitat. The National Marine Fisheries Service concurred with the Department's analysis of impacts to fish species and habitat and provided a Letter of Concurrence in January 2017. This letter may be found on the project website at https://dot.ca.gov/caltrans-near-me/district-1/d1-projects/d1-richardson-grove-improvement-project.

For further discussion, see the 2016 Biological Assessment for Potential Impacts to Coho Salmon, Chinook Salmon, Steelhead, their Designated Critical Habitat, and Essential Fish Habitat Assessment for Pacific Salmon (2016a). Documents mentioned in this response are available on the project website.

Comment 7: State Route 299 is an alternative to the Project.

The removal of the prohibition to STAA trucks on SR 299 does not satisfy the purpose and need of the Richardson Grove Operational Improvement Project. See General Response 2.

Comment 8: The allowance of STAA trucks on Highway 299 changes the Project Purpose and Need.

See General Response 2.

Bruce Campbell

Comment 1: Caltrans should consider the Project's fragmentation of the area and impacts on listed species.

See analysis on habitat fragmentation and special status species in the 2010 FEIR, discussion of special status species in the NES Addendum (Caltrans 2016d), FEIR Addendum, General Response 3, and response to BACH Comment 6. The proposed project would not cause habitat fragmentation. No old-growth redwood trees would be removed. The only trees planned for removal are located along the existing roadway. The canopy over the highway, where redwood trees abut the edges of the roadway, would remain unchanged. For further discussion, see the NES Addendum (Caltrans 2016d). Documents mentioned in this response are available on the project website at https://dot.ca.gov/caltrans-near-me/district-1/d1-projects/d1-richardson-grove-improvement-project.

Comment 2: The Redwood Alliance Natural Community includes other plant groupings and is "sensitive." The project may impact this natural community.

As discussed in the FEIR Addendum, the Redwood Alliance natural community, or Redwood forest Alliance, is considered sensitive and includes other plant species. The first plant name in the description is associated with the plant(s) that are dominant, co-dominant, or characteristically present.

For discussion of this natural community, see the FEIR, the FEIR Addendum, and the NES Addendum (Caltrans 2016d). These and other related documents are available on the project website at https://dot.ca.gov/caltrans-near-me/district-1/d1-projects/d1-richardson-grove-improvement-project.

The proposed project would make only slight alterations to the existing alignment of US 101. The FEIR determined the project would have a less than significant impact on this natural community. The FEIR Addendum does not change this conclusion and documents a reduction in the project footprint since 2010, which is a reduction in the extent of impacts. As stated in the FEIR Addendum, project analysis indicates that, prior to applying any special protective measures, no significant impacts would occur to the Redwood forest Alliance or individual old-growth redwood trees—the dominant species of the alliance—as a result of the project. Therefore, the FEIR Addendum did not change the determination made in the FEIR. Furthermore, measures have been incorporated into the project to reduce the already less than significant impacts to the Redwood forest Alliance and its components.

Comment 3: Caltrans relies on studies from the early 1960s which do not reflect the last 55 years of redwood science or canopy dieback at the Avenue of the Giants.

The Project's 2015 Tree Report is based on a site review to evaluate potential impacts on every old-growth redwood tree affected by the project, the arborist's extensive experience of more than three decades of evaluating redwoods as a practicing and consulting arborist, as well as review of the scientific literature on coast redwood biology, ecology, and resilience. The literature reviewed includes multiple studies, academic papers, technical reports, journal articles, historical documents, etc. The dates of these documents range from 1908 to 2015. Most of the works cited post-date the 1960s. Additionally, the 2015 Tree Report documents the results of research concluded the same year as its publication.

In response to comments, the consulting arborist confirmed the health condition of the trees, as reported in the 2015 Tree Report, in a recent visit to Richardson Grove in May 2022, using walk-throughs and binoculars to re-examine tree crowns. For preparation of the 2015 Tree

Report, the arborist did not observe any decline in the vigorous condition of the old-growth trees since the evaluation.

The Avenue of Giants is located more than 10 miles away from Richardson Grove. The proposed project is a minor realignment of an existing highway. As documented in the FEIR and confirmed in the FEIR Addendum, the project is anticipated to have a less than significant impact on old-growth redwood trees.

Comment 4: The Santa Cruz Mountains firestorm in 2020 shows that redwoods are not resistant to fire damage.

Under CEQA, the Department must analyze the potential impacts of *the project*. The 2010 FEIR concluded that the project would not increase exposure to wildfires. The FEIR Addendum does not change this conclusion. Scientific literature supports that coast redwoods are highly resistant to fire damage. Their fibrous insulating bark thickens with age and does not burn easily. The large amount of water in their wood and low-flammability pitch resist fire (Johnston 1994). While this is true, no forest is fully fireproof (Fitzgerald and Bennett 2013). The 2015 Tree Report states:

> The basal bark of a coast redwood trunk is thick and fire resistant, but periodic fires can decrease fire resistance sufficiently to kill the cambium layer (living tissue beneath the bark) . . . Redwoods can live for many centuries with substantial fire scars, as evidenced by charring and fire cavities on old-growth trees throughout Richardson Grove.

Fire resistance is one characteristic of coastal redwood resiliency (2015 Tree Report [Yniguez 2015]). As discussed in the 2015 Tree Report, many studies have supported this conclusion. The reference to this recent event which took place more than 250 miles away in a different setting (latitude, rainfall, etc.) does not change the CEQA analysis and conclusion regarding the project's impacts on redwood trees.

Comment 5: A timber harvest plan proposed to the west of Richardson Grove State Park shifts the setting of this Project and therefore Project scoping should be reopened.

This comment relates to project setting and scoping; topics that are not part of the FEIR Addendum and are outside the scope of the recirculation. As stated in the FEIR, under CEQA, scoping examines a proposed project early in the EIR environmental analysis/review process. Scoping is intended to identify the range of issues pertinent to the proposed project and feasible alternatives or mitigation measures to avoid potentially significant

environmental effects. The scoping process for the Richardson Grove Operational Improvement Project was completed in 2008. See the FEIR for discussion of this process.

Richard Campbell

Comment 1: Impacts to redwood roots or changes to hydrology have the potential for crown dieback or tree mortality.

See the 2015 Tree Report and General Response 5. As discussed, the project would not substantially change the existing drainage patterns or the availability of water to the old-growth redwoods. Impacts to redwood tree roots are discussed in detail in the 2015 Tree Report and the FEIR Addendum. The FEIR concludes no significant impacts to redwoods; the FEIR Addendum does not change this conclusion. In addition, as discussed in the FEIR Addendum, the project would include minimization measures, such as the use of a pneumatic excavator or hand tools to excavate within the structural root radius, and the use of Cement Treated Permeable Base (CTPB). With minimization measures incorporated, the already less than significant impacts to roots would be further minimized and the project would not affect the availability of water to roots of old-growth redwood trees.

Comment 2: Impacts to the root structure of redwoods or increased edge effects associated with roads are theorized to increase windthrow.

No old-growth redwood trees would be removed for this project. Analyses in the 2015 Tree Report concluded the limited root disturbance would be inconsequential to the stability and continued health of the old-growth redwoods trees in Richardson Grove (Yniguez 2015).

Edge effects are defined as, "Changes in population sizes, species richness, or other aspects of the ecology of individuals, populations, or communities at the interface between two habitat types" (Levin et al., 2009). In the context of forests, edge effects may include decreased moisture and increased wind (Levin et al., 2009). This project is a minor modification of an existing road, which only removes thirty-eight (38) smaller understory trees of various species (predominantly Douglas-fir and tanoak) over the 1.1 mile long project. The project would not increase or create new "edge effects." See also Response to Dangerfield Comment 6.

