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DEPARTMENT OF FORESTRY AND FIRE PROTECTION
NORTHERN REGION HEADQUARTERS
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OFFICIAL RESPONSE OF THE DIRECTOR OF THE CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION TO SIGNIFICANT ENVIRONMENTAL POINTS RAISED DURING THE TIMBER HARVESTING PLAN EVALUATION PROCESS

THP NUMBER: 1-22-00043-SON

SUBMITTER: Gualala Redwood Timber, LLC

COUNTY: Sonoma

END OF PUBLIC COMMENT PERIOD: August 8, 2022

DATE OF OFFICIAL RESPONSE/DATE OF APPROVAL: September 2, 2022

The California Department of Forestry and Fire Protection has prepared the following response to significant environmental points raised during the evaluation of the above-referenced plan. Comments made on like topics were grouped together and addressed in a single response. Where a comment raised a unique topic, a separate response is made. Remarks concerning the validity of the review process for timber operations, questions of law, or topics or concerns so remote or speculative that they could not be reasonably assessed or related to the outcome of a timber operation, have not been addressed.

Sincerely,

DocuSigned by:
AE5E25725914422...

Adam Deem, RPF #2759
Forester II
Review Team Chair

cc: Unit Chief
RPF
Plan Submitter
Dept. of Fish & Wildlife, Reg. 1
Water Quality, Reg. 1
Public Comment Writers

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Summary of Review Process

Common Forest Practice Abbreviations

AB 32	Assembly Bill 32
ARB	Air Resources Board
BOF	Board of Forestry
CAA	Confidential Archaeological Addendum
CAL FIRE	Department of Forestry & Fire Protection
CAPCOA	Calif. Air Pollution Control Officers Assoc.
CCR	Calif. Code of Regulations
CDFW/DFW	California Dept. of Fish & Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CGS	California Geological Survey
CIA	Cumulative Impacts Assessment
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
CSO	California Spotted Owl
DBH/dbh	Diameter Breast Height
DPR	Department of Pesticide Regulation
EPA	Environmental Protection Agency
FPA	Forest Practice Act
FPR	Forest Practice Rules
GHG	Greenhouse Gas
ha^{-1}	per hectare
LBM	Live Tree Biomass
LTO	Licensed Timber Operator
LTSY	Long Term Sustained Yield
m^{-2}	per square meter
MAI	Mean Annual Increment
MMBF	Million Board Feet
$MMTCO_2E$	Million Metric Tons CO_2 equivalent
NEP	Net Ecosystem Production
NEPA	National Environ. Policy Act
NMFS	National Marine Fisheries Service
NPP	Net Primary Production
NSO	Northern Spotted Owl
NTMP	NonIndust. Timb. Manag. Plan
OPR	Govrn's Office of Plan. & Res.
PCA	Pest Control Advisor
Pg	Petagram = 10^{15} grams
PHI	Pre-Harvest Inspection
PNW	Pacific NorthWest
PRC	Public Resources Code
RPA	Resource Plan. and Assess.
RPF	Registered Professional Forester
[SIC]	Word used verbatim as originally printed in another document
SPI	Sierra Pacific Industries
SYP	Sustained Yield Plan
tC	tonnes of carbon
Tg	Teragram = 10^{12} grams
THP	Timber Harvest Plan
TPZ	Timber Production Zone
USFS	United States Forest Service
USFWS	U.S. Fish & Wildlife Service
WAA	Watershed Assessment Area
WLPZ	Watercourse. & Lake Prot. Zone
WQ	California Regional Water Quality Control Board
yr^{-1}	per year

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Notification Process

In order to notify the public of the proposed timber harvesting, and to ascertain whether there are any concerns with the plan, the following actions are automatically taken on each THP submitted to CAL FIRE:

- Notice of the timber operation is sent to all adjacent landowners if the boundary is within 300 feet of the proposed harvesting, (As per 14 CCR § 1032.7(e))
- Notice of the Plan is submitted to the county clerk for posting with the other environmental notices. (14 CCR § 1032.8(a))
- Notice of the plan is posted at the Department's local office and in Cascade Area office in Redding. (14 CCR § 1032))
- Notice is posted with the Secretary for Resources in Sacramento. (14 CCR § 1032.8(c))
- Notice of the THP is sent to those organizations and individuals on the Department's current list for notification of the plans in the county. (14 CCR § 1032.9(b))
- A notice of the proposed timber operation is posted at a conspicuous location on the public road nearest the plan site. (14 CCR § 1032.7(g))

Plan Review Process

The laws and regulations that govern the timber harvesting plan (THP) review process are found in Statute law in the form of the Forest Practice Act which is contained in the Public Resources Code (PRC), and Administrative law in the rules of the Board of Forestry (rules) which are contained in the California Code of Regulations (CCR).

The rules are lengthy in scope and detail and provide explicit instructions for permissible and prohibited actions that govern the conduct of timber operations in the field. The major categories covered by the rules include:

*THP contents and the THP review process
*Silvicultural methods
*Harvesting practices and erosion control
*Site preparation
*Watercourse and Lake Protection
*Hazard Reduction
*Fire Protection
*Forest insect and disease protection practices
*Logging roads and landing

When a THP is submitted to the California Department of Forestry and Fire Protection (CAL FIRE) a multidisciplinary review team conducts the first review team meeting to assess the THP. The review team normally consists of, but is not necessarily limited to, representatives of CAL FIRE, the Department of Fish and Game (DFW), and the Regional Water Quality Control Board (WQ). The California Geological Survey (CGS) also reviews THP's for indications of potential slope instability. The purpose of the first review team meeting is to assess the logging plan and determine on a preliminary basis whether it conforms to the rules of the Board of Forestry. Additionally, questions are formulated which are to be answered by a field inspection team.

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Next, a preharvest inspection (PHI) is normally conducted to examine the THP area and the logging plan. All review team members may attend, as well as other experts and agency personnel whom CAL FIRE may request. As a result of the PHI, additional recommendations may be formulated to provide greater environmental protection.

After a PHI, a second review team meeting is conducted to examine the field inspection reports and to finalize any additional recommendations or changes in the THP. The review team transmits these recommendations to the RPF, who must respond to each one. The director's representative considers public comment, the adequacy of the registered professional forester's (RPF's) response, and the recommendations of the review team chair before reaching a decision to approve or deny a THP. If a THP is approved, logging may commence. The THP is valid for up to five years, and may be extended under special circumstances for a maximum of 2 years more for a total of 7 years.

Before commencing operations, the plan submitter must notify CAL FIRE. During operations, CAL FIRE periodically inspects the logging area for THP and rule compliance. The number of the inspections will depend upon the plan size, duration, complexity, regeneration method, and the potential for impacts. The contents of the THP and the rules provide the criteria CAL FIRE inspectors use to determine compliance. While CAL FIRE cannot guarantee that a violation will not occur, it is CAL FIRE's policy to pursue vigorously the prompt and positive enforcement of the Forest Practice Act, the forest practice rules, related laws and regulations, and environmental protection measures applying to timber operations on the timberlands of the State. This enforcement policy is directed primarily at preventing and deterring forest practice violations, and secondarily at prompt and appropriate correction of violations when they occur.

The general means of enforcement of the Forest Practice Act, forest practice rules, and the other related regulations range from the use of violation notices which may require corrective actions, to criminal proceedings through the court system. Civil, administrative civil penalty, Timber operator licensing, and RPF licensing actions can also be taken.

THP review and assessment is based on the assumption that there will be no violations that will adversely affect water quality or watershed values significantly. Most forest practice violations are correctable and CAL FIRE's enforcement program seeks to assure correction. Where non-correctable violations occur, civil or criminal action may be taken against the offender. Depending on the outcome of the case and the court in which the case is heard, some sort of supplemental environmental corrective work may be required. This is intended to offset non-correctable adverse impacts. Once a THP is completed, a completion report must be submitted certifying that the area meets the requirements of the rules. CAL FIRE inspects the completed area to verify that all the rules have been followed including erosion control work.

Depending on the silvicultural system used, the stocking standards of the rules must be met immediately or in certain cases within five years. A stocking report must be filed to certify that the requirements have been met. If the stocking standards have not been met, the area must be planted annually until it is restored. If the landowner fails to restock the land, CAL FIRE may hire a contractor to complete the work and seek recovery of the cost from the landowner.

General Discussion and Background

The following summary is provided for some of the over-arching concerns expressed in public comment. Specific issues raised within comments will be addressed in the next section.

CEQA Analysis

A CEQA analysis is not required to be perfect, but it must be accurate and adequately describe the proposed project in a manner that allows for informed decision-making. It must include an assessment of impacts based upon information that was "reasonably available before submission of the plan." (Technical Rule Addendum #2)

CEQA clearly establishes that the Lead Agency has a duty to minimize harm to the environment while balancing Competing Public Objectives (14 CCR §15021)[1]. These duties are further refined in the Z'berg-Nejedly Forest Practice Act (PRC §4512(c)[2]) and PRC §4513(b)[3] for how the mandate to provide "maximum sustained production of high quality timber products" is to be balanced with other environmental considerations. The term "while giving consideration to" is further defined in 14 CCR §895.1 as follows:

> ***While Giving Consideration*** *means the selection of those feasible silvicultural systems, operating methods and procedures which substantially lessen significant adverse Impact on the environment and which best achieve long-term, maximum sustained production of forest products, while protecting soil, air, fish and wildlife, and water resources from unreasonable degradation, and which evaluate and make allowance for values relating to*

---

[1] Duty to Minimize Environmental Damage and Balance Competing Public Objectives
CEQA establishes a duty for public agencies to avoid or minimize environmental damage where feasible.

(1) In regulating public or private activities, agencies are required to give major consideration to preventing environmental damage.
(2) A public agency should not approve a project as proposed if there are feasible alternatives or mitigation measures available that would substantially lessen any significant effects that the project would have on the environment.

(b) In deciding whether changes in a project are feasible, an agency may consider specific economic, environmental, legal, social, and technological factors.
(c) The duty to prevent or minimize environmental damage is implemented through the findings required by Section 15091.
(d) CEQA recognizes that in determining whether and how a project should be approved, a public agency has an obligation to balance a variety of public objectives, including economic, environmental, and social factors and in particular the goal of providing a decent home and satisfying living environment for every Californian. An agency shall prepare a statement of overriding considerations as described in Section 15093 to reflect the ultimate balancing of competing public objectives when the agency decides to approve a project that will cause one or more significant effects on the environment.

Note: Authority cited: Section 21083, Public Resources Code; Reference: Public Resources Code Sections 21000, 21001, 21002, 21002.1, and 21081; San Francisco Ecology Center v. City and County of San Francisco, (1975) 48 Cal. App. 3d 584; Laurel Hills Homeowners Association v. City Council, (1978) 83 Cal. App. 3d 515.

Discussion: Section 15021 brings together the many separate elements that apply to the duty to minimize environmental damage. These duties appear in the policy sections of CEQA, in the findings requirement in Section 21081, and in a number of court decisions that have built up a body of case law that is not immediately reflected in the statutory language. This section is also necessary to provide one place to explain how the ultimate balancing of the merits of the project relates to the search for feasible alternatives or mitigation measures to avoid or reduce the environmental damage.

The placement of this section early in the article on general responsibilities helps highlight this duty to prevent environmental damage. This section is an effort to provide a careful statement of the duty with its limitations and its relationship to other essential public goals.

[2] (c) The Legislature thus declares that it is the policy of this state to encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, sequestration of carbon dioxide, and recreational opportunities alike in this and future generations.

[3] (b) The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to sequestration of carbon dioxide, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment.

> *range and forage resources, recreation and aesthetics, and regional economic vitality and employment.*

What is missing from the Act, Rules or CEQA Guidelines is the weight that is to be applied to the evaluation of the other resources specified. Clearly, there are certain legal restrictions on the degradation of specific values (e.g. water quality standards) but many of the elements that must be considered have a qualitative, not quantitative mandate for evaluation. This allows the Plan Submitter and the Lead Agency to exercise "professional judgement[4]" when preparing and evaluating plans.

What is also evident from an examination of the entire record (i.e. information provided by the Plan Submitter, submitted as public comment and information supplemented to the record by CAL FIRE) is that there is disagreement amongst experts about what the appropriate course of action is or what the feasible alternatives to the project may be. Again, CEQA provides guidance on this topic, with respect to both the adequacy of the record, and on differences of opinion; even between recognized experts:

> *15151. Standards for Adequacy of an EIR*
> *An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.*
>
> > *Note: Authority cited: Section 21083, Public Resources Code; Reference: Sections 21061 and 21100, Public Resources Code; San Francisco Ecology Center v. City and County of San Francisco, (1975) 48 Cal. App. 3d 584.*
> >
> > *Discussion: This section is a codification of case law dealing with the standards for adequacy of an EIR. In Concerned Citizens of Costa Mesa, Inc. v. 32nd District Agricultural Assoc. (1986) 42 Cal. 3d 929, the court held that "the EIR must contain facts and analysis, not just the agency's bare conclusions or opinions." In Browning-Ferris Industries of California, Inc. v. San Jose (1986) 181 Cal. App. 3d 852, the court reasserted that an EIR is a*

[4] *14CCR §897(d) Due to the variety of individual circumstances of timber harvesting in California and the subsequent inability to adopt site-specific standards and regulations, these Rules use judgmental terms in describing the standards that will apply in certain situations. By necessity, the RPF shall exercise professional judgment in applying these judgmental terms and in determining which of a range of feasible (see definition 14 CCR 895.1) silvicultural systems, operating methods and procedures contained in the Rules shall be proposed in the plan to substantially lessen significant adverse Impacts in the environment from timber harvesting. The Director also shall exercise professional judgment in applying these judgmental terms in determining whether a particular plan complies with the Rules adopted by the Board and, accordingly, whether he or she should approve or disapprove a plan. The Director shall use these Rules to identify the nature he limits to the professional judgment to be exercised by him or her in administering these Rules.*

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> *disclosure document and as such an agency may choose among differing expert opinions when those arguments are correctly identified in a responsive manner. Further, the state Supreme Court in its 1988 Laurel Heights decision held that the purpose of CEQA is to compel government at all levels to make decisions with environmental consequences in mind. CEQA does not, indeed cannot, guarantee that these decisions will always be those which favor environmental considerations, nor does it require absolute perfection in an EIR.*

CAL FIRE has an obligation to explain the rationale for approving a plan. This is often done in the presence of contradicting information and results in different parties being displeased with the results. A competent CEQA analysis is not required to make the "best" choice, but the choice made must be supported by information contained within the record. This is where Lead Agency discretion comes into play. CAL FIRE ultimately bears the responsibility for making a decision and, when presented with public comments, is expected to provide an answer to significant questions raised.

Another expressed concern is over the extent to which the plan, and by extension CAL FIRE, discusses effects that are not deemed to be significant. CEQA provides guidance on how to address impacts within 14 CCR §15130:

> *15130. DISCUSSION OF CUMULATIVE IMPACTS*
>
> *(a) An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in section 15065 (a)(3). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.*
>
> *(1) As defined in Section 15355, a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. An EIR should not discuss impacts which do not result in part from the project evaluated in the EIR.*
>
> *(2) When the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. A lead agency shall identify facts and analysis supporting the lead agency's conclusion that the cumulative impact is less than significant.*

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(3) An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The lead agency shall identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable.