Comment 3: The Dangerfield (2020) master's thesis and Dangerfield (2021) article are new studies that should be considered.

See General Response 4, as well as responses to Dangerfield and EPIC comment letters.

Comment 4: The International Society of Arboriculture defines the "critical root zone" (CRZ) as a 1-foot radius from the base of the tree's trunk for each 1 inch of the tree's diameter at 4.5 feet above grade and recommends avoidance of construction activities within that zone. The 2021 Dangerfield study supports use of this methodology. Use of the CRZ method would expand the number of old-growth redwood trees subject to analysis.

The commenter's definition of CRZ is not supported by the International Society of Arboriculture (ISA). According to the most recent edition of the ISA's Best Management Practices (Matheny et al., 2022), a critical root zone (CRZ) is the "area of soil around a tree where the minimum amount of roots critical to the structural stability or health of the tree are located. *There are no universally accepted methods to calculate the CRZ* " (Matheny et al., 2022). [Emphasis added.] An acceptable methodology for determining potential impacts of root disturbance to trees would be based on an evaluation of such factors as tree species, age, condition, root configuration, soil characteristics, site conditions, and the severity of the root disruption (Fite and Smiley, 2016). These concepts have been confirmed by the ISA in 2022.

The CRZ is one method of analyzing impacts to trees. As acknowledged by the commenter, there are various methodologies to conduct such an analysis. The Department's analysis, as documented in the 2015 Tree Report, examined the areas around all 109 old-growth redwood trees where some part of their root health zone (RHZ) fell within areas of proposed project activity. The RHZ is a circular area with the tree trunk at the center and a radius equal to five times the tree trunk diameter measured 4.5 feet above ground level. Of the 109 trees analyzed in the 2015 Tree Report, 78 trees would be subject to project activity within their structural root zone (SRZ) (Yniguez 2015). The SRZ is a circular area with the tree trunk at the center and a radius equal to three times the tree trunk diameter measured 4.5 feet above ground level (California State Parks 2011b) (Figure 12).

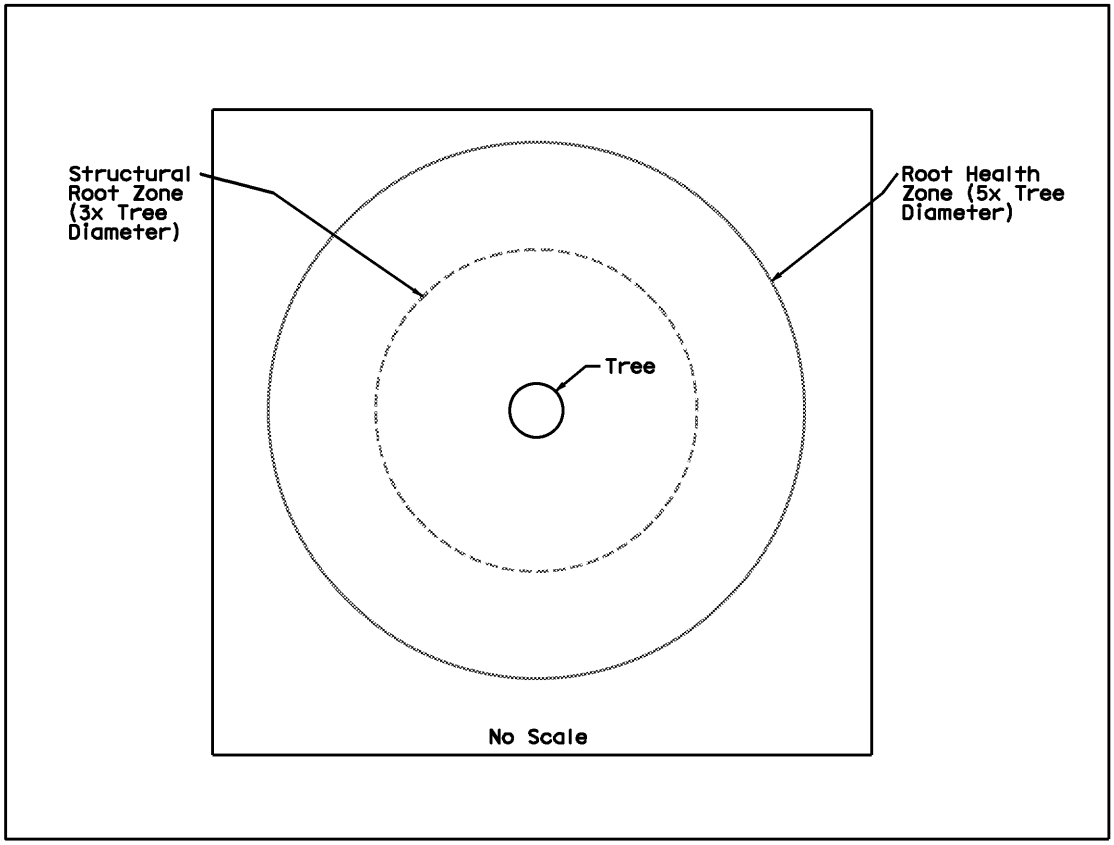

Figure 12. Tree Root Zones (from the FEIR Addendum)

According to the ISA, the CRZ is subjective and there is no accepted calculation to define it biologically (Fite and Smiley, 2016), rendering it impossible to determine whether more old-growth redwood trees would have been subject to analysis using that method.

As described in the 2015 Tree Report, the use of the RHZ and SRZ in the Department's tree impact analysis was based on the professional opinion of the experienced consulting arborist and supported by scientific literature cited therein (Yniguez 2015). The Department's CEQA determination in the FEIR was that the project would cause less than significant impacts to old-growth redwood trees and the FEIR Addendum does not change that conclusion. State Parks reviewed the FEIR Addendum and had no comments on the Department's CEQA analysis and concurred that all possible planning to minimize long term harm to Park resources has been included.

Comment 5: In Russell et al. (2000), edge effects have been observed at distances greater than 200 meters or greater than 650 feet; crown dieback had a depth of influence at 120 meters.

See response to Comment 2, from the same commenter, above, and Response to Dangerfield Comment 6. The purpose of the Russell study was to determine the influence and effects of timber harvesting on forest structure and species distribution within adjacent coast redwood forests (Russell et al., 2000). The Richardson Grove Operational Improvement Project is not a "timber harvest" and includes only the removal of 38 smaller understory trees of various species (predominantly Douglas-fir and tanoak), including 21 within the 1.1-mile length of highway through the Park. As no old-growth redwoods would be removed, the canopy would not change and no new "edge effects" would be created. Therefore, no additional edge effects or crown dieback are anticipated.

Comment 6: The State Parks Handbook sets forth a tree-specific cumulative impact analysis; Caltrans performed no such analysis.

The State Parks Handbook describes a formula for calculating impacts to individual trees called the Cumulative Impacts Score, which is different and distinct from cumulative impacts analysis under CEQA Guidelines, Section 15130, which is a specific type of analysis discussed in the Responses to BACH Comments 2 and 3. The FEIR conducted a cumulative impact analysis of the project under CEQA, which included analysis of cumulative impacts on redwoods, and concluded the project would have no significant cumulative impacts. The FEIR Addendum does not change this conclusion.

Use of the State Parks formula (Cumulative Impacts = Age Value + Vigor Value - Root Loss - Foliage Loss) is a general guideline that does not measure cumulative impacts under CEQA and is based on multiple subjective inputs.

The 2015 Tree Report (Yniguez 2015) was based on:

- the certified arborist's professional experience of more than three decades evaluating redwoods
- extensive review of the scientific literature on coast redwoods
- review of FEIR and other project documents
- multi-year examination of old-growth redwoods at Richardson Grove State Park, including a helicopter overflight to evaluate tree crowns

- consultation with Department engineers and biologists, and

- a site review with Department staff including the project engineer and biologist, to evaluate potential impacts on every old-growth redwood tree affected by the project, using project layouts and detailed descriptions of work.

Every old-growth redwood tree occurring a distance of five times its diameter (RHZ) or less from proposed ground disturbance was carefully evaluated.

State Parks has reviewed the FEIR Addendum and had no comments on the Department's CEQA analysis that project impacts on old-growth redwoods would be less than significant. They concurred that all possible planning to minimize long term harm to Park resources has been included.

Comment 7: State Parks' guidelines state that there should be no construction activities in the structural root zone of a protected tree, or intrusion beneath the dripline for a protected tree with pre-existing structural root loss.

See Response to BACH Comment 2 and General Response 6. In addition, the State Parks Handbook is not a mandate or prohibition but contains general guidelines that may be applied across a wide range of tree species and other variables. The Handbook's recommendations regarding "minimum distances" for root pruning are also suggested guidelines and approximations that may be applied across a wide range of tree species, sites, and projects. Arboricultural literature advises that the professional arboricultural consultant exercise professional judgment and make recommendations after considering the characteristics of the tree, the site, and the project. Impacts should be evaluated in the context of the specific characteristics of the trees and the site. For example, the Handbook states that a tree's ability to recover and grow new specialized tissue to compensate for the lost tissue depends on the tree's age and vigor (State Parks 2011).

The proposed project construction activities in the SRZ would not significantly impact the old-growth redwood trees, as supported by the FEIR Addendum and the 2015 Tree Report (Yniguez 2015). As discussed in these documents, the characteristics of tree species, age, health, and soil characteristics weigh in favor of the old-growth redwood trees in Richardson Grove. These trees have wide-spreading roots in alluvial soil that would not be substantially disrupted by minor project work. Coast redwoods are described in arboricultural literature as having the highest category of tolerance in response to development impacts (Fite and Smiley, 2016; Matheny and Clark, 1998).

With few exceptions, such as culvert replacement north of Richardson Grove State Park, the project proposes excavating no deeper than 12 inches below the roadway at nearly every location. A pneumatic excavator or hand tools would be used for new road sections in the structural root zone; roots larger than two inches in diameter would not be cut; and if roots smaller than two inches must be cut, they would be cut cleanly with a sharp instrument.

The FEIR concluded the project would not substantially affect old-growth redwood trees. The FEIR Addendum did not change that conclusion, even if conventional construction methods were used without any special protection measures. Incorporation of the proposed additional protection measures would further reduce these minimal impacts. Design features that minimize impacts to the old-growth trees in Richardson Grove include reduced shoulder widths and steepened embankment slopes which allow for a narrower project footprint, and the use of Cement Treated Permeable Base (CTPB) for new pavement in the roadway, which allows approximately 6 inches less in application depth than other common road aggregates. CTPB is also permeable and requires only consolidation (a lesser degree of compaction) adjacent to roots within the structural root zone.

Lastly, the project excavations would take place mostly in existing roadbed. A pavement core sample taken in Richardson Grove south of the State Parks Visitor Center in 2010 showed the roadway at that location to be approximately 30 inches deep. It is anticipated much of the project excavation would not reach the original ground below the roadbed.

State Parks has reviewed the FEIR Addendum, had no comments on the Department's CEQA analysis concluding project impacts would be less than significant, and concurred that all possible planning to minimize long term harm to Park resources has been included.

Comment 8: Yniguez documents that Trees #20, #89, and #90 have experienced previous substantial detrimental impacts and will see construction impacts in their structural root zones but concludes that there would be no decline in foliage density or tree health as a result of the project.

See Response to BACH Comment 2. In addition, the two-lane US 101 segment through Richardson Grove was constructed about a century ago. Three of the old-growth trees directly adjacent to the highway (#20, #89, and #90) apparently formed "spike tops" when some of their very large buttress roots were abruptly severed during highway construction in the 1950s-60s. These three trees were identified in the 2015 Tree Report (Yniguez 2015) and

photographs of their severed buttress root scars, some more than one foot in diameter, were appended therein.

There is no visible evidence of crown decline below the spike tops in trees #20, #89, and #90. They have adapted to and recovered from the abrupt severance of major buttress roots many decades ago. For the purposes of CEQA analysis, the baseline condition of these trees is one of good health:

> Although spikes (dried-out treetops) still extend above the crowns of these three trees as evidence of severe moisture stress from decades ago, their canopies appear to be vigorous and healthy today (Yniguez 2015).

The crown health of old-growth redwoods, including trees #20, #89, and #90, was confirmed by the arborist as recently as May 2022 as having no visible evidence of crown decline.

The root disturbance that would be experienced by each of these trees is minimal, as can be seen in the Individual Tree Details in the 2015 Tree Report (Yniguez 2015), and the impacts were rated from very slight to slight. There is no expectation that the minor disturbances due to the project would cause any decline in visual appearance or detriment to the health or stability to these three trees.

Comment 9: The FEIR Addendum does not consider synergistic impacts from climate change, which may benefit old-growth redwoods by adding CO_2 to the atmosphere and/or may reduce summer fog, contribute to severe droughts, and affect the water table in Richardson Grove.

See General Response 1, and Response to BACH Comment 3.

Comment 10: The 2015 Tree Report cites to information regarding redwoods' resiliency to floods, pruning, and low-light conditions, which does not apply to the Project.

The inclusion of such information about coast redwood resiliency is appropriate in this type of report. It is common practice to provide general information regarding the resources being analyzed and, in this case, serves to inform the reader that coast redwoods are, in fact, an extraordinarily resilient tree species. This information illustrates redwoods' ability to regenerate roots under a wide variety of conditions and is therefore relevant and can be applied to the proposed project.

These statements are also consistent with statements in the Dangerfield studies. For example, the 2021 Dangerfield study (Dangerfield et al., 2021) noted that coast redwoods have "relatively high hydraulic safety margins from cavitation during periods of severe drought and adaptive leaf morphology to combat the hydrostatic constraints that gravity places on water conductance in the upper portions of their crowns" (Ambrose et al., 2009 and 2010).

The Dangerfield study also refers to traits that give mature redwood trees "both resistance and resilience" to "many different types of natural disturbances such as fire and flood"; "thick bark that allows them to survive moderately intense fires"; their "ability to resprout via basal burls and epicormic buds"; their ability to "respond to sediment deposition after flooding by extending their existing roots and forming new adventitious roots into new mineral deposits"; and their "extremely decay-resistant heartwood that limits damage from wood decay fungi after injuries from disturbances."

Comment 11: The 2015 Tree Report does not consider hydrology impacts in the tree-specific analysis, such as potential impacts to Tree #106. The Dangerfield studies hypothesize that tree dieback as a result of highway construction was due, in part, to changes in hydrology.

See General Response 4 and General Response 5, which address the Dangerfield studies and hydrology comments, respectively.

Regarding Tree #106, the proposed work is described in the FEIR. ". . . a short section of gabion wall (steel mesh box filled with rocks) would be constructed to protect the large trees located in each of these areas. *Excavation for the gabion wall would not be deeper than the base of the tree so the root structure would not be substantially impacted*." [Emphasis added.] Tree #106 is growing slightly downslope of the roadway, as shown by the topographic lines on the diagram in Appendix D of the 2015 Tree Report (Yniguez 2015). For Tree #106, the report concluded, "Effect of root zone disturbance may be a short-term visible reduction in foliage density that is still well within the adaptive capabilities of the tree."