(b) The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact. The following elements are necessary to an adequate discussion of significant cumulative impacts:

(1) Either:

(A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

(B) A summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the lead agency.

(2) When utilizing a list, as suggested in paragraph (1) of subdivision (b), factors to consider when determining whether to include a related project

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should include the nature of each environmental resource being examined, the location of the project and its type. Location may be important, for example, when water quality impacts are at issue since projects outside the watershed would probably not contribute to a cumulative effect. Project type may be important, for example, when the impact is specialized, such as a particular air pollutant or mode of traffic.

(3) Lead agencies should define the geographic scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used.

(4) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and

(5) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

(c) With some projects, the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations rather than the imposition of conditions on a project-by- project basis.

(d) Previously approved land use documents, including, but not limited to, general plans, specific plans, regional transportation plans, plans for the reduction of greenhouse gas emissions, and local coastal plans may be used in cumulative impact analysis. A pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference pursuant to the provisions for tiering and program EIRs. No further cumulative impacts analysis is required when a project is consistent with a general, specific, master or comparable programmatic plan where the lead agency determines that the regional or areawide cumulative impacts of the proposed project have already been adequately addressed, as defined in section 15152(f), in a certified EIR for that plan.

(e) If a cumulative impact was adequately addressed in a prior EIR for a community plan, zoning action, or general plan, and the project is consistent with that plan or action, then an EIR for such a project should not further analyze that cumulative impact, as provided in Section 15183(j).

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> *Note: Authority cited: Sections 21083, 21083.05, Public Resources Code. Reference: Sections 21003(d), 21083(b), 21093, 21094 and 21100, Public Resources Code; Whitman v. Board of Supervisors, (1979) 88 Cal. App. 3d 397; San Franciscans for Reasonable Growth v. City and County of San Francisco (1984) 151 Cal.App.3d 61; Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692; Laurel Heights Homeowners Association v. Regents of the University of California (1988) 47 Cal.3d 376; Sierra Club v. Gilroy (1990) 220 Cal.App.3d 30; Citizens to Preserve the Ojai v. County of Ventura (1985) 176 Cal.App.3d 421; Concerned Citizens of South Cent. Los Angeles v. Los Angeles Unified Sch. Dist. (1994) 24 Cal.App.4th 826; Las Virgenes Homeowners Fed'n v. County of Los Angeles (1986) 177 Cal.App.3d 300; San Joaquin Raptor/Wildlife Rescue Ctr v. County of Stanislaus (1994) 27 Cal.App.4th 713; Fort Mojave Indian Tribe v. Cal. Dept. Of Health Services (1995) 38 Cal.App.4th 1574; Santa Monica Chamber of Commerce v. City of Santa Monica (2002) 101 Cal.App.4th 786; Communities for a Better Environment v. California Resources Agency (2002) 103 Cal.App.4th 98; and Ass'n of Irritated Residents v. County of Madera (2003) 107 Cal.App.4th 1383.*

When an analysis has determined that the impacts are less than significant, a detailed discussion is not required and an abbreviated explanation is acceptable.

About Agency "Activism" (Agency Prohibited from creating "underground regulations")

Another theme is that CAL FIRE should take an activist role in steering plan submitters towards, or in this case away from, certain actions that the comment writer deems deleterious to the natural environment. To do so would be contrary to our purpose and entirely outside of our jurisdictional authority. The plan submitter is responsible for proposing plans consistent with their objectives and CAL FIRE is responsible for determining whether or not the operations as proposed would cause a significant adverse effect on the environment. How an individual THP may or may not align with state goals or other non-regulatory targets is not a factor we can consider when making such a determination.

In fact, if CAL FIRE was to impose a standard not required by regulation, we would likely be found to have created an "underground regulation[5]" and would be open to legal challenge.

[5] https://oal.ca.gov/underground_regulations/

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Requirement to augment the record

In addition to information provided by the Plan Submitter and Public Commenters, CAL FIRE is also responsible for considering additional information and adding it to the plan record. This requirement is specified in 14 CCR §898 "*The Director shall supplement the information provided by the RPF and the plan submitter when necessary to ensure that all relevant information is considered.*" Sometimes this information is discovered while reviewing submitted literature and other information is added when the reviewer believes it is relevant to the discussion.

All Concerns Are Treated Equal

From CAL FIRE's perspective, one concern expressed is as good as a thousand. Every concern, no matter who it comes from, is given careful consideration. It is our responsibility to the public and to those we regulate to provide a fair and unbiased review. This Official Response is written with that in mind.

Watersheds as the Focal Point for Cumulative Impacts Evaluation

Because they have defined boundaries and a single outlet, watersheds are an appropriate way to measure impacts to many resources (e.g. watershed, soil productivity) because these resources are bound primarily by the effects of gravity. For example: water flows downhill, landslides move down and not up slope such that upslope or resources in an adjacent watershed would not expect impacts. Most of the early environmental concerns rest upon the choice of assessment area and its appropriateness.

For other resources (e.g. recreation, noise, traffic, visual, fire hazard, greenhouse gas), the watershed boundary is not necessarily a limiting factor. For instance, deer and wolves move between watersheds easily and birds traverse large areas during their normal life cycle. Thus, it makes sense that some other delineation of assessment area for these specific resources would be used. While early THPs typically used the watershed boundary as the basis for evaluating all cumulative effects, contemporary analysis acknowledges the need for more refined boundaries, based upon the resource being evaluated. Even so, in some instances, areas such as the watershed (or multiple watersheds) are used to define the assessment area for resources such as fire hazard or greenhouse gas, because there is a requirement to have some defined boundary (e.g. carbon exchange occurs on a global scale but projects must evaluate site-specific impacts so a smaller area of evaluation is required in order to have a relevant analysis).

The Forest Practice Rules and Technical Rule Addendum #2 provide guidance in the determination of the size and shape of the assessment areas. 14 CCR §898 provides the general direction and reference to the evaluation of significant impacts and states:

> "Cumulative impacts shall be assessed based upon the methodology described in Board Technical Rule Addendum Number 2, Forest Practice Cumulative Impacts Assessment Process and shall be

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> guided by standards of practicality and reasonableness. The RPF's and plan submitter's duties under this section shall be limited to closely related past, present and reasonably foreseeable probable future projects within the same ownership and to matters of public record."

Further, 14 CCR §897(b)(2) [Implementation of Act Intent] provides additional context for evaluating timber harvesting plans:

> Individual THPs shall be considered in the context of the larger forest and planning watershed in which they are located, so that biological diversity and watershed integrity are maintained within larger planning units and adverse cumulative impacts, including impacts on the quality and beneficial uses of water are reduced.

Although the Rules acknowledge that different assessment areas may be chosen based upon the resource under consideration, the designation of the planning watershed as an appropriate spatial scale is consistent with 14 CCR §15130(b)(1)(B)(3), which states that:

> "Lead agencies should define the geographical scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used."

There are, however, two different systems for classifying watersheds in California.

The CalWater System

The Natural Resource Conservation service established the nationwide classification of watersheds from 1992-1996 (Wikipedia, 2020). The California Resources Agency began a digitization project in 1993 based upon the Hydrologic Basin Planning Maps developed by the State Water Resources Control Board in 1986 (CAL FIRE, 2004). The state and federal systems in California were moved closer together over time, through multi-agency MOUs and integrated into the CalWater system, managed by the California Department of Water Resources (DWR). In 2017, DWR notified the original members of the MOU that going forward the National Hydrography Dataset (NHD) would be the new authoritative dataset (DWR, 2021). The CalWater 2.2.1 system is widely used in California, although the boundaries vary in some cases from the federal designations. Most notably, some watersheds in the Calwater system are broken up using administrative or political boundaries.

The California Forest Practice Rules first included a definition of "Watershed" in the 1992 Rules:

> ***planning watershed*** *means the contiguous land base and associated watershed system that forms a fourth order or other watershed typically 10,000 acres or less in size. Where a watershed exceeds 10,000 acres, the Director may approve subdividing into smaller planning watersheds which shall be a composite of contiguous lower order watersheds and areas draining into the*

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> *main channel but not supporting a first order tributary. Smaller planning watersheds shall not be less than 3,000 acres nor exceed 10,000 acres in size as proposed by a plan submitter and approved by the Director. Plan submitters with approval of the director may allow a larger size planning watershed when 10,000 acres or less is not a logical planning unit, such as on the Eastside Sierra Pine type, as long as the size in excess of 10,000 acres is the smallest that is practical. Third order basins flowing directly into the ocean shall also be considered an appropriate planning watershed. This section will stay in effect until such time as the Director prepares and distributes maps identifying planning watersheds using the above criteria.*

The 1997 Rules were revised as follows:

> ***Planning Watershed*** *means the contiguous land base and associated watershed system that forms a fourth order or other watershed typically 10,000 acres or less in size. Planning watersheds are used in planning forest management and assessing impacts. The Director has prepared and distributed maps identifying planning watersheds plan submitters must use. Where a watershed exceeds 10,000 acres, the Director may approve subdividing it. Plan submitters may propose and use different planning watersheds, with the director's approval. Examples include but are not limited to the following: when 10,000 acres or less is not a logical planning unit, such as on the Eastside Sierra Pine type, as long as the size in excess of 10,000 acres is the smallest that is practical. Third order basins flowing directly into the ocean shall also be considered an appropriate planning watershed.*

Initially, plan preparers were directed to come up with their own watersheds, based upon the 10,000 acre target. The California Resources Agency (CRA) Department of Forestry and Fire Protection (CDF) contracted with Tierra Data Systems for the original digital production in 1993, based on Hydrologic Basin Planning Maps published in hardcopy (CAL FIRE, 2004). Once this was finished, it was distributed to RPFs for use in plans. The system was then maintained by an interagency group called the "California Interagency Watershed Mapping Committee". Changes were made to boundaries and information over time, with the newest changes made in 2004 (version 2.2.1).

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The CalWater system is broken down into 6 categories:

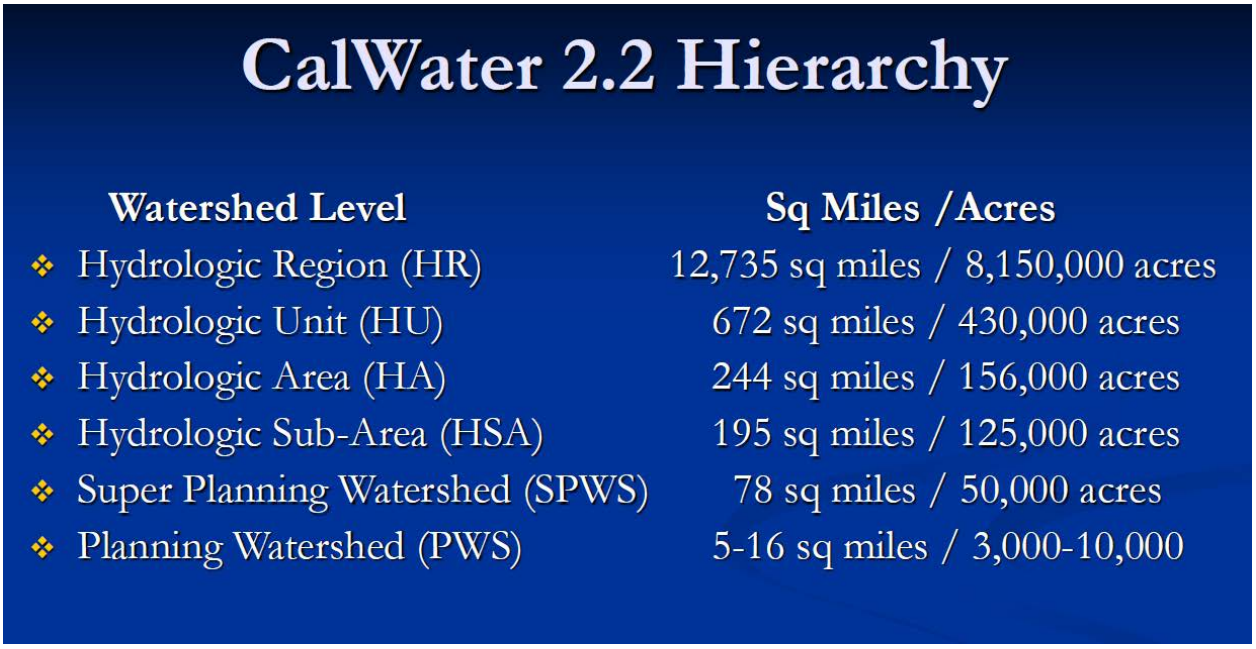

Figure 1 CalWater 2.2.1 Hierarchy (Meyers, 2004)

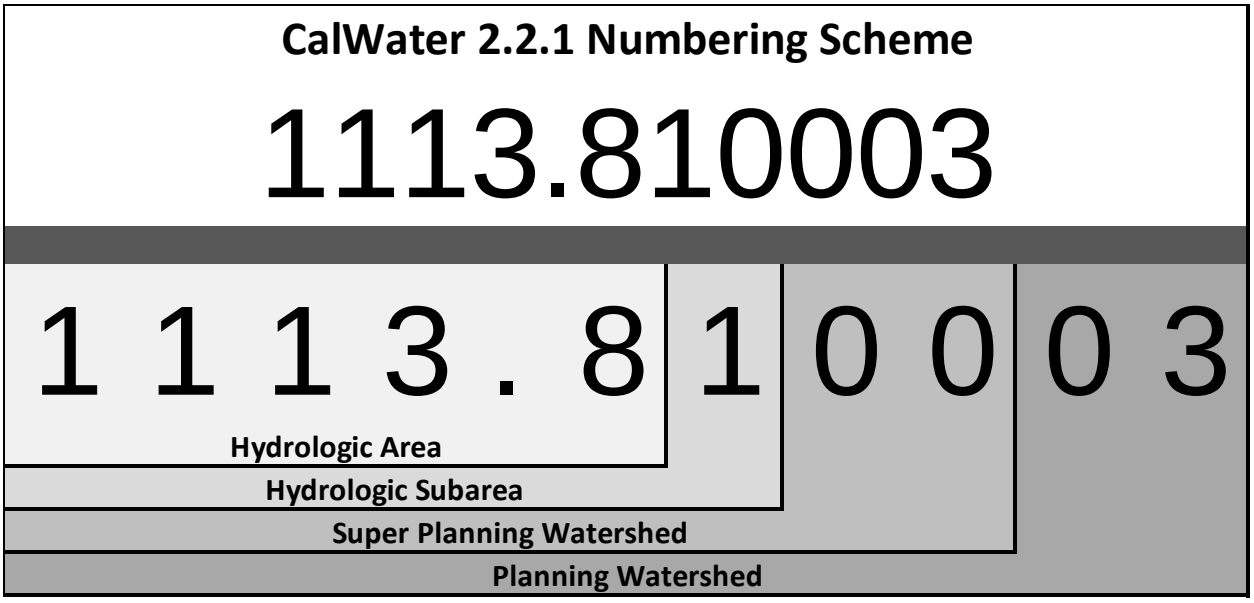

Figure 2 A breakdown of the CalWater 2.2.1 numbering scheme

The Federal Hydrologic Unit Maps (HUC)

Initially begun in 1978 by the USGS, this is an ongoing project to designate all hydrologic units in the US (USGS, 2020). In 1999, a multi-agency MOU was formed between state and federal agencies to bring the CalWater system into compliance with the federal model. There are still differences between the watershed boundaries established by both systems, but both represent logical approaches to watershed delineation that are widely used for assessment purposes.