In addition, an aggregate mix called Cement-Treated Permeable Base would be used as a base for new pavement in the roadway. This material was selected because it requires approximately six fewer inches in application depth than other common road aggregates, is permeable, requires less compaction adjacent to roots within the structural root zone and allows greater oxygen diffusion and water percolation than a conventional subbase material. (Yniguez 2015). The soil within the SRZ of old-growth redwood trees would be removed

using hand tools such as picks and shovels, using hand-held pneumatic devices, or a combination of the two, to protect old-growth redwood roots two inches or larger from being cut during excavation (Yniguez 2015).

Project analyses concluded that the limited root disturbance would be inconsequential to the stability and continued health of the old-growth redwoods in Richardson Grove (Yniguez 2015).

InterTribal Sinkyone Wilderness Council

Comment 1: Richardson Grove holds great cultural and spiritual meaning for Sinkyone people and the Tribes of this region.

The Department recognizes and is sensitive to the relationship of the Sinkyone people to this area. Accordingly, throughout the 15-year development of this project, the Department has consulted with Tribes and the InterTribal Sinkyone Wilderness Council (Council) to ensure the concerns and comments of each are addressed. This has included numerous in-person meetings and communications by phone, e-mail, and letter. The Department has continually sought to include and incorporate ideas from stakeholders, including the Council, into the project.

In addition to meetings, discussion of project details, and carefully considered responses to the Council's comments, the Department funded an ethnographic study in 2010 to document traditional tribal uses of the area to address the Council's concern that these uses could possibly be affected. This study was unique in that it provided funding to hire a Council-identified individual to collect and provide documentation of these traditional uses. Based on the results of this study, the proposed project would not affect the continued traditional tribal use of the area. Importantly, no old-growth redwood trees in the Park would be cut. Additionally, many protective measures have been included in this project to help preserve the legacy of the Grove. These measures were developed in conjunction with State Parks, biologists, cultural specialists, a landscape architect, professional arborists, and other subject matter experts for the purpose of preserving this special place for the future. Also, at the Council's request, specific cultural measures have been included in the project plans.

Comment 2: The rating system used in the 2015 Tree Report has not been sufficiently tested.

As described in the 2015 Tree Report (Yniguez 2015), the metric used by the arborist to assess the effects of the project on the health of each tree was twofold. First, the extent of

disturbance proposed for each tree was determined by consulting engineering diagrams with a project engineer, and considering methods of construction, including protective measures and the location of the activities to be undertaken. Second, a scale was used to predict how the level of root zone disturbance would affect the tree's ability to absorb and transport moisture throughout its system, as evidenced by a visible change in the tree. The scale ranges from a rating of "no effect," (rating 0), to "effect severe enough to threaten survival of the tree" (rating 6). The scale was developed based on professional experience and training of the arborist, the condition of the tree, the history of the site, and the body of literature on the biology and physiology of coast redwoods.

Measurements of tree crowns have been used extensively as indicators of the health and vigor of forest trees. When natural or anthropogenic stresses impact a forest, the first signs of deterioration are often observed in the tree crowns (Zarnoch et al., 2004). Visual assessments of fluctuations in tree leaf density as an indicator of tree health is also a long-established methodology in horticulture, arboriculture, and forestry. The disciplines of Plant Health Care, tree health and risk analysis, and forest health assessments routinely include observations of changing leaf condition, location, and density to ascertain the health of plant and tree crowns.

Unlike roots, leaves are relatively easy to observe. A decrease in needle (leaf) density in the crowns of conifers is a common metric in arboriculture and forestry for evaluating whether changing biotic or abiotic conditions may have created temporary or extended changes in moisture availability to foliage in the crown.

The rating system used in the 2015 Tree Report utilizes industry standard assessment methods as described above and is consistent with arboricultural practices. Furthermore, State Parks has reviewed the FEIR Addendum, had no comments on the Department's CEQA analysis that project impacts would be less than significant, and concurred that all possible planning to minimize long term harm to Park resources has been included. For discussion of the rating system, see the 2015 Tree Report (Yniguez 2015), available on the project website https://dot.ca.gov/caltrans-near-me/district-1/d1-projects/d1-richardson-grove-improvement-project. See also See Response to Richard Campbell Comment 6.

Comment 3: Cutting old-growth roots will weaken the support structure of the Grove and impact the symbiotic relationship among redwood root systems, other tree species, and fungi.

The proposed project consists of a minor realignment of the existing roadway. The FEIR, 2015 Tree Report (Yniguez 2015), and FEIR Addendum reflect a comprehensive tree-by-tree

analysis of potential project impacts to redwoods, including their roots, which determined there would be no significant impacts to redwood trees.

In addition, the FEIR assessed impacts to biological resources in the project area, including the Redwood Alliance natural community, which determined the project would have no significant impacts. The FEIR Addendum does not change this conclusion and it documents a reduction in project footprint since 2010, which further reduces project impacts.

State Parks reviewed the FEIR Addendum and had no comments on the Department's CEQA analysis and concurred that all possible planning to minimize long term harm to resources in the Park has been included.

Project analyses concluded the limited root disturbance would be inconsequential to the stability and continued health of the old-growth redwoods in Richardson Grove (2015 Tree Report [Yniguez 2015]). See also Response to Bruce Campbell Comment 2.

Comment 4: Request for further tribal involvement by InterTribal Sinkyone Wilderness Council.

The InterTribal Sinkyone Wilderness Council has been involved in the proposed project since the beginning as described above in the Response to the Council's Comment 1. The Department has made it a priority to keep the Council informed and involved throughout the project planning process. The Department values the Council's input and has held numerous meetings to discuss project details and has provided responses to all the Council's comments. The Department will continue to be open to input from the Council and member tribes.

Save the Redwoods League

Comment 1: Climate change will likely result in greater drought and fire stress in the future, and additional compounding stressors could lead to additional tree decline and mortality.

The FEIR, 2015 Tree Report (Yniguez 2015), NES Addendum (Caltrans 2016d), and the FEIR Addendum, considered impacts to the forest as a whole. The Department's CEQA analysis concluded the proposed minor realignment of the existing highway would not alter the characteristics of the forest and total impacts to the grove would be less than significant. The 2015 Tree Report examined the old-growth redwoods in the project area and concluded they were in vigorous health (Yniguez 2015). The conclusions were confirmed in a recent

visit to Richardson Grove by the consulting arborist in May 2022, using walk-throughs and binoculars to re-examine tree crowns. See also General Response 1.

Comment 2: Caltrans should consider the Dangerfield (2021) article, about growth declines due to construction of Highway 101 through Humboldt Redwoods State Park, in relation to the original highway construction at Richardson Grove and the proposed Project.

See General Response 4, Dangerfield Comment 8, and EPIC Comment 10. The Dangerfield studies do not consider this project's impacts on Richardson Grove and are based on inaccurate assumptions and comparison of impacts from a much larger project of drastically different and greater scope and magnitude. Additionally, the old-growth redwood trees along US 101 in Richardson Grove have had about a century to recover and adapt after the original roadway construction. The 2015 Tree Report found the old-growth redwood trees in the project area to be in vigorous good health (Yniguez 2015). This determination was confirmed in a recent visit to Richardson Grove by the consulting arborist in May 2022. No decline in the vigorous condition of the old-growth trees was observed.

Ely Reighter, Leggett Fire and Rescue

Comment 1: The Leggett Valley Fire and Rescue volunteer fire department had not been consulted in Project planning.

The project is located within the State Responsibility Area (California Department of Forestry and Fire Protection [Calfire]) and the Goodwill Response Area of the Garberville Fire Protection District. The Piercy Fire Protection District abuts the project area to the south. The Department typically does not outreach to agencies outside of the project area but does understand and value Leggett Valley Fire and Rescue's valuable emergency response support under mutual aid agreements.

Planning of the Richardson Grove Operational Improvement Project began more than 15 years ago. Public outreach has been extensive throughout the process and local groups, including the Piercy Fire Protection District, have participated and commented, as did CAL FIRE. There have been four public meetings and six public comment periods, in addition to public notices, news articles, media interviews and stories, as well as social media posts and press releases.

The Department appreciates the vital public service provided by the Leggett Valley Fire and Rescue and welcomes their relevant input as the project moves forward.

Comment 2: The Leggett and Piercy fire departments may not have specialized equipment for emergencies involving longer trucks.

STAA trucks are currently allowed on US 101 south of Leggett and north of Richardson Grove State Park. Therefore, there are already STAA trucks traveling within the service areas of the Leggett and Piercy fire departments. STAA trucks do not vary greatly from the CA legal trucks that currently travel US 101 through Richardson Grove. STAA trucks have the same weight limit as CA legal trucks, though they can be slightly longer. The equipment in current use for these areas should suffice for use in Richardson Grove after the restriction of STAA vehicles is lifted.

Cody Dangerfield

Comment 1: Dangerfield analyzed tree-ring widths and stable isotopes to investigate the effects of the Highway 101 expansion through Humboldt Redwoods State Park, and found the construction disproportionately impacted the growth of trees within 30 meters of the highway; these effects were particularly elevated in trees that currently exhibit crown dieback.

See General Response 4.

Comment 2: All trees in the Dangerfield studies that experienced a major growth suppression, defined as a 50% decline in growth over 25 years, were typically 6 to 12 times DBH from Highway 101, which indicates that the 5 times DBH root health zone is insufficient.

See General Response 4, Richard Campbell Comment 4, and EPIC Comment 5.

Comment 3: Declines in growth rates were also observed in trees with healthy crowns and that were greater than 30 meters from the highway, though these declines were not as severe as the ones observed in trees with crown dieback.

See General Response 4.

Comment 4: It is likely that the trees near Richardson Grove without deteriorated crowns suffered similar declines in growth following the highway's original construction.

As discussed in the 2015 Tree Report, the trees alongside the highway within Richardson Grove State Park that experienced crown dieback had their large buttress/structural roots cut decades ago (Yniguez 2015). Despite this injury, the crowns have regenerated below the spike top and are vigorous today, as are all the old-growth redwood trees in the project area within the Park. Other than the trees whose buttress roots were cut, highway construction in this section of US 101 generally does not appear to have substantially impacted the adjacent trees.

Comment 5: Dangerfield mapped crown health for individual redwoods within Humboldt Redwoods State Park and found crown dieback rates were especially high along Highway 101 and the Avenue of the Giants, with elevated rates of crown dieback greater than 100 meters from the forest edge.

See General Response 4.

Comment 6: Dangerfield observed declines in growth and increased rates of dieback at distances beyond the extents of individual tree root systems, likely driven by changes in hydrology and edge effects. Artificial edges like roads can increase sunlight, wind exposure, canopy temperatures, soil compaction, and change local hydrology.

See General Response 4 and General Response 5. The proposed project includes the removal of only 38 smaller trees, 21 of which are within Richardson Grove State Park. No old-growth redwoods trees would be removed. Tree removal would not contribute to fragmentation of the forest, as it would involve only smaller understory trees, occur adjacent to the existing highway, and would be spread over a linear distance more than a mile. The mature redwood canopy would remain intact (Caltrans 2016d). For these reasons, no new edge effects would be created.

Comment 7: Changes in hydrology due to soil compaction and culvert installation can also impact the health and productivity of nearby redwoods.

See General Response 5 on the topic of hydrology. In addition, an aggregate mix called Cement-Treated Permeable Base would be used as a base for new pavement in the roadway. This material was selected because it requires approximately six fewer inches in application depth than other common road base aggregates, is permeable, requires less compaction

adjacent to roots within the structural root zone, and allows greater oxygen diffusion and water percolation than a conventional subbase material (Yniguez 2015).

Project analyses concluded the minor drainage work associated with the project would have negligible impacts to site hydrology and would be inconsequential to the stability and continued health of the old-growth redwoods in Richardson Grove (Yniguez 2015).

Comment 8: Although the Project will not create a new road, effects associated with road construction still apply in areas of new road and should be considered. It is Dangerfield's opinion that the Project would at least partially affect the health of bordering redwoods and impact their ability to conduct physiological activities.

See General Response 4. Additionally, the potential effects associated with road construction and areas where pavement would be added were considered in the FEIR, the 2015 Tree Report (Yniguez 2015), and the FEIR Addendum. After a thorough evaluation of potential impacts, each of these documents concluded that disturbances would be confined to a small percentage of the root zones and would be well within the adaptive capabilities of the trees; finding these impacts would be less than significant. In addition, measures have been incorporated into the project to reduce these less than significant impacts even further, as described in the FEIR.

Comment 9: Dangerfield believes it is unlikely that the Project will lead to immediate structural instability and mortality of bordering trees, but believes there may be extended growth declines, elevated water stress, and even potential crown dieback which in his opinion would equate to a significant impact that would be compounded by climate change.

See General Responses 1 and 4 and responses to Dangerfield Comments 6 and 8.

EPIC

Comment 1: Caltrans' definition of significance of impacts to old-growth redwoods changed between the FEIR, which was concerned with whether trees would be "substantially adversely affected," to the FEIR Addendum, which analyzed whether the Project would "threaten the soundness or stability of any of the old-growth redwood trees in the project area."

Following the appellate court decision in *Lotus v. Department* Transportation (2014) 223 Cal.App.4th 645 (*Lotus*), the 2015 Tree Report (Yniguez 2015) and the FEIR Addendum replace the tree impacts analysis from the FEIR. The FEIR Addendum clarifies with more

specificity the FEIR's definition of significance but does not set a higher threshold for significance.

This comment also cites a Department informational brochure and a fact sheet, which do not report the Department's CEQA determinations. The Department's CEQA determinations are found in CEQA documents. The FEIR and FEIR Addendum both found a less than significant impact to the old-growth redwood trees.

Comment 2: Caltrans does not consider the setting of Richardson Grove State Park and does not look at the grand total of impacts in the grove.

This comment relates to project setting, which was not part of the FEIR Addendum and is outside the scope of the recirculation. Nonetheless, the setting of Richardson Grove is discussed extensively in the Affected Environment section for every resource analyzed in the EIR/EA, as well as in project technical studies, such as the Natural Environment Study and Visual Impacts Assessment. The Affected Environment section provides the baseline conditions and is considered when preparing the Environmental Consequences analysis.

In addition to analyzing the impacts to individual trees, the FEIR, 2015 Tree Report (Yniguez 2015), NES Addendum (Caltrans 2016d), and the FEIR Addendum considered impacts to the forest as a whole. The Department's CEQA analysis concluded that the proposed minor realignment of the existing highway would not alter the characteristics of the forest and that total impacts to the grove would be less than significant.

State Parks, the agency with jurisdiction over the Park, reviewed the FEIR Addendum and had no comments on the Department's CEQA analysis and concurred that all possible planning to minimize long term harm to Park resources has been included.