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WDB Hierarchy

Level	Name	Number	Area (approx.)	California State Codes Description	California Approx. Area
Level 1	Region	2 digit	180,000 sq miles 115,193,577 acres		
Level 2	Sub-region	4 digit	16,844 sq miles 10,779,559 acres	Hydrologic Region	12,735 sq miles 8,150,000 acres
Level 3	Basin	6 digit (used to be "accounting unit")	10,600 sq miles 6,783,622 acres	Hydrologic Units	672 sq miles 430,000 acres
Level 4	Sub-basin	8 digit (used to be "cataloging unit")	703-1,735 sq miles 449,895 – 1,110,338 acres	Hydrologic Areas	244 sq miles 156,000 acres
Level 5	Watershed	10 digit (used to be 11 digit in NRCS)	63-391 sq miles 40,000 to 250,000 acres	Hydrologic Sub-areas	195 sq miles 125,000 acres
Level 6	Sub-watershed	12 digit (used to 14 digit in NRCS)	16-63 sq miles 10,000 to 40,000 acres	Super Planning Watershed	78 sq miles 50,000 acres
Level 7	Drainage	14 digit	15 sq miles 10,000 acres	Planning Watersheds	5-16 sq miles 3,000-10,000
Level 8	Site	16 digit	1 sq mile 650 acres		

*California acknowledges the need for local watersheds to delineate in more detail than planned for by the National Guidelines. We propose that **Drainage** and **Site** levels be added to California's guidelines to allow for this local detail.*

Figure 3 Federal Watershed Boundary Hierarchy (Meyers, 2004)

1-22-00043-SON

Planning Watershed

Gualala River Hydrologic Area

Watercourse (USGS)

County Boundary

1-22-00043-SON and Watersheds

Disclaimer: The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of or arising from the use of data or maps.

FPGIS Forest Practice

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Figure 4 CalWater 2.2 Watersheds of the Gualala River HA Compared to the Rock THP

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The use of CalWater Planning Watersheds (14 CCR §895.1) is an accepted method for determining the impacts of proposed timber operations on Watershed Resources. The rationale is that all impacts from the proposed operation will only be seen within the area that is drained by that watershed, and areas downstream of that watershed. Areas that do not receive drainage from the watershed (i.e. adjacent or upstream watersheds), would not be impacted.

Planning watersheds are defined in 14 CCR §895.1 as:

> "the contiguous land base and associated watershed system that forms a fourth order or other watershed typically 10,000 acres or less in size. Planning watersheds are used in planning forest management and assessing impacts. The Director has prepared and distributed maps identifying planning watersheds plan submitters must use. Where a watershed exceeds 10,000 acres, the Director may approve subdividing it. Plan submitters may propose and use different planning watersheds, with the Director's approval."

The methodology used in the Board's rules to determine the size of the Watershed Assessment Area (WAA) was clarified by a letter to all RPFs and LTOs from the Director on January 7, 1992. This letter states on page 4 that:

> The watershed assessment area for assessing cumulative watershed effects (CWEs) should be selected to include an area of <u>manageable size relative to the THP (usually an order 3 or 4 watershed) that maximizes the opportunity to detect an impact</u>. Where there is a choice of combining watersheds with different disturbance levels, the assessment area should be based on the smallest watershed area that includes the most disturbances. The intent is to focus on an area of manageable size, where the presence of cumulative effects related to the proposed project and the benefits or failings of the proposed practices can be reasonably considered. (CAL FIRE, 1992)

The size of the assessment area quoted in the letter above is supported in the Board rules described in 14 CCR § 897(b)(2) and in the definition for "Planning Watershed" found in 14 CCR §895.1. The size of the watershed assessment area found in these regulations is a recommended third or fourth order watershed size, and therefore, the letter from the Director is consistent with the regulations of the Board.

Watersheds may also be used as the basis for other assessment areas. The California Forest Carbon Plan (Forest Climate Action Team, 2018) discusses using watersheds as the basis for Greenhouse Gas emission and sequestration assessments:

> *The watershed level has proven to be an appropriate organizing unit for analysis and for the coordination and integrated management of the numerous physical, chemical, and biological processes that make up a watershed ecosystem. Similarly, a watershed can serve as an appropriate reference unit for the policies, actions, and processes that affect the biophysical*

> *system, and providing a basis for greater integration and collaboration. Forests and related climate mitigation and adaptation issues operate across these same biophysical, institutional, and social gradients.*
>
> *Because of these factors, the Forest Carbon Plan proposes working regionally at the landscape or watershed scale. The appropriate scale of a landscape or watershed to work at will vary greatly depending upon the specific biophysical conditions, land ownership or management patterns, and other social or institutional conditions.*

However, it should be noted that the detailed analysis for the Watershed Assessment Area selected by the RPF does not limit CAL FIRE with respect to consideration of other activities outside the assessment area. The watershed assessment area is more like a window which CAL FIRE can see through to view the combined effects of other related projects, rather than a wall or barrier. CAL FIRE recognizes that environmental elements cannot be truly and completely separated one from another. It is the limitations of analytical processes that require infinitely complex systems to be subdivided into reasonably manageable components.

Further, the RPF is expected to explain and justify the rationale for the chosen assessment area. CAL FIRE must then review this rationale and either accept or reject the defined assessment areas. This occurs with every THP reviewed.

The Board's rules do not require a specific method of cumulative impacts assessment, because the Board determined that no single, available procedure adequately addresses the wide range of site conditions and THP activities found in California. Technical Rule Addendum No. 2, provides the framework of what should be considered and what to look for with respect to conditions that may be at or near some level of concern. As stated in the Addendum, *"The watershed impacts of past upstream and on-site projects are often reflected in the condition of stream channels on the project area."* This is a critical element as it guides the RPF to focus on areas where cumulative watershed effects are known to accumulate. The Addendum then describes factors that can be used to evaluate the potential project impacts. Such factors include gravel embeddedness, pool filling, stream aggrading, bank cutting, bank mass wasting, downcutting, scouring, organic debris, stream-side vegetation, and recent floods. Taken together, they help inform the RPF about the status of the Environmental Setting (14 CCR §15125[6]) with respect to the impacts of past projects, and will form the basis of a determination on the impacts of the proposed project.

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[6] **15125. ENVIRONMENTAL SETTING**
(a) An EIR must include a description of the physical environmental conditions in the vicinity of the project. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. The description of the environmental setting shall be no longer than is necessary to provide an understanding of the significant effects of the proposed project and its alternatives. The purpose of this requirement is to give the public and decision makers the most accurate and understandable picture practically possible of the project's likely near-term and long-term impacts.
(1) Generally, the lead agency should describe physical environmental conditions as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Where existing conditions change or fluctuate over time, and where necessary to provide the most accurate picture practically possible of the project's impacts, a lead agency may define existing conditions by referencing historic conditions, or conditions expected when the project becomes operational, or both, that are supported with substantial evidence. In addition, a lead agency may also use baselines consisting of both existing conditions and projected future conditions that are supported by reliable projections based on substantial evidence in the record.
(2) A lead agency may use projected future conditions (beyond the date of project operations) baseline as the sole baseline for analysis o.nly if it demonstrates with substantial evidence that use of existing conditions would be either misleading or without informative value to

Greenhouse Gas Sequestration

Forest Practice Regulatory Background

The Z'berg-Nejedley Forest Practice Act (Division 4, Chapter 8, PRC) establishes the necessity for Timber Harvesting Plans to conduct commercial timber operations and establishes the Board of Forestry and Fire Protection as the regulatory authority for promulgation of regulations to, among other things:

> …encourage prudent and responsible forest resource management calculated to serve the public's need for timber and other forest products, while giving consideration to the public's need for watershed protection, fisheries and wildlife, sequestration of carbon dioxide, and recreational opportunities alike in this and future generations.

The FPA was initially adopted in 1973. Since that time, the BOF has enacted numerous regulations to support the Act's intent related to sustained yield and has adopted conservation standards for post-harvest stocking that meet or exceed the minimum resource conservation standards specified in PRC §4561 of the Act. The Board has established rules related to demonstration of Timberland Productivity, Sustained Forestry Planning (14 CCR §933.10), demonstration of Maximum Sustained Productivity (14 CCR §933.11), and has defined sustained yield and Long Term Sustained Yield (14 CCR §895.1). Under these various rule provisions, landowners with more than 50,000 acres of timberland are required to demonstrate long-term sustained yield under the management regime they have selected for the ownership. Under this provision, the Department has received and approved long term sustained yield documents covering approximately 3.2 million acres of timberland. For smaller industrial and nonindustrial landowners, they must comply with minimum retention standards specified in the Rules as established by the Board, although they may choose a higher standard.

More recently, amendments were made to the FPA to clarify and refine other mandates related to the assessment of Greenhouse Gas (GHG) impacts:

> 4512.5. Sequestration of carbon dioxide; legislative findings and declarations.

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decision-makers and the public. Use of projected future conditions as the only baseline must be supported by reliable projections based on substantial evidence in the record.
(3) An existing conditions baseline shall not include hypothetical conditions, such as those that might be allowed, but have never actually occurred, under existing permits or plans, as the baseline.
(b) When preparing an EIR for a plan for the reuse of a military base, lead agencies should refer to the special application of the principle of baseline conditions for determining significant impacts contained in Section 15229.
(c) Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project. The EIR must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed and it must permit the significant effects of the project to be considered in the full environmental context.
(d) The EIR shall discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, regional blueprint plans, plans for the reduction of greenhouse gas emissions, habitat conservation plans, natural community conservation plans and regional land use plans for the protection of the Coastal Zone, Lake Tahoe Basin, San Francisco Bay, and Santa Monica Mountains.
(e) Where a proposed project is compared with an adopted plan, the analysis shall examine the existing physical conditions at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced as well as the potential future conditions discussed in the plan.

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The Legislature finds and declares all of the following:

(a) State forests play a critical and unique role in the state's carbon balance by sequestering carbon dioxide from the atmosphere and storing it long term as carbon.

(b) According to the scoping plan adopted by the State Air Resources Board pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code), the state's forests currently are an annual net sequesterer of five million metric tons of carbon dioxide (5MMTCO2). In fact, the forest sector is the only sector included in the scoping plan that provides a net sequestration of Greenhouse Gas emissions.

(c) The scoping plan proposes to maintain the current 5MMTCO2 annual sequestration rate through 2020 by implementing "sustainable management practices," which include potential changes to existing forest practices and land use regulations.

(d) There is increasing evidence that climate change has and will continue to stress forest ecosystems, which underscores the importance of proactively managing forests so that they can adapt to these stressors and remain a net sequesterer of carbon dioxide.

(e) The Board, the Department, and the State Air Resources Board should strive to go beyond the status quo sequestration rate and ensure that their policies and regulations reflect the unique role forests play in combating climate change.

4551. Adoption of district forest practice Rules and regulations; factors considered in Rules and regulations governing harvesting of commercial tree species; funding.

(a) …

(b) (1) The Board shall ensure that its Rules and regulations that govern the harvesting of commercial tree species, where applicable, consider the capacity of forest resources, including above ground and below ground biomass and soil, to sequester carbon dioxide emissions sufficient to meet or exceed the state's Greenhouse Gas reduction requirements .for the forestry sector, consistent with the scoping plan adopted by the State Air Resources Board pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code).

(2) …

Technical Rule Addendum #2, Item G:

G. GREENHOUSE GAS (GHG) IMPACTS

Forest management activities may affect GHG sequestration and emission rates of forests through changes to forest inventory, growth, yield, and mortality. Timber Operations and subsequent

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production of wood products, and in some instances energy, can result in the emission, storage, and offset of GHGs. One or more of the following options can be used to assess the potential for significant adverse cumulative GHG Effects:

1. Incorporation by reference, or tiering from, a programmatic assessment that was certified by the Board, CAL FIRE, or other State Agency, which analyzes the net Effects of GHG associated with forest management activities.
2. Application of a model or methodology quantifying an estimate of GHG emissions resulting from the Project. The model or methodology should at a minimum consider the following:
   a. Inventory, growth, and harvest over a specified planning horizon
   b. Projected forest carbon sequestration over the planning horizon
   c. Timber Operation related emissions originating from logging equipment and transportation of logs to manufacturing facility
   d. GHG emissions and storage associated with the production and life cycle of manufactured wood products.
3. A qualitative assessment describing the extent to which the Project in combination with Past Projects and Reasonably Foreseeable Probable Future Projects may increase or reduce GHG emissions compared to the existing environmental setting. Such assessment should disclose if a known ‘threshold of significance’ (14 CCR § 15064.7) for the Project type has been identified by the Board, CAL FIRE or other State Agency and if so whether or not the Project's emissions in combination with other forestry Projects are anticipated to exceed this threshold.

California Legislative and Administrative Background

Over the years, various efforts by the California Legislature and the Governor to quantify greenhouse gas emissions and develop strategies for avoiding potential negative impacts have occurred. A summary relevant to this THP is provided below:

1. Assembly Bill 32 (AB32), the Global Warming Solutions Act of 2006, was signed into law by Governor Schwarzenegger and represents a comprehensive approach to address climate change. AB32 establishes a statewide goal to reduce greenhouse gas emissions to 1990 levels by 2020. The California Resources Air Board (ARB) is the lead agency for implementing AB32.

   The scoping plan adopted by the ARB in December of 2008 (CARB, 2008) establishes a general roadmap that California will take to achieve the 2020 goals. Targets for the

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Forestry Sector were established under the "Sustainable Forests" section of the Scoping Plan. The "Sustainable Forest" element was recognized as a carbon sink based on the current carbon inventory for the Forest Sector and sequestration benefits attributable to forests. Specific recommendations for the sector included:

- Maintaining the current 5 $MMTCO_2E$ reduction target through 2020 by ensuring that current carbon stock is not diminished over time.
- Monitoring of carbon sequestered
- Improving greenhouse gas inventories.
- Determining actions needed to meet the 2020 targets.
- Adaptation
- Focusing on sustainable land-use activities.

Wildfire threat and loss to conversions were recognized as potential threats to the Forest Sector in relation to achieving sector goals.

2. AB 1504 (Chapter 534, Statutes of 2010, Skinner): Requires the Board of Forestry and Fire Protection to ensure that its rules and regulations that govern timber harvesting consider the capacity of forest resources to sequester carbon dioxide emissions sufficient to meet or exceed the state's GHG reduction target for the forestry sector, consistent with the AB 32 Climate Change Scoping Plan goal of 5 million metric tons CO2 equivalent sequestered per year. Currently, these reports are principally prepared by Glenn A. Christensen.

3. SB 1122 (Chapter 612, Statutes of 2012, Rubio): This bill requires production of 50 megawatts of biomass energy using byproducts of sustainable forest management from fire threat treatment areas as determined by CAL FIRE.