See also Response to Bruce Campbell Comment 2.

Comment 3: Past highway construction and future conditions like climate change form the Project baseline and are a cumulative impact.

This comment relates to project baseline, which was not part of the FEIR Addendum and is outside the scope of the recirculation. See General Response 1 and Responses to BACH Comments 2 and 3. As discussed, the baseline for CEQA analysis is the existing conditions, as is proper under CEQA.

Comment 4: Temporary "canopy dieback" in three trees is a significant impairment to those trees.

The temporary loss of a very small percentage of needles, given that the vast majority of healthy younger needles continue to grow on the same healthy branches, is not considered "canopy dieback", or "an impairment and threat to these old-growth redwood trees." A short-term visible reduction in needle (leaf) density is not equivalent to "canopy dieback," and is well within the adaptive capabilities of these trees (Yniguez 2015).

New needles are continually forming and older needles are continually abscising (letting go), year-round throughout the life of a coast redwood. Continual needle turnover in coast redwoods, especially of older needles, is a normal and healthy response to seasonal, climatic, and localized variations in water availability. If there is a minor and temporary increase in needle turnover as a result of a minor and temporary decrease in localized water availability, this is a normal fluctuation in the life of a coast redwood. Fluctuations in needle density occur even when coast redwoods are growing under natural conditions away from human activities (Yniguez 2015).

The life span of a coast redwood needle varies, but ranges from about 2 to 5 years, with an average life span of perhaps 3–4 years (Barbour 2001; Johnston 1994; Snyder 1992). Ongoing seasonal "flushes" of new chartreuse-colored needles will be followed several years later by the browning and release of the same needles as they reach the end of their useful life (senescence). Thus, the "evergreen" appearance of a coast redwood crown persists through every season despite continuous changes in the number, location, and density of needles (Yniguez 2015).

A short-term visible reduction in foliage density in three out of 109 trees is not a significant impact under CEQA in the broader setting of Richardson Grove. Fluctuations in needle density and growth-ring width that are within normal, seasonal changes would not rise to the level of a significant impact under CEQA. The proposed project would not threaten the health or stability of any old-growth redwood. State Parks has reviewed the FEIR Addendum, had no comments on the Department's CEQA analysis and conclusion that project impacts would be less than significant, and concurred that all possible planning to minimize long term harm to Park resources has been included. As stated in the FEIR and confirmed by the 2015 Tree Report (Yniguez 2015) and FEIR Addendum, the proposed project would have a less than significant impact on old-growth redwood trees within the project area.

Comment 5: The 2015 Tree Report cites Smiley et al. (2002) and the State Parks Handbook as a basis for the root health zone analysis area, but Smiley discourages any root cutting within 5x DBH of a tree and was developed for different forest types. Analysis areas described by Richard Campbell and Dangerfield would be more applicable.

Proposed project construction activities in the Root Health Zone (RHZ) (5 times the DBH of the tree) would not significantly impact old-growth redwood trees, as supported by the FEIR Addendum and the 2015 Tree Report (Yniguez 2015). Minimum distances for root pruning are approximations and suggested guidelines that may be applied across a wide range of tree species, sites, and environmental conditions. The arboricultural professional is encouraged to take these factors into account and to proceed in accordance with the characteristics of the tree and the site (California State Parks, 2011; Fite and Smiley, 2016). Smiley also states that a tree's ability to tolerate construction impacts varies greatly by species and coast redwoods are in the highest category of tolerance in response to development impacts (Fite and Smiley, 2016).

Arboricultural literature describes specified distances from trees as general guidelines. The level of root disturbance that is acceptable for any tree is related to size, species, vigor, and the conditions around the tree. Suggestions for minimum distances for linear root severance have been described in many publications, including publications of the International Society of Arboriculture (Costello et al., 2017; Fite and Smiley, 2016), and *they vary*. [Emphasis added.]

The State Parks Handbook was also considered during the Department's project impacts analysis. State Parks has reviewed the FEIR Addendum, had no comments on the Department's CEQA analysis that project impacts would be less than significant, and concurred that all possible planning to minimize long term harm to Park resources has been included.

See also Responses to Richard Campbell Comments 4 and 5 and Dangerfield Comment 5.

Comment 6: Caltrans has invented its own methodology for considering impacts to old-growth redwoods, which does not reflect more objective standards like that of the State Parks Handbook, the PNW ISA methodology, or those of Dr. Smiley.

See Responses to EPIC Comment 12 and Richard Campbell Comments 4, 6, and 7. As explained in the 2015 Tree Report, the scale used by the Department to assess the effect of the project on the health of each tree was developed based on professional experience and

training of the arborist, the condition of the tree, the history of the site, proposed construction activities at each tree, and the body of scientific literature on the biology and physiology of coast redwood. The scale utilizes factors recognized in the literature as relevant to assessing tree health (Yniguez 2015).

For example, measurements of tree crowns have been used extensively as indicators of the health and vigor of forest trees. When natural or anthropogenic (human-caused) stresses impact a forest, the first signs of deterioration are often observed in the tree crowns (Zarnoch et al., 2004). Visual assessments of fluctuations in tree leaf (needle) density as an indicator of tree health is a long-established methodology in horticulture, arboriculture, and forestry. The disciplines of Plant Health Care, tree health and risk analysis, and forest health assessments also routinely include observations of changing leaf condition, location, and density to ascertain the health of plant and tree crowns.

Comment 7: The project record, including the 2010 Environmental Assessment (EA), 2013 Supplement, and 2017 EA/FONSI, which comprise a Revised EA under NEPA, is confusing. Caltrans did not strike Table 10 from the 2017 EA/FONSI.

The above comment references the National Environmental Policy Act (NEPA) documents for the project. This document, Richardson Grove Operational Improvement Project Responses to Comments on the Addendum to the Final Environmental Impact Report, contains responses to comments received during circulation of the FEIR Addendum, prepared under CEQA. The CEQA project documents include the 2010 FEIR and 2017 FEIR Addendum.

The above assertion regarding Table 10 was made in the federal litigation, where the federal courts upheld the environmental document as fully compliant with NEPA. Table 10 was a table in the 2010 FEIR/EA (a joint CEQA/NEPA document) which showed now-superseded data regarding cut and fill depths at redwood trees 30 inches DBH and larger within Richardson Grove State Park.

As explained when circulated, the Addendum summarizes and documents the revised redwood tree impact analysis as contained the 2015 Tree Report. The more comprehensive tree-by-tree analysis in the 2015 Tree Report supersedes the prior impact analysis, including Table 10, as noted by the court in *Bair v. California State Department of Transportation* (N.D. Cal. 2019) 385 F.Supp.3d 878, 885, and is consistent with the Court of Appeal's directive in *Lotus v. Department of Transportation* and with the reduced footprint of the project as set forth in the FEIR Addendum. It supports the Department's CEQA determination of no significant impacts to old-growth redwood trees.

Comment 8: The 2015 Tree Report does not provide an adequate description of baseline tree conditions and is based on observations made over five years ago, which does not account for a recent megadrought.

This comment relates to project baseline, which was not part of the FEIR Addendum and is outside the scope of the recirculation. See response to General Comment 1 and Responses to BACH Comments 2 and 3. As discussed, the baseline for CEQA analysis is the existing conditions, as is proper under CEQA. The FEIR Addendum and the 2015 Tree Report examined the old-growth redwoods in the project area and concluded they were in vigorous health (Yniguez 2015). The conclusions were confirmed in a recent visit to Richardson Grove by the consulting arborist in May 2022, using walk-throughs and binoculars to re-examine tree crowns.