4. AB 417 (Chapter 182, Statutes of 2015, Dahle): This bill provides the Board of Forestry and Fire Protection with additional flexibility in setting post timber harvest tree stocking standards in order to, in part, contribute to specific forest health and ecological goals as defined by the Board. The 2020 Forest Practice Rules include the Board's revisions to the "Resource Conservation Standards" under 14 CCR §932.7.

5. In 2015, the Governor issued Executive Order B-30-15 establishing a GHG reduction target for California of 40 percent below 1990 levels by 2030 and 80 percent by 2050 to help limit global warming to 2 degrees Celsius or less as identified by the IPCC to avoid potentially catastrophic climate change impacts. In 2016, the California Legislature passed Senate Bill 32 (Chapter 249, Statutes of 2016), which codifies the Governor's Executive Order. CARB updated the AB 32 Scoping Plan in 2017 to reflect the 2030 target.

6. SB 859 (Chapter 368, Statutes of 2016, Committee on Budget and Fiscal Review): Among other things, calls for CARB, in consultation with CNRA and CAL FIRE, to complete a standardized GHG emissions inventory for natural and working lands, including forests by December 31, 2018 (CARB, 2018).

7. SB 1386 (Chapter 545 Statutes of 2016, Wolk): Declares the policy of the state that the protection and management of natural and working lands, including

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forests, is an important strategy in meeting the state's greenhouse gas reduction goals, and requires all state agencies, departments, boards, and commissions to consider this policy when revising, adopting, or establishing policies, regulations, expenditures, or grant criteria relating to the protection and management of natural and working lands.

8. (2018) Accompanying release of the Forest Carbon Plan, Governor Brown's Executive Order B-52-18 on forest management emphasizes the importance of implementing the Forest Carbon Plan. Executive Order B-55-18 also calls for California to achieve carbon neutrality no later than 2045, with carbon sequestration targets to be set in the Natural and Working Lands to help achieve this goal.

These Laws, Regulations and Executive Orders form the background under which CAL FIRE reviews plans for impacts to GHG emissions and sequestration.

National and State-Level GHG Assessments

A variety of assessments have been conducted to calculate the GHG emissions and rates of sequestration related to management of natural and working lands. Due to the rapidly evolving science, accounting methods and policy directions from the executive and legislative branches, specific accounting that conforms from study to study has yet to be achieved. The overall trends, however, do provide meaningful insight within which to make assumptions about how an individual THP fits into the overall objectives of assessing and mitigating potential negative impacts from GHG emissions.

USEPA Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018 (EPA, 2020):
Summary: Forest management falls under the "Land Use, Land Use Change, and Forestry" (abbreviated LULUCF) for consistent reporting with other international efforts. Sequestrations at the national level offset approximately 12% of total US GHG Emissions annually and this carbon pool remains relatively stable over time.

- In 2018, total gross U.S. greenhouse gas emissions were 6,676.6 million metric tons of carbon dioxide equivalent (MMT CO2 Eq). Total U.S. emissions have increased by 3.7 percent from 1990 to 2018, down from a high of 15.2 percent above 1990 levels in 2007. Emissions increased from 2017 to 2018 by 2.9 percent (188.4 MMT CO2 Eq.). Net emissions (including sinks) were 5,903 MMT CO2 Eq. Overall, net emissions increased 3.1 percent from 2017 to 2018 and decreased 10.2 percent from 2005 levels as shown in Table ES-2. The Fdeferreddecline reflects many long-term trends, including population, economic growth, energy market trends, technological changes including energy efficiency, and energy fuel choices. Between 2017 and 2018, the increase in total greenhouse gas emissions was largely driven by an increase in CO2 emissions from fossil fuel combustion. The increase in CO2 emissions from fossil fuel combustion was a result of multiple factors, including increased energy use from greater heating and cooling needs due to a colder winter and hotter summer in 2018 compared to 2017.

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- Conversely, U.S. greenhouse gas emissions were partly offset by carbon (C) sequestration in forests, trees in urban areas, agricultural soils, landfilled yard trimmings and food scraps, and coastal wetlands, which, in aggregate, offset 12.0 percent of total emissions in 2018.

- Within the United States, fossil fuel combustion accounted for 92.8 percent of CO2 emissions in 2018. There are 25 additional sources of CO2 emissions included in the Inventory (see Figure ES-5). Although not illustrated in the Figure ES-5, changes in land use and forestry practices can also lead to net CO2 emissions (e.g., through conversion of forest land to agricultural or urban use) or to a net sink for CO2 (e.g., through net additions to forest biomass).

- Land Use, Land-Use Change, and Forestry (LULUCF)

    - Overall, the Inventory results show that managed land is a net sink for CO2 (C sequestration) in the United States. The primary drivers of fluxes on managed lands include forest management practices, tree planting in urban areas, the management of agricultural soils, landfilling of yard trimmings and food scraps, and activities that cause changes in C stocks in coastal wetlands. The main drivers for forest C sequestration include forest growth and increasing forest area, as well as a net accumulation of C stocks in harvested wood pools.
    - The LULUCF sector in 2018 resulted in a net increase in C stocks (i.e., net CO2 removals) of 799.6 MMT CO2 Eq. (Table ES-5). This represents an offset of 12.0 percent of total (i.e., gross) greenhouse gas emissions in 2018… Between 1990 and 2018, total C sequestration in the LULUCF sector decreased by 7.1 percent, primarily due to a decrease in the rate of net C accumulation in forests and Cropland Remaining Cropland, as well as an increase in CO2 emissions from Land Converted to Settlements.
    - Forest fires were the largest source of CH4 emissions from LULUCF in 2018, totaling 11.3 MMT CO2 Eq. (452 kt of CH4).
    - Forest fires were also the largest source of N2O emissions from LULUCF in 2018, totaling 7.5 MMT CO2 Eq. (25 kt of N2O). Nitrous oxide emissions from fertilizer application to settlement soils in 2018 totaled to 2.4 MMT CO2 Eq. (8 kt of N2O).

CARB AB32 Scoping Plan (CARB, 2017) :

Summary: At the state level, all sectors are cumulatively on track to meet the 2020 targets for GHG reductions and sequestration. The Natural and Working Lands in the state represent a key sector for the long-term storage of carbon in vegetation and soils. During the period of

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2001-2010, disturbances (primarily in the form of wildfire) caused significant losses to the total stored carbon. Meeting state goals will require multi-owner and jurisdictional cooperation as well as trade-offs between competing interests.

- California's natural and working landscapes, like forests and farms, are home to the most diverse sources of food, fiber, and renewable energy in the country. They underpin the state's water supply and support clean air, wildlife habitat, and local and regional economies. They are also the frontiers of climate change. They are often the first to experience the impacts of climate change, and they hold the ultimate solution to addressing climate change and its impacts. In order to stabilize the climate, natural and working lands must play a key role.

- Work to better quantify the carbon stored in natural and working lands is continuing, but given the long timelines to change landscapes, action must begin now to restore and conserve these lands. We should aim to manage our natural and working lands in California to reduce GHG emissions from business-as-usual by at least 15-20 million metric tons in 2030, to compliment the measures described in this Plan.

- California's forests should be healthy carbon sinks that minimize black carbon emissions where appropriate, supply new markets for woody waste and non-merchantable timber, and provide multiple ecosystem benefits.

- AB 32 directs CARB to develop and track GHG emissions and progress toward the 2020 statewide GHG target. California is on track to achieve the target while also reducing criteria pollutants and toxic air contaminants and supporting economic growth. As shown in Figure 1, in 2015, total GHG emissions decreased by 1.5 $MMTCO_2e$ compared to 2014, representing an overall decrease of 10 percent since peak levels in 2004. The 2015 GHG Emission Inventory and a description of the methodology updates can be accessed at: www.arb.ca.gov/cc/inventory/inventory .

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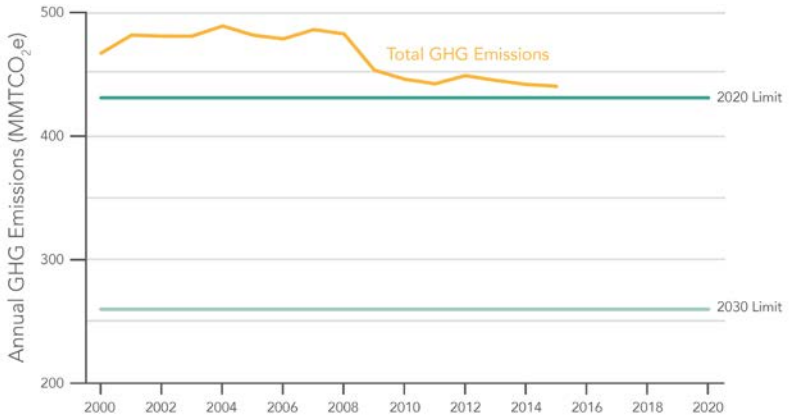
FIGURE 1: CALIFORNIA GHG INVENTORY TREND



- Carbon dioxide is the primary GHG emitted in California, accounting for 84 percent of total GHG emissions in 2015, as shown in Figure 2 below. Figure 3 illustrates that transportation, primarily on-road travel, is the single largest source of CO2 emissions in the State.. When these emissions sources are attributed to the transportation sector, the emissions from that sector amount to approximately half of statewide GHG emissions. In addition to transportation, electricity production, and industrial and residential sources also are important contributors to CO2

- Increasing Carbon Sequestration in Natural and Working Lands
    - California's natural and working lands make the State a global leader in agriculture, a U.S. leader in forest products, and a global biodiversity hotspot. These lands support clean air, wildlife and pollinator habitat, rural economies, and are critical components of California's water infrastructure. Keeping these lands and waters intact and at high levels of ecological function (including resilient carbon sequestration) is necessary for the well-being and security of Californians in 2030, 2050, and beyond. Forests, rangelands, farms, wetlands, riparian areas, deserts, coastal areas, and the ocean store substantial carbon in biomass and soils.

    - Natural and working lands are a key sector in the State's climate change strategy. Storing carbon in trees, other vegetation, soils, and aquatic sediment is an effective way to remove carbon dioxide from the atmosphere. …We must consider important trade-offs in developing the State's climate strategy by understanding the near and long-term impacts of various policy scenarios and actions on our State and local communities.

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- Recent trends indicate that significant pools of carbon from these landscapes risk reversal: over the period 2001–2010 disturbance caused an estimated 150 MMT C loss, with the majority– approximately 120 MMT C– lost through wildland fire.

- California's climate objective for natural and working lands is to maintain them as a carbon sink (i.e., net zero or negative GHG emissions) and, where appropriate, minimize the net GHG and black carbon emissions associated with management, biomass utilization, and wildfire events.

- Decades of fire exclusion, coupled with an extended drought and the impacts of climate change, have increased the size and intensity of wildfires and bark beetle infestations; exposed millions of urban and rural residents to unhealthy smoke-laden air from wildfires; and threatened progress toward meeting the state's long-term climate goals. Managing forests in California to be healthy, resilient net sinks of carbon is a vital part of California's climate change policy.

- Federally managed lands play an important role in the achievement of the California climate goals established in AB 32 and subsequent related legislation and plans. Over half of the forestland in California is managed by the federal government, primarily by the USDA Forest Service Pacific Southwest Region, and these lands comprise the largest potential forest carbon sink under one ownership in the state... The State of California must continue to work closely and in parallel to the federal government's efforts to resolve these obstacles and achieve forest health and resilience on the lands that federal agencies manage.

California Forest Carbon Plan (Forest Climate Action Team, 2018)

Summary: Current estimated sequestration for the entire forest sector is 32.8 MMT CO2e/year, which is 6.56 times more than the current target of 5 MMT per year. Regional, landscape or watershed level assessments are appropriate scales for examining rates of GHG emissions and sequestration. Wildfire remains the single largest source of carbon loss and remains the largest source of black carbon emissions. Although there are trade-offs with in-forest carbon stores, sustainably managed working forests can further provide climate mitigation benefits.

- When all forest pools are considered, California's forests are sequestering 34.4 MMT CO2e/year, and when land-use changes and non-CO2 emissions from wildfires are accounted for, the total net sequestration is 32.8 MMT CO2e/year.

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Table 16. Statewide Average Annual Growth, Removals, Mortality, and Net Change for the Above Ground Live Tree Pool by Disturbance, Owner, and Land Status on Plots Initially Measured between 2001-2005 and Re-Measured between 2011-2015 (thousand metric tons carbon dioxide equivalent per year).

	UNRESERVED FORESTLAND			RESERVED FORESTLAND	ALL FORESTLAND[2]
	Private, Corporate	Private, Non-Corporate	USDA Forest Service	USDA Forest Service	Total
	thousand metric tons CO2 equivalent per year				
Gross tree growth	18,554	13,772	25,983	7,188	**73,253**
Removal - harvest	-10,664	-1,476	-1,467	-22	**-13,645**
Mortality – fire killed	-278	-449	-6,077	-4,689	**-12,566**
Mortality – cut and fire[1]	-466	-49	-326	0	**-842**
Mortality – insects and disease	-488	-435	-3,162	-1,039	**-5,728**
Mortality – natural/other	-2,525	-2,988	-6,743	-2,203	**-16,543**
Net live tree	4,133	8,375	8,208	-765	**23,929**
				95% confidence interval	**4,575**

[1]Mortality – Cut and fire: plots where tree mortality has occurred due to both harvest and fire.

[2]Includes other public forestland.

Source: USDA Forest Service FIA.[267]

- The key findings of the [Forest Carbon Plan] include:
  - California's forested landscapes provide a broad range of public and private benefits, including carbon sequestration.
  - The long-term impacts of excluding fire in fire-adapted forest ecosystems are being manifested in rapidly deteriorating forest health, including loss of forest cover in some cases.
  - Extreme fires and fire suppression costs are increasing significantly, and these fires are a growing threat to public health and safety, to homes, to water supply and water quality, and to a wide range of other forest benefits, including ecosystem services.
  - Reducing carbon losses from forests, particularly the extensive carbon losses that occur during and after extreme wildfires in forests and through uncharacteristic tree mortality, is essential to meeting the state's long-term climate goals.
  - Fuel reduction in forests, whether through mechanical thinning, use of ecologically beneficial fire, or sustainable commercial timber harvest to achieve forest health goals, involves some immediate loss of forest carbon, but these treatments can increase the stability of the remaining and future stored carbon.
  - Current rates of fuel reduction, thinning of overly dense forests, and use of prescribed and managed fire are far below levels needed to restore forest health, prevent extreme fires, and meet the state's long-term climate goals.

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  - Where forest stands are excessively dense, forest managers may have to conduct a heavy thinning to restore resilient, healthy conditions, which, among other benefits, will subsequently facilitate the reintroduction of prescribed fire as an ecological management tool.
  - Sustainable timber harvesting on working forests can substantially improve the economic feasibility of these treatments to achieve forest health goals at the scale necessary to make an ecologically meaningful difference.
  - Where forestlands have been diminished due to fires, drought, insects, or disease, they should be reforested with ecologically appropriate tree species from appropriate seed sources.
  - The scale and combination of needed treatments and their arrangement across the landscape is likely to be highly variable and dependent on the local setting.
  - The state must work closely with Federal and private landowners to manage forests for forest health, multiple benefits, and resiliency efficiently at a meaningful scale.