Comment 9: Dr. McBride states that Caltrans did not provide information about the amount of cut and fill for each tree, which was previously provided in the 2010 EA.

The above NEPA-related comment regarding cut and fill for each tree was made in the federal litigation, where the federal courts upheld the environmental document as fully compliant with NEPA. The Individual Tree Details in the 2015 Tree Report describe the area of excavation and include detailed design drawings for each individual old-growth redwood within the project area and a comprehensive analysis in the individual tree diagrams showing where the cut and fill will take place in the root zones of trees. As such, the Individual Tree Details provide more extensive detail than the FEIR (Yniguez 2015). The consulting arborist was provided the construction details and discussed them with project staff in a series of meetings onsite in Richardson Grove.

Dr. McBride made these same assertions in prior litigation, where the federal district court found his data and analytical opinions contained in sworn statements to be unreliable and also substantively inaccurate. Dr. McBride's opinions of the Richardson Grove Operational Improvement Project's potential impacts on redwoods are considered in that light.

Comment 10: The 2015 Tree Report is based on the subjective opinions of an expert arborist who did not account for the current baseline vigor of old-growth redwoods in the Project area. The State Parks Handbook is more objective.

The 2015 Tree Report did account for existing conditions and found that all the trees assessed were healthy. Observations of the tree canopy and health by a qualified arborist constitutes a valid scientific methodology and this method is used broadly in the field of forest science (see response to EPIC Comment 6). Only three trees showed evidence of prior

detrimental impacts attributable to root destruction; however, they have adapted to and recovered from the abrupt severance of major buttress roots many decades ago (Yniguez 2015).

As explained in the 2015 Tree Report, today the old-growth redwoods alongside US 101 in Richardson Grove are manifesting healthy and vigorous crowns (Yniguez 2015). The consulting arborist visited Richardson Grove in May 2022 and confirmed the continued vigorous health of the crowns of old-growth redwoods in the project area. There was no visible evidence of crown decline. Other than the three trees (#20, #89, and #90) that developed "spike tops" decades ago when very large buttress roots were abruptly severed, no other old-growth redwood trees adjacent to the highway in Richardson Grove have developed spike tops from the original highway construction or from the effects of roughly a century of periodic highway maintenance and resurfacing.

See also Response to Richard Campbell Comment 6 regarding use of the State Parks formula.

Comment 11: The 2015 Tree Report cites to articles about redwoods' resiliency that are not related to the Project impacts, as described by Richard Campbell and Dr. McBride.

See Responses to BACH Comment 1, Richard Campbell Comment 10, and EPIC Comment 9.

Comment 12: Dr. McBride used a different and more objective methodology by providing an estimate of pre-existing impacts combined with project impacts over the structural root zone.

See Responses to Richard Campbell Comment 6 and EPIC Comment 9.

Dr. McBride's methodology to rate the effects of construction on old-growth redwoods in the Richardson Grove Operational Improvement Project would yield a table whereby the numbers would merely reflect a compounded set of highly subjective judgments, not a "more objective measure." For example, this methodology would require the evaluator to categorize each redwood 30 inches or more in diameter as Young, Mature, or Old, and to then ascribe one of three percentage ratings of 15%, 10%, or 5% as part of a "Score." The three categories (Young, Mature, Old) are not defined, nor is there any procedure for determining the anticipated life expectancy of an individual tree with a maximum species life span potential of over 2,000 years. The average life span of an old-growth redwood has been estimated to be from 500 to 700 years in some forested settings (Stone 1965), making it difficult to

"objectively" categorize a particular tree as young, mature, or old without knowing its age or approximation of its longevity. Such methodology would not provide useful information for the purposes of analyzing potential impacts for the proposed project nor would it be more valid than the 2015 Tree Report (Yniguez 2015).

In addition, the subjective categorization of any change or disturbance to the environment as an "impact," regardless of its actual consequences to old-growth redwoods, would cause an overestimate of cumulative detriment. For example, replacing up to 12 inches of surface asphalt within an existing roadbed of up to 30 inches or more in thickness would be calculated improperly as an "impact" when in fact the work occurred entirely within the existing roadbed.

Furthermore, Dr. McBride's methodology was asserted in prior litigation, where the federal district court found his data and analytical opinions to lack reliability and to be substantively inaccurate. Dr. McBride's analysis and opinions of the Richardson Grove Operational Improvement Project's potential impacts on redwoods are considered in that light.

State Parks has reviewed the FEIR Addendum, had no comments on the Department's CEQA analysis that project impacts would be less than significant, and concurred that all possible planning to minimize long term harm to Park resources has been included.

Comment 13: The EIR does not consider how construction impacts the diversion of water to culverts, creation of soldier pile walls will impact the amount of available water to individual trees, including Tree #23 and Tree #24. The 2021 Dangerfield study discusses potential impacts from alterations to hydrology.

See General Response 4 and General Response 5.

For Tree #23, the effects would be extremely minor because the existing pavement would be removed near the tree and replaced with gravel at the road edge and native soils and duff beyond. The existing paved roadway is approximately 40 feet away and, after construction, would be approximately 50 feet away.

For Tree #24, the effects would also be slight because even after the curvilinear roadway arc is shifted toward the tree, *the roadway and embankment would be approximately 25 feet away from Tree #24.* The rest of the wide-spreading root system would remain undisturbed (Yniguez 2015).

Comment 14: Dangerfield (2020) and Dangerfield et al. (2021) are the only peer reviewed studies of impacts from road construction and road use on old-growth redwoods and rebuts observational articles.

The Dangerfield studies do not consider this project's impacts on Richardson Grove and are based on inaccurate assumptions and comparison of impacts from a much larger project of drastically different and greater scope and magnitude. See General Response 4.

Comment 15: Caltrans should incorporate the effects of climate change into the baseline against which project impacts are considered.

The baseline against which the project impacts were measured was the existing conditions, as is proper under CEQA. See also General Response 1 and response to BACH Comment 3.

Comment 16: The 2017 Coalition for Responsible Transportation Priorities (CRTP) study suggests that the Project is likely to result in increased truck trips, and this is significant new information.

This comment discusses traffic impacts, which were not part of the FEIR Addendum and are outside the scope of the recirculation. The FEIR analyzed project traffic impacts, including potential increases in truck traffic, and found traffic impacts to be less than significant. The FEIR Addendum does not change that determination. Prior project traffic analyses by the Department found there to be no expectation of a measurable increase in truck traffic volumes (FEIR, Caltrans 2016b).

Nevertheless, the study submitted by commenters was reviewed by project staff, a senior transportation planner, and licensed engineers in the Department's District 1 Traffic Operations Office. The review concluded that the study was inadequate and not useful for the purposes of analyzing potential impacts of the proposed project. Specifically, among other flaws, the study grouped traffic volume data from census stations in a manner inconsistent with Federal Highway Administration guidance; failed to distinguish between correlation and causation with respect to truck traffic increases; acknowledged that its comparison of before and after volumes on segments that changed from STAA-prohibited to STAA-allowed are based on "*too small a sample to provide meaningful results*"; and acknowledged that data regarding increases in "[r]ates of change in truck traffic volumes and intensities" on throughway STAA routes were also "*not statistically significant*." [Emphasis added.] The CRTP study offers no new information which would alter the Department's existing truck volume analysis.

Comment 17: The completion of State Route 299 at Buckhorn Summit, which is now open to STAA traffic, calls into question the purpose and need of the Project.

See General Response 2.