- The watershed level has proven to be an appropriate organizing unit for analysis and for the coordination and integrated management of the numerous physical, chemical, and biological processes that make up a watershed ecosystem. Similarly, a watershed can serve as an appropriate reference unit for the policies, actions, and processes that affect the biophysical system, and providing a basis for greater integration and collaboration. Forests and related climate mitigation and adaptation issues operate across these same biophysical, institutional, and social gradients.

  Because of these factors, the Forest Carbon Plan proposes working regionally at the landscape or watershed scale. The appropriate scale of a landscape or watershed to work at will vary greatly depending upon the specific biophysical conditions, land ownership or management patterns, and other social or institutional conditions.

- Forests are shaped by disturbance and background levels of tree mortality. However, elevated tree mortality from overly dense stand conditions, fire exclusion, lack of or poor forest management practices, and impacts related to drought and climate change can have a substantial effect on the forest carbon balance. Wildfire is the single largest source of carbon storage loss and GHG emissions from forested lands: of the estimated 150 million metric tons of carbon lost from forests from 2001-2010, approximately 120 million metric tons of carbon was lost through wildland fire. Wildfire also is the single biggest source of black carbon emissions. Reducing the intensity and extent of

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wildland fires through tools such as fuels reduction, prescribed or managed fire, thinning, and sustainable timber management practices is therefore a top priority.

- In addition to fuels reduction and prescribed and managed fire treatments, sustainable commercial timber harvesting on private and public lands, where consistent with the goals of owners or with management designations and done to maximize forest health goals, can play a beneficial role, both in thinning dense forests and financing additional treatments. Although there are trade-offs with in-forest carbon stores, sustainably managed working forests can further provide climate mitigation benefits. Commercial timber harvest within a sustainable management regime to maximizing forest health goals also creates revenue opportunities to fund additional forest treatments and should be seen as a tool in the maintenance of our forests as healthy, resilient net sinks of carbon.

- In order to support the goals of this Forest Carbon Plan, wood and biomass material generated by timber harvesting, forest health, restoration and hazardous fuels treatments must be either utilized productively or disposed of in a manner that minimizes net GHG and black carbon emissions. Timber and other biomass harvest volumes are expected to increase as a result of the forest management activities outlined above. These volumes will include green and dead trees suitable for timber production, smaller-diameter green and dead trees with little traditional timber value, and tops and limbs.

- Specific Rates of Sequestration/Emission by landowner category:

    - Private Corporate Forestland: Private corporate forestland includes both timberland and other forestland. On private corporate forestland growth is high and exceeds removal and mortality, reflecting the practice of sustained yield as required by California’s Forest Practice Act and Rules. These forests are managed to create relatively little annual mortality and the harvested volume is less than forest growth. Rates of removals from harvest and thinning are highest on these lands, but the rate of fire-related mortality is lowest. These forests experience a net gain in carbon at a rate of 0.75 metric tons of CO_2e per acre per year, or 4.1 MMT of CO_2e per year. In 2012, these lands contributed 70 percent of the total harvest (Figure 16) and are therefore an important contributor to the carbon stored long-term in harvested wood products and reduced emissions from burning wood instead of fossil fuels for energy.

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- Private Non-Corporate Forestland: This category represents private ownerships for which timber production may or may not be a primary management objective. The rate of gross growth is high on these lands, while the rate of natural, non-fire related mortality is low. The rate of fire-related mortality is also quite low, although it is higher than on private corporate forestland. As these lands exhibit high growth rates, lower harvest per acre than corporate forestland, and have relatively low levels of mortality, these forest lands see the highest net sequestration rates on the order of 1.33 metric tons of CO2e per acre per year, or 8.4 million metric tons of CO2e per year.

  Private non-corporate forestland has the highest rate of sequestration per acre (Figure 17), and despite making up 10 percent less of the forestland base than USDA Forest Service unreserved forestland, these forests sequester the greatest total amount (Table 16). A net 33 percent increase in carbon stock from private non-corporate forestland came from only 24 percent of the California forestland base (Figure 18, Figure 9). A net 13 percent increase in carbon stock from private corporate forestland came from 15 percent of the forestland base. … Private non-corporate forestlands provided slightly less of a net increase in carbon stocks than all USDA FS forestlands, despite being just half the size.

- Forest carbon is stored in both forest ecosystems and, to a lesser extent, in harvested wood products. The degree to which California forests operate as a sink or source is influenced by land management, weather, and a range of forest health issues (e.g., growth, tree mortality from drought, pest and disease outbreaks, wildfire severity). In recent years, prolonged drought conditions have resulted in elevated tree mortality that is widespread across the southern Sierra. The combination of drought impacts and extensive wildfires has made forests lose significant capacity for storing carbon. For all forestlands, improving forest health and managing to reduce losses from mortality can greatly increase the carbon balance on forestlands. On commercial and other actively managed forestlands in California, efficient uses of long lasting wood products and residues for energy can yield GHG benefits. Key inventory findings include:
  - Based on FIA Program data from 2006-2015, all California forests combined on all ownerships were performing as a net sink and are sequestering carbon at an average rate of 0.79 metric tons of CO2e per acre per year, or 0.22 metric tons of carbon per acre per year.

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- Based on FIA Program data from 2006 – 2015, California forests have substantial carbon storage; 1,303 MMT above ground and 734 MMT below ground, for a total of 2,037 MMT.

- Based on remeasurements taken between 2011 and 2015, carbon sequestration in the live tree pool (in-forest) was estimated at 7.4 MMT of CO2e per year on National Forest System unreserved and reserved forestlands, 4.1 MMT on private corporate forestland, 8.4 MMT on private noncorporate timberlands, and 4.0 MMT on other public lands. The net change in the live tree pool across all forestlands is estimated at 23.9 MMT of CO2e per year.

- When other forest pools, soils, non-GHG emissions from wildfire, and changes from land-use are accounted for, the net change is 32.8 MMT CO2e per year, meeting the AB 1504 goal of sequestering 5 MMT CO2e per year, assuming the contribution of flux associated with wood products does not drastically lower rates.

- On a per-acre basis, conifer forest types have enormous carbon capture and storage potential.

- FIA Program data suggest that on private forestland growth is outpacing losses from harvest and mortality (excluding wood product storage), and exceeds that of National Forest System lands.

- FIA Program data show that non-corporate forestland has the greatest net growth (i.e., growth minus mortality and harvest excluding wood product storage).

- Based on FIA Program data, tree mortality from forest health-related causes results in substantial declines in forest carbon. These data indicate that tree mortality rates are highest on federal forest lands in reserve (e.g., wilderness), where mortality is slightly outpacing growth.

CARB California Greenhouse Gas Emissions for 2000 to 2018 **(CARB, 2020)**
Summary: This inventory is specific to anthropogenic sources so most of the agriculture category relates to commercial agriculture. Emissions related to logging from trucks and equipment would fall under the transportation sector. The Natural and Working Lands Emission Inventory contains more specific emission and sequestration numbers for Forestry.

- California statewide GHG emissions dropped below the 2020 GHG Limit in 2016 and have remained below the 2020 GHG Limit since then.

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- Transportation emissions decreased in 2018 compared to the previous year, which is the first year over year decrease since 2013.
- Since 2008, California's electricity sector has followed an overall downward trend in emissions. In 2018, solar power generation has continued its rapid growth since 2013.
- Emissions from high-GWP gases increased 2.3 percent in 2018 (2000-2018 average year-overyear increase is 6.8 percent), continuing the increasing trend as they replace Ozone Depleting Substances (ODS) being phased out under the 1987 Montreal Protocol.

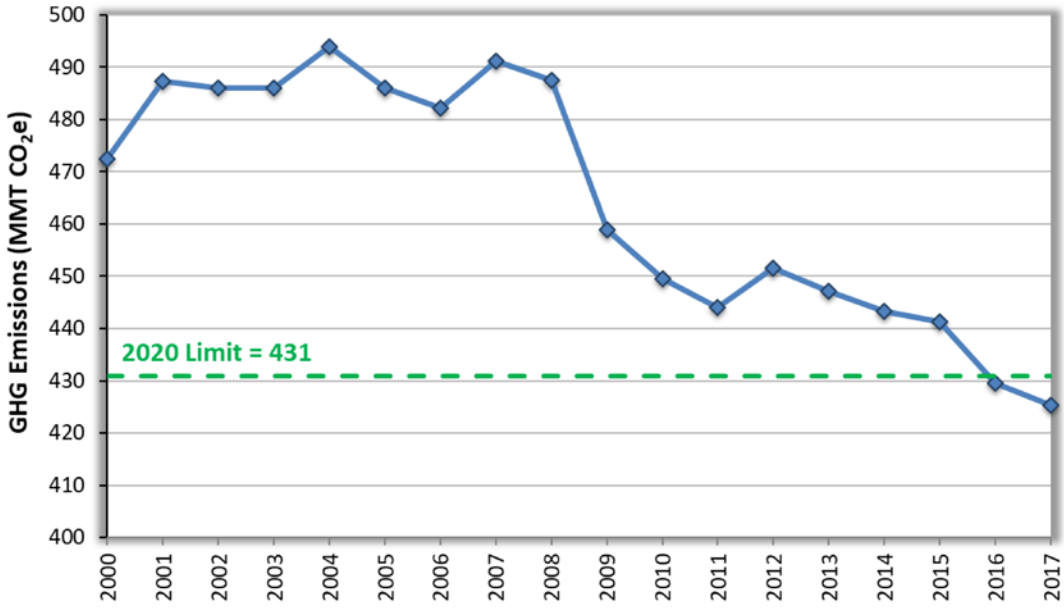

Figure 1. California GHG Emissions Trends. This figure shows the emission trends between 2000 and 2017 as compared to the 2020 statewide GHG limit of 431 $MMTCO_2e$.

- In 2017, emissions from statewide emitting activities were 424 million metric tons of CO2 equivalent (MMTCO2e), which is 5 MMTCO2e lower than 2016 levels. 2017 emissions have decreased by 14 percent since peak levels in 2004 and are 7 MMTCO2e below the 1990 emissions level and the State's 2020 GHG limit. Per capita GHG emissions in California have dropped from a 2001 peak of 14.1 tonnes per person to 10.7 tonnes per person in 2017, a 24 percent decrease.4,19 Overall trends in the inventory also demonstrate that the carbon intensity of California's economy (the amount of carbon pollution per million dollars of gross domestic product (GDP)) is declining. From 2000 to 2017, the carbon intensity of California's economy has decreased by 41 percent from 2001 peak emissions while simultaneously increasing GDP by 52 percent. In 2017, GDP grew 3.6 percent while the emissions per GDP declined by 4.5 percent compared to 2016.22

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Figures 2(a)-(c) on the next page show California's growth alongside GHG reductions.

- California's agricultural sector contributed approximately 8 percent of statewide GHG emissions in 2017, mainly from methane (CH_4) and nitrous oxide (N_2O) sources.

An Inventory of Ecosystem Carbon in California's Natural & Working Lands (NWL)
(CARB, 2020)

This inventory tracks carbon within California ecosystems and how it moves between various "pools". This is a snapshot view that provides for valuable long-term comparisons. These inventories are constantly being improved and some tracking categories have higher levels of certainty than others. Soil is the largest estimated pool of carbon and also has the highest error associated with those estimates. The assessment estimates that a majority of soil carbon loss is associated with the Sacramento-San Joaquin Delta region. Forest and shrublands show a 6% decrease, due to loss from wildfire. During the early iterations of these inventories, it appears prudent to only focus on gross trends.

- The Earth's carbon cycle involves the exchange of carbon between the atmosphere, biosphere (plants, animals, and other life forms), hydrosphere (water bodies), pedosphere (soils), and lithosphere (Earth's crust and mantles, including rocks and fossil fuels). Carbon moves between land types (e.g., forests and grasslands) and carbon pools1 (e.g., wood, roots, and soils) due to natural processes (growth, decay, and succession) and disturbances (e.g., wildfire) or anthropogenic forces such as land use change. The NWL Inventory tracks how much carbon exists in California's ecosystems, where that carbon is located, and estimates how much carbon is moving in and out of the various land types and carbon pools. It provides stored carbon "snapshots" and gives insight into the location and magnitude of NWL carbon stocks at discrete moments in time.

- The NWL inventory includes:
  - Forest and other natural lands (woodland, shrubland, grassland, and other lands with sparse vegetation): live and dead plant materials and their roots
  - Urban land: trees in urban area
  - Cropland: woody biomass in orchards and vineyards
  - Soil Carbon: organic carbon in soils for all land types
  - Wetlands: CO_2 and CH_4 emissions from wetland ecosystem

- Current NWL Inventory

  - There are approximately 5,340 million metric tons (MMT)2 of ecosystem carbon in the carbon pools that CARB has quantified.3 (To put it into context, 5,340 MMT of carbon in land is equivalent to 19,600 MMT of atmospheric CO_2

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currently existing as carbon in the biosphere and pedosphere as carbon cycles through the Earth's carbon cycle.) Forest and shrubland contain the vast majority of California's carbon stock because they cover the majority of California's landscape and have the highest carbon density of any land cover type. All other land categories combined comprise over 35% of California's total acreage, but only 15% of carbon stocks. Roughly half of the 5,340 MMT of carbon resides in soils and half resides in plant biomass.

- Soil is the largest carbon reservoir. Using the IPCC default assumptions, most of the estimated net change in soil carbon was due to microbial oxidation of organic soil on the Sacramento-San Joaquin Delta. Disturbance caused by tillage and other agricultural management practices, land conversion, and land degradation also contributed to the soil carbon loss. Forest and shrubland carbon stocks in 2010 was 6% lower than in 2001 due to a number of large wildfires that occurred during the 2001-2010 period. (Future inventory editions will capture the impacts of large fire events seen in recent years.) Woody crops and urban forest both gained carbon, as these trees are generally well maintained due to their economic and aesthetic values. Part of the carbon gain seen in urban forests came from expansion of the urban footprint over this period of time. Movement of carbon among land types and carbon pools is a dynamic process. Carbon gain in one land type may be a result of carbon loss in another land type, and vice versa.

- Although carbon that leaves the land base is counted as a carbon stock loss in the NWL Inventory, not all carbon stock loss becomes emissions released into the atmosphere. Some of the carbon leaving the land base continue to retain carbon as durable wood products (e.g., furniture and building materials).

- Disturbances in Forest and Other Natural Lands
  Geospatially explicit carbon stock change information can be related to the different types of disturbance on land. During the 2001–2014 period, wildfire accounted for 74% and prescribed fire accounted for 3% of the areas that experienced disturbance. The impact of wildfire can be seen throughout the State, in both rural areas and urbanized areas near shrublands and forest. Harvest and clearcut accounted for 11%, and fuel reduction activities (thinning, mechanical, and mastication) accounted for 14% of the disturbed area.

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- Uncertainty of the Inventory Estimates The science, method, and technique for accounting of ecosystem carbon are relatively new and still rapidly advancing. Although significant progress has been made in the inventory development, more work still needs to be done. The parts of the NWL Inventory that have been in development for more years generally have a reasonably constrained uncertainty (between 15% and 40%), but other parts of the inventory that CARB started to develop more recently contain significant uncertainties.

AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory
(Christensen, Gray, Kuegler, Tase, & M, 2021)
Summary: California forests vastly exceed the 5MMT CO2e target, by a factor of over 5 times, even when taking into account losses from fire, drought and timberland conversion. Forests remain a net sink of carbon, even accounting for losses from wildfire and drought.

- Overall California forests are exceeding the 5 MMT CO2e target rate of annual sequestration established by AB 1504, sequestering 26.8 ± 4.2 MMT CO2e per year (excludes confidence interval for HWP C net change; Table 7.1). This value includes changes in forest ecosystem pools (26.0 MMT CO2e per year), harvested wood product pools (0.8 MMT CO2e per year), non-CO2 emissions from wildfires (-0.6 MMT CO2e per year), and forest land conversions (-1.0 MMT CO2e per year).
- Based on plots initially measured between 2001-2009 and re-measured between 2011-2019, the average statewide rate of forest carbon sequestration is 26.0 ± 4.1 MMT CO2e per year, excluding net CO2e contributions from other sources such as, harvested wood products, forest land conversions and non-CO2 GHG emissions from wildfire (Table 4.1,4.3).
- Based on the 2019 measurement period, after accounting for these other CO2 and greenhouse gas sources the statewide rate of carbon sequestration on all forest land is 24.5 ± 4.0 MMT CO2e per year (Table 4.2a), down from the 2018 re-calculated reporting period estimate of 26.4 ± 4.3 MMT CO2e. This value cannot be directly compared to previous report values from the 2015 reporting period (32.8 ± 5.5 MMT CO2e per year), the 2016 reporting period (30.7 ± 5.3 MMT CO2e per year), or the 2017 reporting period (27.0 ± 5.5 MMT CO2e per year) due to improved methods over time and the re- stratification that occurred in 2019. However, data suggest that the net annual sequestration rate is decreasing over time. This value excludes contributions from HWP pools.

THP-Specific Assessment

CEQA requires that individual projects estimate the associated GHG emissions from a proposed project and make a determination of significance. The plan submitter provided a site-

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specific analysis on pages 255 through 268. The specific calculations used for the assessment are from the CAL FIRE Greenhouse Gas calculator located on pages 263 through 268 and estimate the THP is capable of releasing a total of 1,231 tonnes of CO_2e. As described in the analysis, many of these releases will occur slowly over time, and are provided in the THP as a conservative, worst case emission estimate. These emissions are estimated to be recouped by trees in the THP area within 10 years. Over the next 100 years, these stands are expected to sequester a total of 17,772 tonnes of CO_2e.

The THP concluded that these emissions would not be significant, when combined with other past, present and reasonably foreseeable future projects.

The Department has reviewed the estimates of emissions associated with the pools evaluated by the Plan as part of the project specific analysis and has determined that the calculations have reasonably accounted for emissions from biologic and production elements of the project and that the sequestration estimates incorporate approaches for estimating carbon sequestration that are consistent with current science.

When this THP is considered within its own context, taking into account the state and national assessments discussed previously, CAL FIRE believes that it meets the requirements of CEQA and is consistent with the broader goals established by AB32 in providing for long-term carbon sequestration while providing for the market needs for forest products.

Fire Hazard Risk and Assessment

> From the appointment of the first State Board of Forestry in 1885, to the creation of the first State Forester position in 1905, and the organization of the original California Division of Forestry in 1927, the Department of Forestry and Fire Protection (CAL FIRE) has protected the people, property, and natural resources of California. The Department’s diverse programs work together to plan protection strategies for over 31 million acres of privately-owned wildlands, and to provide emergency services of all kinds throughout California.
>
> -CAL FIRE 2019 Strategic Plan

As an agency, CAL FIRE fulfills many roles to protect both the public and natural resources of our state. When it comes to operations that can impact both the natural environment and the public, CAL FIRE must review these proposals with an eye towards these two responsibilities. When it comes to a decision of whether to approve a plan, CAL FIRE must exercise professional discretion:

> 14 CCR § 897 Implementation of Act Intent
> (d) Due to the variety of individual circumstances of timber harvesting in California and the subsequent inability to adopt site-specific standards and regulations, these Rules use

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> judgmental terms in describing the standards that will apply in certain situations. By necessity, the RPF shall exercise professional judgment in applying these judgmental terms and in determining which of a range of feasible (see definition 14 CCR 895.1) silvicultural systems, operating methods and procedures contained in the Rules shall be proposed in the plan to substantially lessen significant adverse Impacts in the environment from timber harvesting. The Director also shall exercise professional judgment in applying these judgmental terms in determining whether a particular plan complies with the Rules adopted by the Board and, accordingly, whether he or she should approve or disapprove a plan. The Director shall use these Rules to identify the nature of and the limits to the professional judgment to be exercised by him or her in administering these Rules.

Requirements of Evaluation included in the Rules

The Forest Practice Rules recognize that Timber Operations have the potential to cause and contribute to the severity of fires. The need to protect property and natural resources from fire goes back to the founding of the original Board of Forestry in 1885. Fire prevention laws were the first regulations governing forestry in our state.

Current Forest Practice Laws contain significant detail on how operations are to be conducted to reduce or eliminate the chance that logging will cause a fire. Article 7 of the Rules cover the various methods of reducing fire risk and hazard, collectively called “Hazard Reduction”:

- 917, 937, 957 Hazard Reduction
  - 917.2, 937.2, 957.2 Treatment of *[Logging]* Slash to Reduce Fire Hazard
  - 917.3 Prescribed Broadcast Burning of Slash [Coast]
  - 937.3 Prescribed Broadcast Burning of Slash [Northern]
  - 957.3 Prescribed Broadcast Burning of Slash [Southern]
  - 917.4 Treatment of Logging Slash in the Southern Subdistrict
  - 957.4 Treatment of Logging Slash in the High Use Subdistrict
  - 917.5, 937.5, 957.5 Burning of Piles and Concentrations of Slash
  - 917.6, 937.6, 957.6 Notification of Burning
  - 917.7, 937.7, 957.7 Protection of Residual Trees
  - 917.9, 937.9, 957.9 Prevention Practices

A primary concern addressed in the Hazard Reduction Rules deals with logging debris left over after trees are harvested. Branches, leaves, and other materials not taken to a sawmill (called “slash”) must be treated in such a way that an increase in fire hazard does not occur, and to prevent the spread of forest-based insects and diseases. For example, the following standard practices shall be followed within the THP area to treat slash:

> 917.2, 937.2, 957.2 Treatment of Slash to Reduce Fire Hazard [All Districts]
> Except in the [High-Use Subdistrict of the Southern Forest District,] Southern Subdistrict of the Coast Forest District

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and Coastal Commission Special Treatment Areas of the Coast Forest District, the following standards shall apply to the treatment of Slash created by Timber Operations within the plan area and on roads adjacent to the plan area. Lopping for fire hazard reduction is defined in 14 CCR 895.1.

(a) Slash to be treated by piling and burning shall be treated as follows:
    (1) Piles created prior to September 1 shall be treated not later than April 1 of the year following its creation, or within 30 days following climatic access after April 1 of the year following its creation.
    (2) Piles created on or after September 1 shall be treated not later than April 1 of the second year following its creation, or within 30 days following climatic access after April 1 of the second year following its creation.

(b) Within 100 feet of the edge of the traveled surface of public roads, … and seasonal] private roads open for public use where permission to pass is not required, Slash created and trees knocked down by road construction or Timber Operations shall be treated by lopping for fire hazard reduction, piling and burning, chipping, burying or removal from the zone.

(c) All woody debris created by Timber Operations greater than one inch but less than eight inches in diameter within 100 feet of permanently located structures maintained for human habitation shall be removed or piled and burned; all Slash created between 100-200 feet of permanently located structures maintained for human habitation shall be lopped for fire hazard reduction, removed, chipped or piled and burned

This plan has no public roads that would require slash treatment adjacent to it and does not propose to use slash pile burning for hazard reduction.

This proposal was reviewed by CAL FIRE and determined to be appropriate and in conformance with the Rules. For this plan, there are no structures requiring hazard reduction near the plan area,

No matter where Timber Operations are located, every Licensed Timber Operator is required to submit to CAL FIRE a Fire Suppression Resource Inventory that contains emergency contact information for each Licensed Timber Operator along with the number of personnel and types of equipment that can be used to suppress any fire. These operators can be called upon

to assist CAL FIRE with emergency fire suppression in the area where they are operating, further adding to the resources that can be used during a fire.

In addition to the hazard reduction rules, operations proposed in this plan have additional benefits expected to reduce fire danger.

- Road brushing and maintenance: As part of the Timber Operations, existing roads will receive maintenance to allow for access for logging equipment. These operations ensure that roads used for operations are free of obstruction and can be used during the operations and in the future in the event they are required for fire suppression:

  > 923.1, 943.1, 963.1 Planning for Logging Roads and Landings. [All Districts]
  > Logging Roads and Landings shall be planned and located within the context of a systematic layout pattern that considers 14 CCR § 923(b), uses existing Logging Roads and Landings where feasible and appropriate, and provides access for fire and resource protection activities.

  Additionally, any time that burning permits are required (e.g. during the declared fire season), all roads and landings within the harvest plan area must be passable for use during an emergency:

  > 923.6, 943.6, 963.6 (d) When burning permits are required pursuant to PRC § 4423, Logging Roads and Landings that are in use shall be kept in passable condition for fire trucks.

Maintaining access within the harvest plan area is consistent with the Sonoma Lake Napa Unit Strategic Fire Plan to allow for rapid extinguishment of fires within CAL FIRE responsibility areas.

When it comes to evaluating the potential for the proposed plan to negatively impact wildfire risk and hazard, the Rules contain the following guidelines:

> Excerpt from Technical Rule Addendum #2:
> WILDFIRE RISK AND HAZARD
> Cumulative increase in wildfire risk and hazard can occur when the Effects of two or more activities from one or more Projects combine to produce a significant increase in forest fuel loading in the vicinity of residential dwellings and communities.
> The following elements may be considered in the assessment of potential Cumulative Impacts:
> 1. Fire hazard severity zoning.
> 2. Existing and probable future fuel conditions including vertical and horizontal continuity of live and dead fuels.

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3. Location of known existing public and private Fuelbreaks and fuel hazard reduction activities.
4. Road access for fire suppression resources.

The Rules specify that an RPF must evaluate potential impacts that could be caused by the project. Timber harvesting is not required to lower wildfire risk and hazard, although this is common from properly designed and implemented operations.

The complete assessment is located on page 269-270 and correctly discloses that the area is designated as being within a High Fire Hazard Severity Zone. This designation was made by CAL FIRE as part of a statewide assessment. Additional detail and information can be found on the CAL FIRE website[7]

> *The Fire Hazard Severity Zone maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high and very high. Urban and wildland areas are treated differently in the model, but the model does recognize the influence of burning embers traveling into urban areas, which is a major cause of fire spread.*

CAL FIRE has determined that the assessment of potential hazards is reasonable based upon the characteristics of the assessment area and the proposed operations. In light of the available information contained within the record, CAL FIRE concurs with the RPFs conclusion that the plan will not have a significant adverse effect on Wildfire Risk and Hazard.

[7] https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildfire-prevention-engineering/fire-hazard-severity-zones

CEQA Thresholds of Concern (TOC) and Quantitative Versus Qualitative Assessments

The Board's rules do not require a specific method of cumulative impacts assessment, because the Board determined that no single, available procedure adequately addresses the wide range of site conditions and THP activities found in California. Technical Rule Addendum No. 2 provides the framework of what should be considered and what to look for with respect to conditions that may be at or near some level of concern. As stated in the Addendum, "The watershed impacts of past upstream and on-site projects are often reflected in the condition of stream channels on the project area." This is a critical element as it guides the RPF to focus on areas where cumulative watershed effects are known to accumulate. The Addendum then describes factors that can be used to evaluate the potential project impacts. Such factors include gravel embeddedness, pool filling, stream aggrading, bank cutting, bank mass wasting, downcutting, scouring, organic debris, stream-side vegetation, and recent floods. Taken together, they help inform the RPF about the status of the Environmental Setting (14 CCR §15125[8]) with respect to the impacts of past projects, and will form the basis of a determination on the impacts of the proposed project.

Comment writers take exception to the assessment produced by the Registered Professional Foresters claiming it to be subjective and not sufficient upon which to make determinations on potential plan impacts. Additionally, commenters propose alternative methods that quantify impacts based upon the expected change to vegetation. Attempts to codify statewide, quantitative standards for determining thresholds of concern for impacts have consistently proved problematic due to the wide variety of conditions found in California.

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[8] **15125. ENVIRONMENTAL SETTING**
(a) An EIR must include a description of the physical environmental conditions in the vicinity of the project. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. The description of the environmental setting shall be no longer than is necessary to provide an understanding of the significant effects of the proposed project and its alternatives. The purpose of this requirement is to give the public and decision makers the most accurate and understandable picture practically possible of the project's likely near-term and long-term impacts.
(1) Generally, the lead agency should describe physical environmental conditions as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Where existing conditions change or fluctuate over time, and where necessary to provide the most accurate picture practically possible of the project's impacts, a lead agency may define existing conditions by referencing historic conditions, or conditions expected when the project becomes operational, or both, that are supported with substantial evidence. In addition, a lead agency may also use baselines consisting of both existing conditions and projected future conditions that are supported by reliable projections based on substantial evidence in the record.
(2) A lead agency may use projected future conditions (beyond the date of project operations) baseline as the sole baseline for analysis o.nly if it demonstrates with substantial evidence that use of existing conditions would be either misleading or without informative value to decision-makers and the public. Use of projected future conditions as the only baseline must be supported by reliable projections based on substantial evidence in the record.
(3) An existing conditions baseline shall not include hypothetical conditions, such as those that might be allowed, but have never actually occurred, under existing permits or plans, as the baseline.
(b) When preparing an EIR for a plan for the reuse of a military base, lead agencies should refer to the special application of the principle of baseline conditions for determining significant impacts contained in Section 15229.
(c) Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project. The EIR must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed and it must permit the significant effects of the project to be considered in the full environmental context.
(d) The EIR shall discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, regional blueprint plans, plans for the reduction of greenhouse gas emissions, habitat conservation plans, natural community conservation plans and regional land use plans for the protection of the Coastal Zone, Lake Tahoe Basin, San Francisco Bay, and Santa Monica Mountains.
(e) Where a proposed project is compared with an adopted plan, the analysis shall examine the existing physical conditions at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced as well as the potential future conditions discussed in the plan.

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Faced with similar comments, the Board of Forestry addressed this issue during the rulemaking for Technical Rule Addendum #2 in 1991:

Final Statement of Reasons (FSOR) for Technical Rule Addendum #2 (1/18/91)

Pages 56-57 (In response to concerns on the need for Quantitative Data for establishing baselines):

Response - The Board reviewed several drafts of regulations before noticing the proposed language. One of the drafts offered to the Board by the Department contained a set of required measurements which could be reproduced as suggested.

Public comment received by the Board from the agencies and public convinced the Board that there is not a set of quantitative values which can withstand peer review in all areas which are affected by cumulative effects. The breadth of this expertise ranges from geologists, hydrologists, soils scientists, and various biologists.

Given this, the Board relied upon the experience of others in the field of cumulative effects and decided that a qualitative method would be most reliable for the decision maker. Most other agencies currently use the qualitative method which means that an independent analysis is conducted on each project. In this method available data is collected and evaluated to determine that defined topic and issue areas (i.e. stream bank or bed condition) are considered and a condition identified. There then are certain conditions which can be identified. One example is a lack of certain stream biota which indicate the threshold of significant cumulative effects has been reached.

To date, the quantitative methods identified by the Board rely upon numbers which are assigned on the basis of professional judgment. This means that it is only a modified qualitative analysis at best. An example of this is the Chatoian Method of Equivalent Roaded Acres being developed for use by the United States Forest Service. Recent field evaluations have shown that there is little relationship between Equivalent Roaded Acres and the conditions of the water quality in a watershed.

For these reasons the Board did not believe it could require a standardized set of data measurements in the THP regulations. Further, the data collected would have to be entered into a common data base if any analytical value is to be gained. This would be a costly proposition for the State. The Board believes that such a data base will ultimately be developed and will be invaluable but it should be sought at this time in a nonregulatory manner.

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> Proceeding with the development of a data base in this manner will allow the necessary data to be identified, the analysis process to be developed, the funding to be identified, and most of all the necessary peer acceptance of such a system to be nurtured.
>
> Also page 70
>
> Response - Refer to response No. 1 in the letter dated August 1, 1990 by Mr. Benjamin Kor, Northcoast Regional Water Quality Control Board. Further, the Board conducted an extensive review of cumulative effects methodologies during 1988 and 1989 most recently and has had at least two previous reports prepared on the topic. The Board in developing this proposal released several draft cumulative effects methodologies for peer review. These methods were originally quantitative to the extent numerical values were assigned to professional judgments. Those values were then totaled and used to estimate whether a cumulative effects threshold had been crossed. The peer review always resulted in criticism of the time required to develop determinations which still relied upon best professional judgment. In response the Board chose to pursue development of the adopted proposal which relies on an independent analysis which provides guidance on what measures must be considered when judging if a cumulative impact will occur. This method as is now currently used by most planning departments and other lead agencies. Use of this method requires information of sufficient detail to support a record of decision.

The CEQA Guidelines encourage agencies to develop specific Thresholds of Concern that can be applied to environmental review, but this is not required (14 CCR §15064.7(b)). For CAL FIRE, the establishment of Thresholds of Concern rest with the Board of Forestry and they will make the final determination on if, when and where these thresholds should be applied.

What is (and is not) Answered in an Official Response

In its simplest form, the Official Response (OR) is an apologia, which is latin for “speaking in defense.” This involves CAL FIRE providing an explanation for why the plan was approved within the context of the comments received. Usually, this is why the plan was approved over comments that it should be denied or modified. The OR is limited to only substantial environmental concerns (PRC §21080.5(d)(2)(D)[9], 14 CCR §1037.8[10], §1090.22[11],

[9] (d) To qualify for certification pursuant to this section, a regulatory program shall require the utilization of an interdisciplinary approach that will ensure the integrated use of the natural and social sciences in decision making and that shall meet all of the following criteria:… 2) The rules and regulations adopted by the administering agency for the regulatory program do all of the following: … (D) Require that final action on the proposed activity include the written responses of the issuing authority to significant environmental points raised during the evaluation process.

[10] At the time the Director notifies the plan submitter that the plan has been found in conformance, as described in 14 CCR 1037.7, the Director shall transmit a notice thereof to the agencies and persons referred to in 14 CCR 1037.3, and for posting at the places named in 14 CCR 1037.1.

§1094.21[11]) and does not address issues that are outside of CAL FIRE jurisdiction, involve points of law, or policy.

Public Comment

Public comment for this plan came in the form of one email with attachments for cited literature. These have been included in Appendix A along with a reference to where they are specifically responded to in the document. The discussion preceding this section provides responses to broader questions received through public comment, and information below provides specific responses to individual questions responded to separately. The brackets around the snapshot below show that this is considered specific Concern #1, of which a corresponding Response #1 is provided.

III. Lower Rockpile Creek Planning Watershed; Cumulative Harvested Acres

At only 2,947 acres, Lower Rockpile Creek [calwater 1113.820003] is the *smallest* planning watershed in the entire Gualala River basin by far. It is also the fifth most harvested, with over 10% of the watershed acreage subjected to harvesting in just the past few years.

Table 1. Gualala River Basin planning watersheds and 10-year harvested acreage totals

Planning Watershed	Name	Watershed Acres	THP Acres	ECA	Cumulative ECA %	Cumulative Acres %
1113.850303	Mouth of Gualala River	5305.35	1044.15	728.56	13.7	19.7

Response #1: (Past Harvesting and Equivalent Clearcut Acres [ECA])

When it comes to the evaluation of potential cumulative effects of a project, 14 CCR §898 specifies "Cumulative Impacts shall be assessed based upon the methodology described in Board Technical Rule Addendum Number 2, Forest Practice Cumulative Impacts Assessment Process and shall be guided by standards of practicality and reasonableness." With respect to the discussion of past projects, Technical Rule Addendum #2 specifies:

> *D. Past Projects and Reasonably Foreseeable Probable Future Projects*
> *Past Projects and Reasonably Foreseeable Probable Future Projects included in the Cumulative Impacts assessment shall be described as follows:*
> *1. Identify and briefly describe the location of Past Projects and Reasonably Foreseeable Probable Future Projects within assessment areas. Include a map or maps and associated legend(s) clearly depicting the following information:*
> *a. Township and Range numbers and Section lines.*

A copy of the notice shall be filed with the Secretary for Resources. The notice of conformance shall include a written response of the Director to significant environmental issues raised during the evaluation process.

[11] §1090.22 and §1094.21 contain the same language related to the Official Response as §1037.8

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b. Boundary of the planning watershed(s) which the Plan area is located along with the CALWATER 2.2 Planning Watershed number(s).
c. Location and boundaries of Past Projects and Reasonably Foreseeable Probable Future Projects on land owned or controlled by the Timberland Owner (of the proposed timber harvest) within the planning watershed(s) depicted in provision (b) above. For purposes of this provision, Past Projects shall be limited to those Projects submitted within ten years prior to submission of the Plan.

For this plan, these are included on pages 168-177. The information tabulated by the comment writer uses the metric of "Equivalent Clearcut Acres" (ECA) to express concern over the impacts of cumulative timber harvesting. This method is one way of estimating changed in impacts due to management actions:

"Equivalent Clearcut Acres (ECA) – ECA is used as an indicator of change in water yield or peak flows resulting from reductions in forest canopy (thinning and harvest-related activities). The ECA analysis takes into account the initial percentage of crown removal and the recovery through vegetative regrowth since the initial disturbance. Existing roads are considered permanent openings in ECA estimates. The analysis takes a simple snapshot in time, with the assumption that all Clear Creek project activities would be implemented in 1 year. ECA predictions are used to compare alternatives and are not viewed as absolutes. This water yield indicator serves only as a red flag that suggests a potential for decreased stability due to sustained increased energy in the stream channel. ECA is used in combination with other indicators such as channel stability and channel type to determine hydrologic risk. The ECA method was developed to address concerns about water yield increases and potential effects on channel morphology. In the 1970s and 1980s, channel changes (primarily scouring) were often observed following timber harvest, and these changes were thought to be caused by water yield increases."

- Biological Assessment for snake river fall chinook, salmon, Snake river steelheao trout, Columbia river bull trout, Spring chinook salmon, Westslope cutthroat trout, Interior redband trout, Pacific lamprey,Western pearlshell musse. USDA Nez Perce-Clearwater National Forests.

Introduction from (Ager & Clifton, 2005)

Understanding and modeling the cumulative watershed effects of management and natural disturbance is a significant challenge for land managers (U.S. Council on Environmental Quality 1997). Cumulative watershed effects can result from minor actions taking place over a period of time that

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collectively are thought to alter hydrologic response (FEMAT 1993). A wide variety of qualitative and quantitative methods for analyzing cumulative watershed effects have been developed over the past 25 to 30 years (Berg et al. 1996, Reid 1993). One of the earliest quantitative approaches used by the Forest Service was the equivalent clearcut area (ECA) method, which accounts for past and future effects of different types of disturbances by standardizing the effects and modeling the recovery over time. It was originally developed for use in northern Idaho and Montana (King 1989, USDA FS 1974) where it was used to measure the potential impacts of alternative timber harvesting schedules. A more encompassing model, equivalent roaded area (ERA), was later developed in the Pacific Southwest Region by using the same framework, and was extensively used in the Sierra Nevada Ecosystem Project (Menning et al. 1997).

Both models assume a direct linkage between vegetation disturbance and hydrologic response (i.e., peak flows and water yield) (Bosch and Hewlett 1982, Stednick 1996). Despite conficting literature on the existence of these linkages and other limitations (Beschta et al. 2000, Menning et al. 1997), the model is still required for consultation with the National Oceanic and Atmospheric Administration (NOAA) Fisheries Department and the U.S. Fish and Wildlife Service (USDC NMFS 1995, USDI FWS 1998) for all proposed management actions in the Blue Mountains national forests and elsewhere within the range covered by PACFISH (USDA USDI 1995a) and INFISH (USDA USDI 1995b) policies. An ECA analysis is typically applied at the subwatershed scale (10,000 to 40,000 acres) as part of analyzing alternative management actions developed in the National Environmental Policy Act (NEPA) project analysis. Equivalent clearcut area measures are also relevant to standards and guidelines for many of the current national forest plans that specify maximum treatment acreages on a subwatershed basis over time. For the Umatilla National Forest, there is no explicit ECA standard in the forest plan, but an ECA of 15 percent is used as a surrogate for a forest plan standard that allows a maximum of 30 percent of the forested area in a subwatershed to be in the 0 to 10-year age class.

The ECA model uses one set of coefficients to describe the proportion of the total basal area removed for different disturbance types, including harvest prescriptions, wildfire, prescribed fire, roads, and insect mortality. A second set determines how fast the treated acres recover to 100 percent of potential leaf area or canopy closure, at

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> which point the acre is assumed to have hydrologic function the same as an untreated acre. The physical model behind ECA as a cumulative-effects measure is that vegetation removal changes water yield characteristics (peak flow, timing, total yield) in rough proportion to leaf area, or basal area removed from a site. Several studies have shown that timber harvest affects water yield by reducing water loss associated with interception and evapotranspiration, or by changing snow distribution and melt rates (Hicks et al. 1991, Scherer 2001, Stednick 1996). The hydrologic changes may lead to destabilized stream channels and other adverse ecological effects (Reid 1993). The ECA statistic (percentage of area in equivalent clearcut condition) is typically used in conjunction with climatic data to evaluate the cumulative effects of vegetative removal on water yields and peak flows. The ECA statistic also may be used as a general guide to overall watershed condition when coupled with site-specific evaluations.
>
> Calculation of the ECA statistic can be a time-consuming process for watersheds that have received multiple disturbances over time. Calculations are complicated by the consideration of multiple treatment alternatives and revision of treatment intensities in the process of project development. This paper describes the program Equivalent Treatment Area Calculator (ETAC) that vastly simplifies calculation of the ECA statistic. The ETAC program is intended to provide a consistent approach to measuring harvest and other impacts to forest vegetation. This paper describes the most recent version of the program, methods for preparing data, considerations for use of the model, and includes an example analysis.

While ECA and other methods such as ERA can be used to analyze past projects and their expected interactions with proposed actions, their use is not required. This is discussed in greater detail in the General Discussion above. CAL FIRE reviewed the past projects assessment and concluded that it was consistent with the requirements of TRA2.

Response #2 (Thresholds of Concern):

This concern is addressed above in the section titled: “CEQA Thresholds of Concern (TOC) and Quantitative Versus Qualitative Assessments” with additional discussion in Response #6.

Response #3 (CAL FIRE not Complying with Regulations):

Although several sections of code and case law are referenced, no specific deficiency with the plan that correlates to the concern is provided making a response impossible.

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Response #4 (CAL FIRE Deferred Mitigation/Mitigation as an Alternative to Analysis and Deficiencies with CAL FIRE Review):

CAL FIRE believes that deferred mitigation is not appropriate, although CEQA case law shows a more mixed opinion of the practice (see below). It is reasonable to conclude that impacts from a proposed project cannot be reasonably assessed unless the mitigation measures to apply are specified before approval. The potential always exists that a more appropriate mitigation could be developed after plan approval, but such changes would need to be considered as an amendment to the plan, providing the Lead Agency with the decision of how to proceed with making that change to the plan (i.e. minor or substantial deviation)

Deferred Mitigation

Deferred mitigation refers to the practice of putting off the precise determination of whether an impact is significant, or precisely defining required mitigation measures, until a future date. Over the years, the courts have addressed the issue of deferred mitigation numerous times to the point where patterns of appropriate and inappropriate CEQA behavior have emerged. Such certainty is not possible if the details of enforceable mitigation measures to avoid the impacts are deferred.

Deferral should only be considered when there is a legitimate reason why the agency cannot develop a specific mitigation measure at the time of the project environmental review. As discussed below, deferring mitigation does not mean deferring the inclusion of a mitigation measure in the environmental document or the implementation of that measure. It refers to deferring to a future time for the refinement or full definition of the adopted mitigation measure.
The essential rule for proper deferral of the specifics of mitigation was established in Sacramento Old City Assoc. v. City Council of Sacramento (1991) 229 Cal. App. 3d 1011. This case held that the City of Sacramento had correctly deferred the selection of specific mitigation measures to reduce the parking impacts from the expansion of its convention center. Under the reasoning established in this case and cited in many decisions since, in order to meet CEQA’s requirements a mitigation measure must meet one of the following basic Conditions:

- The agency must commit itself to the mitigation by identifying and adopting one or more mitigation measures for the identified significant effect. The mitigation measure must also set out clear performance standards for what the

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future mitigation must achieve.

- Alternatively, the agency must provide a menu of feasible mitigation options from which the applicant or agency staffs can choose in order to achieve the stated performance standards.

The courts have opined on deferred mitigation in reported cases many times since the Sacramento Old City decision, and three points stand out. First, each case is fact-specific. So, keeping a clear administrative record that contains substantial evidence supporting the deferred approach is crucial. Second, performance standards must be included in the mitigation measure; specific performance standards are needed in order to show that the final mitigation measure will be effective. Third, the lead agency must ensure that the future mitigation will be implemented— oftentimes done through a condition of approval for obtaining a development permit. Inherent in the commitment to mitigation and adoption of performance standards is a responsibility to ensure that the final mitigation is effective and is actually implemented.

> "'[W]hen a public agency has evaluated the potentially significant impacts of a project and has identified measures that will mitigate those impacts,' and has committed to mitigating those impacts, the agency may defer precisely how mitigation will be achieved under the identified measures pending further study." (Oakland Heritage Alliance v. City of Oakland (2011) 195 Cal.App.4th 884, citing California Native Plant Society v. City of Rancho Cordova (2010) 172 Cal.App.4th 603.)