LIST OF PREPARERS

Department Staff

Anthony Carnemolla, PE, Senior Transportation Engineer, technical study review.

Julie East, Senior Environmental Scientist, document preparation and oversight.

Tyler Egerer, Associate Governmental Program Analyst, support.

Kim Floyd, PE, Senior Transportation Engineer, document oversight.

Rex Jackman, Senior Transportation Planner, technical study review.

Tim Keefe, Senior Environmental Planner, archaeologist.

Brandon Larsen, Supervising Environmental Planner, document oversight.

Sean Larson, PE, Transportation Engineer, technical study review.

Zachary Larson, Environmental Scientist, peer review.

Eric Lund, PE, Transportation Engineer, document oversight.

Julie Price, Environmental Scientist, peer review and document remediation.

Karen Radford, Associate Environmental Planner, technical editing.

Sheri Rodriguez, PE, Senior Transportation Engineer, technical study review.

Stantec Consulting Services Inc. Staff

Kate Gray, Senior Environmental Planner, document preparation and oversight.

Sylvia Langford, Editor, technical editing.

David Plumpton, Ph.D., CWB, Principal Environmental Planner, document preparation and oversight.

Tree Decisions Staff

Dennis Yniguez, JD, Registered Consulting Arborist, Board Certified Master Arborist, document preparation.

REFERENCES

Ambrose, A. R., S. C. Sillett, and T. E. Dawson. 2009. Effects of Tree Height on Branch Hydraulics, Leaf Structure, and Gas Exchange in California Redwoods. Plant, Cell and Environment 32:743–757.

Ambrose, A. R., S . C. Sillett, G. W. Hoch, R. Van Pelt, M. E. Antoine, and T. E. Dawson. 2010. Effects of Height on Treetop Transpiration and Stomatal Conductance in Coast Redwood (*Sequoia sempervirens*). Tree Physiology 30:1260-1272. https://doi:10.1093/treephys/tpq064

Barbour, M., S. Lydon, M. Borchert, M. Popper, V. Whitworth, and J. Evarts. John Evarts and Marjorie Popper, eds. 2001. Coast Redwood: A Natural and Cultural History. Los Olivos, CA: Cachuma Press.

Burgess, S. S. O., and T. E. Dawson. 2004. The Contribution of Fog to the Water Relations of Sequoia sempervirens (D. Don): Foliar Uptake and Prevention of Dehydration. Plant, Cell, and Environment 27(8):1023–1034.

Burns, E. 2016. Understanding Sequoia Sempervirens. In Standiford, R. B. and Valachovic, Y. 2017. Proceedings of the Coast Redwood Science Symposium-2016: Past Successes and Future Directions. Gen. Tech. Rep. PSW-GTR-258. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Burns, E., and S. C. Sillett. 2019. Discovering the Climate Change Resilience of Coast Redwood Forests. *Redwoods Magazine*. https://www.savetheredwoods.org/redwoods-magazine/spring-2019/discovering-the-climate-change-resilience-of-coast-redwood-forests/

California State Parks. 2011. Department Operating Manual (DOM), Section DOM 0310.6.1.

California Department of Transportation (Caltrans). 2010. Storm Water Data Report. Prepared under direction of Eric Lund. April 4, 2010.

_____.2016a. Biological Assessment for Potential Impacts to Coho Salmon (Oncorhynchus kisutch), Chinook Salmon (Oncorhynchus tshawytscha), Steelhead (Oncorhynchus mykiss), their Designated Critical Habitat, and Essential Fish Habitat Assessment for Pacific Salmon. Prepared by Gail Popham and Valerie Gizinski. October 2, 2016.

_____.2016b. Impacts of Richardson Grove Improvement Project Memorandum. Prepared by Kevin Tucker. May 9, 2016.

_____.2016c. Project Drainage Impacts Memorandum. Prepared by Eric Lund. August 30, 2016.

_____. 2016d. Richardson Grove Operational Improvement Project Natural Environment Study Addendum. Prepared by Gail Popham. June 7, 2016.

Costello, L., Watson, G., and Smiley, E. T. 2017. Best Management Practices: Root Management. Champaign, IL: International Society of Arboriculture.

Dangerfield C. R., S. L. Voelker, and C. A. Lee. 2021. Long-term Impacts of Road Disturbance on Old-growth Coast Redwood Forests. Forest Ecology and Management. 499(1):119595. https://doi.org/10.1016/j.foreco.2021.119595

Dangerfield, C. R. 2020. Influences of Forest Edges on the Growth and Health of Old-Growth Coast Redwood Forests. Master's thesis, Utah State University, Logan, UT.

Fite, K. and Smiley, E. T., 2016. Best Management Practices: Managing Trees During Construction. Champaign, IL: International Society of Arboriculture.

Fitzgerald, S., and M. Bennett. 2013. A Land Manager's Guide for Creating Fire-Resistant Forests. Northwest Fire Science Consortium. EM 9087. Oregon State University Extension Service.

Johnston, Verna R. 1994. California Forests and Woodlands. Berkeley, CA: University of California Press.

Johnstone, J. A., and T. E. Dawson. 2010. Climatic Context and Ecological Implications of Summer Fog Decline in the Coast Redwood Region. PNAS 107 (10):4533-4538. https://doi.org/10.1073/pnas.0915062107

Levin, S. A., Carpenter, S. R., Godfray, C. H. J., Kinzig, A. P., Loreau, M., Losos, J. B., Walker, B., & Wilcove, D. S. (2009). The Princeton Guide to Ecology. Princeton University Press.

Matheny, N. P., and J. R. Clark. 1998. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. Champaign, IL : International Society of Arboriculture.

Matheny, N. P., E. T. Smiley, R. Gilpin, and R. Hauer. 2022. Best Management Practices: Managing Trees During Site Development and Construction. Atlanta, GA: International Society of Arboriculture. [In process for publication in 2022 by the International Society of Arboriculture. Atlanta, GA.]

Russell, W. H., McBride, J. R., Carnell, K., 2000. Edge effects and the effective size of old-growth coast redwood preserves. Proc. Rocky Mt. Res. Station. USDA For. Serv. 3: 128–136.

Shigo, A. L. 1986. A New Tree Biology Dictionary. Durham, NH: Shigo and Trees, Associates.

Sillett, S. C., R. Van Pelt, A. L. Carroll, R. D. Kramer, A. R. Ambrose, and D. Trask. 2015. How Do Tree Structure and Old Age Affect Growth Potential of California Redwoods? Ecological Monographs. 85:181–212.

Simonin, K. A., L. S. Santiago, and T. E. Dawson. 2009. Fog Interception by Sequoia sempervirens (D. Don) Crowns Decouples Physiology from Soil Water Deficit. Plant, Cell and Environment 32:882–892.

Snyder, J. A. 1992. The Ecology of Sequoia Sempervirens: An Addendum to "On the Edge: Nature's Last Stand for Coast Redwoods." Master's thesis, San Jose State University, San Jose, CA.

Stone, E. C. 1965. Ecology of the Redwoods. In University of California Extension Series on Redwood. School of Forestry. Lecture 2:1–21.

Yniguez, D. 2015. An Evaluation of Potential Effects on Old-growth Redwoods from Implementation of the Richardson Grove Operational Improvement Project. Final Report submitted to California Department of Transportation, Eureka, CA [Prepared by Dennis Yniguez. Tree Decisions, Berkeley, CA].

Zarnoch, S. J., W. A. Bechtold, and K. W. Stolte. 2004. Using Crown Condition Variables as Indicators of Forest Health. Canadian Journal of Forest Research. 34(5):1057-1070. doi: 10.1139/X03-277.