"CEQA Portal Topic Paper - Mitigation Measures" Association of Environmental Professionals. Updated 2/10/20[12]

It is important for CAL FIRE to clarify, without vagueness, that a determination of significance has been made for this plan upon approval. All operational measures included in this plan have been determined to avoid significant adverse effects. No determination on significance or appropriate operational measures has been deferred.

With respect to any mitigation measures adopted, CAL FIRE agrees that they should be accompanied by Substantial Evidence to support their effectiveness. It is important to point out,

[12] https://ceqaportal.org/tp/CEQA%20Mitigation%202020.pdf

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however, that the application of the Rules (including ASP Rules) are not considered mitigation measures in and of themselves.

The Rules were designed as a set of generic measures to avoid significant impacts, but they do not presume that significant impacts would occur if they were not applied. Since every project is unique in both the physical setting and proposed operations, such one-size-fits-all measures cannot be presumed to always avoid impacts, nor does their application imply that a significant impact would occur with some lesser measure. If the Rules were in fact definitive as mitigation measures for a THP, field review would never be required since it would be entirely redundant.

While the Rule development underwent its own CEQA process, site-specific evaluations of impacts and of potential cumulative effects is still required on all THPs.

In the CEQA Guidelines, the following definition of mitigation is provided:

> 15370. MITIGATION
> “Mitigation” includes:
> (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
> (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
> (c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
> (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
> (e) Compensating for the impact by replacing or providing substitute resources or environments, including through permanent protection of such resources in the form of conservation easements.

Since regular CEQA projects (e.g. Environmental Impact Reports) do not have a set of standards or best management practices to draw from in regulation, they must independently evaluate potential impacts and develop custom mitigation measures when a significant adverse effect is anticipated.

Important to remember in the CEQA process, there are no “standard” rules for how a project can mitigate potential risks. Under a Certified Regulatory Program, this is different. The Board has promulgated Rules designed to reduce potential impacts from Timber Operations to below the level of significance. Although this is the purpose of the Rules, as described above, it does not eliminate the requirement to evaluate them for a specific project. Interagency (Interdisciplinary) review is a required component of a Certified Regulatory Program and is part of the decision making process that CAL FIRE uses to evaluate proposed plans.

With respect to the deficiencies with review of cumulative impacts, CAL FIRE watershed protection staff provided a robust and appropriate response to the “Dunne” report in 2003. It is evident from reading both the Dunne report and the CDF response that the Dunne authors did

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not make a good faith attempt to understand the fundamentals of the issue. The report concluded that CDF had no staff with adequate training in CWEs, yet never interviewed any of the employees who actually do this work. The response is so substantive and germane that it has been included in its entirety as Appendix B.

Response #5 (Using Watersheds for Evaluation of Cumulative Effects)

The general discussions of “Watersheds as the Focal Point for Cumulative Impacts Evaluation” and “Greenhouse Gas Sequestration” provide an extensive discussion on the use of watersheds for evaluation. Put simply, there is substantial evidence to support the use of watersheds for the basis of evaluating cumulative effects.

Response #6 (Reasonable Thresholds of Concern Already Exist [e.g. Burkhardt])

CAL FIRE reviewed the report from Burkhardt titled “Maximizing Forest Productivity” and found it to be a competent and compelling argument for re-establishing the productive capacity of cutover or depleted forestlands in Mendocino County.

Burkhardt uses known facts relative to mensuration, growth & yield and forest economics to construct a methodology for sustainable harvesting across multiple forest types. This methodology, while rather conservative with respect to potential tree growth, is nonetheless well constructed, researched and described in his report. While it is one approach that can be taken to dealing with harvesting over large areas, it is not the only method that could be employed or applicable to harvesting applications. California law and regulations provide foresters with a range of methods to achieve sustainable harvests and professional discretion to make decisions about management actions to achieve landowner goals.

The Burkhardt paper and its conclusions are very appropriate for the time when it was written. Before current MSP rules (i.e. 1994), the late 80s and 90s were a time when forest liquidation was accelerating. Companies, investors and financial predators saw the massive financial reserves that timberlands held and devised ways to turn that into cash. Forest investments are radically different than others and rely on the owner placing more assets at risk of loss than other businesses. This is what makes forestry so special and yet vulnerable to exploitation. The Burkhardt paper is one way of dealing with this temptation to liquidate what some see as merely excess capital reserves.

But it is not the only way for plans to demonstrate compliance with the MSP rules. For landowners with less than 50,000 acres, MSP can be demonstrated as specified in 14 CCR 913.11(c):

> (c) In a THP, NTMP, or WFMP, MSP is achieved by:
> (1) For evenage management, meeting the minimum stand age standards of 14 CCR § 913.1(a)(1), meeting minimum stocking and basal area standards for the selected silvicultural methods as contained in these Rules only with group A species, and protecting the soil, air, fish and wildlife, water resources and

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other public trust resources through the application of these
Rules; or
(2) For unevenaged management, complying with the seed tree
retention standards pursuant to 14 CCR § 913.1(c)(1)(A)
[933.1(c)(1)(A), 953.1(c)(1)(A)] or 913.2(b)(6) [933.2(b)(6),
953.2(b)(6)], meeting minimum stocking and basal area standards
for the selected silvicultural methods as contained in these
Rules only with group A species, and protecting the soil, air,
fish and wildlife, water resources and other public trust
resources through the application of these Rules.
(3) For intermediate treatments and special prescriptions,
complying with the stocking requirements of the individual
treatment or prescription.
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For this plan, each silvicultural method proposed complies, at minimum, with the retention standards specified by 14 CCR §913.1(c).

Response #7 (Watershed Biomass not Accumulating)

The concern states that a model was used to determine changes in volume for the Lower Rockpile Creek watershed and that biomass has not accumulated since 2016. It is difficult to provide any response to this concern for the following reasons:

1. The results were tabulated for only 1 of the 2 watersheds included in the proposed plan.
2. The specific inputs used were based upon the RPF description of the THP area in Section III of the plan, which may or may not accurately describe the remainder of the watershed area involved.
3. There is no requirement under the rules to increase biomass over time.

Even if CAL FIRE agreed with the comment writers assessment, and the associated conclusions (which we do not), it does not mean that the plan as proposed is deficient and requiring revision. There is no requirement that biomass in a watershed accumulate over time, nor that even such a condition is desirable in all conditions.

Overall, it was impossible to determine, without speculation, what this concern was trying to convey or what specific negative impacts were expected to occur as a result.

Response #8 (Plan Fails to Address the Water Cycle):

Timber harvesting plans are not required to evaluate the water cycle as part of the cumulative effects analysis, and it is difficult to understand how a THP could alter patterns of the water cycle on a regional or global scale.

The concern makes a series of generalized and generic conclusions about timber harvesting that can be generally responded to:

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- The concern equates timber harvesting with “land degradation” which cannot be supported based upon the Record. One of the definitions used by the International Panel on Climate Change (IPCC) is “*a negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity or value to humans.”* (IPCC, 2019). The report “Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegatation of Other Vegetation Types” (IPCC-NGGIP, 2003) notes that there were over 50 definitions of “degradation” in the literature they reviewed.
- The concern equates timber harvesting with increased fire danger, ignoring the requirements found within the Rules for hazard reduction, the requirement to evaluate fire hazard and risk in the Cumulative Impacts Discussion.
- The concern assumes increased erosion, despite mitigation measures included in the Rules and the plan to assess erosion potential (e.g. EHR) and reduce erosion to below the level of significance.
- The concern assumes that harvesting will result in loss of soil fertility without providing evidence to support the concern.

The concern states that nothing has been done at the local, regional or state level to address the effects on the water cycle, yet it is unclear what could be done at the THP level to address this. Further, requiring mitigation on an individual THP when the ability for forest management to affect the local water cycle is entirely speculative cannot be supported by the Record.

While impacts on the water cycle are not addressed specifically, the impact that the plan could have on the release and sequestration of Greenhouse Gasses (GHG) has been evaluated on pages 215-234 and is also extensively discussed in the General Discussion. Additionally, the long-term trends in expected changes in temperature and rainfall have also been discussed in the General Discussion and taken into consideration when making a determination on this plan.

CAL FIRE reviewed the Lukovic study (Sekulić, 2021) which reviewed rainfall data for the last 60 years and identified a statistically significant decrease in precipitation in the autumn, extending the dry period in California. This research was conducted in order to inform future modeling of precipitation trends.

CAL FIRE reviewed the Porkony study (Pokorný, 2018) compared temperatures collected and released on different surfaces such as forest, meadows and concrete. Not surprisingly, forested landscapes moderated temperatures much more effectively than areas not covered with vegetation such as concrete. Concerns are noted over conversion of forests into non-forested or urban landscapes. This is not proposed under this plan and a new forest will be planted after harvesting within the evenage units.

CAL FIRE reviewed the Ellison work (Ellison, 2017) and found it to be primarily an opinion piece intended to influence public policy to achieve social justice goals. A variety of topics are discussed in this piece, and it is worth noting, however, that the authors conclusions on the value of biodiversity and native species in plantations meshes very well with current practices in California.

> Forest-driven water and energy cycles are poorly integrated into regional, national, continental and

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global decision-making on climate change adaptation, mitigation, land use and water management. This constrains humanity's ability to protect our planet's climate and life-sustaining functions. The substantial body of research we review reveals that forest, water and energy interactions provide the foundations for carbon storage, for cooling terrestrial surfaces and for distributing water resources. Forests and trees must be recognized as prime regulators within the water, energy and carbon cycles. If these functions are ignored, planners will be unable to assess, adapt to or mitigate the impacts of changing land cover and climate. Our call to action targets a reversal of paradigms, from a carbon-centric model to one that treats the hydrologic and climate-cooling effects of trees and forests as the first order of priority. For reasons of sustainability, carbon storage must remain a secondary, though valuable, by-product. The effects of tree cover on climate at local, regional and continental scales offer benefits that demand wider recognition. The forest- and tree-centered research insights we review and analyze provide a knowledge-base for improving plans, policies and actions. Our understanding of how trees and forests influence water, energy and carbon cycles has important implications, both for the structure of planning, management and governance institutions, as well as for how trees and forests might be used to improve sustainability, adaptation and mitigation efforts.

Billions of people suffer the effects of inadequate access to water (Mekonnen and Hoekstra, 2016) and extreme heat events (Fischer and Knutti, 2015; Herring et al., 2015). Climate change can exacerbate water shortages and threaten food security, triggering mass migrations and increasing social and political conflict (Kelley et al., 2015). Strategies for mitigating and adapting to such outcomes are urgently needed. For large populations to remain where they are located without experiencing the extreme disruptions that can cause migrations, reliable access to water and tolerable atmospheric temperatures must be recognized as stable ingredients of life. As we explain, the maintenance of healthy forests is a necessary pre-condition of this globally- preferential state.

The published work we review suggests forests play important roles in producing and regulating the world's temperatures and fresh water flows. Well recognized as stores of carbon, forests also provide a broad range of less recognized benefits that are equally, if not more, important. Indeed, carbon sequestration can, and perhaps should, be viewed as

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one co-benefit of reforestation strategies designed to protect and intensify the hydrologic cycle and associated cooling. Organized and conceived in this way, reduced deforestation, forest landscape restoration and forest preservation strategies offer essential ingredients for adaptation, mitigation and sustainable development.

Deforestation and anthropogenic land-use transformations have important implications for climate, ecosystems, the sustain- ability of livelihoods and the survival of species, raising concerns about long-term damage to natural Earth system functions (Steffen et al., 2015). Mean warming due to land cover change may explain as much as 18% of current global warming trends (Alkama and Cescatti, 2016). Deforestation exerts an influence on warming at the local scale and alters rainfall and water availability, not to mention the emission of greenhouse gases.

Biodiversity enhances many ecosystem functions like water uptake, tree growth and pest resistance (Sullivan and O'Keeffe, 2011; Vaughn, 2010). The perverse effects of current land management strategies require closer scrutiny. For example, the practice of plantation forestry can negatively impact species richness and related ecosystem services (Ordonez et al., 2014; Verheyen et al., 2015).
Mixed species forests may lead to healthier, more productive forests, more resilient ecosystems and more reliable water related services, and often appear to perform better than monocultures regarding drought resistance and tree growth (Ordonez et al., 2014; Paquette and Messier, 2011; Pretzsch et al., 2014 Pretzsch et al., 2014). Through variation in rooting depth, strength and pattern, different species may aid each other through water uptake, water infiltration and erosion control (Reubens et al., 2007).
Species richness – particularly native species – may be an essential driver in land management policies. Forest rehabilitation offers opportunities to restore water-related ecosystem services (Muys et al., 2014). Future research should identify the required species richness for optimal water ecosystem services. The effects of biodiversity on aerosols, volatile organic compounds, ice nucleation and other rainfall related processes require further research.

The long-term maintenance and perpetuation of forested ecosystems is of primary importance in achieving both regulatory and strategic objectives for mitigating the anticipated negative

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effects of climate change. This is discussed in great detail in the General Discussion along with the role that forests and forestry play in achieving these goals.

When studies are referring to deforestation, there does not seem to be a unified definition. Some refer to the conversion of forests to non-forest uses to be deforestation while others would consider a native forest replaced by an exotic tree species to meet the definition. The United Nations Food and Agriculture Organization has the following definition for "deforestation": (UNFAO, 2021)

> Deforestation is:
>
> Decision 11/CP.7 (UNFCCC, 2001): the direct human-induced conversion of forested land to non-forested land.
>
> FAO 2001: The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold.
>
>> Explanatory note:
>> 1. Deforestation implies the long-term or permanent loss of forest cover and implies transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation.
>> 2. It includes areas of forest converted to agriculture, pasture, water reservoirs and urban areas.
>> 3. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Unless logging is followed by the clearing of the remaining logged-over forest for the introduction of alternative land uses, or the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition. In areas of shifting agriculture, forest, forest fallow and agricultural lands appear in a dynamic pattern where deforestation and the return of forest occur frequently in small patches. To simplify reporting of such areas, the net change over a larger area is typically used.
>> 4. Deforestation also includes areas where, for example, the impact of disturbance, over-utilization or changing environmental conditions affects the forest to an extent that it cannot sustain a tree cover above the 10 percent threshold.

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Using the definitions established by the UN, nothing short of timberland conversion would meet this definition, and no conversion is proposed in this THP. Restrictions on the size of evenage harvest units and age limits on adjacent harvesting provide more variety in stand ages and composition across the landscape. When it comes to plantation establishment in California, native species specific to the seed zone where the THP occurs are required to be planted.

Response #9 (THP Impacts on the Ability for Forest to Product Fog Drip):

Fog drip, or the condensation of water vapor onto vegetation, is not only a well-documented phenomenon but can represent a significant portion of available moisture in an ecosystem (Harr, 1982). The degree to which an individual THP can influence fog drip is highly speculative, however, and an in depth analysis on the part of the Plan is not required in this instance. For example, here is the discussion of fog drip included in this THP:

> (THP Page 205-206)
>
> Fog Drip:
> Timber stands close to the coast receive significant amounts of moisture from fog drip. Dawson (1996) determined that 8-34% of water used by coastal redwood trees and 6-100% of water used by under-story vegetation originated as fog drip. The closer to the coast, the more pronounced the effect, as more days have significant fog. The removal of canopy by harvesting would necessarily reduce the amount of fog interception and therefore reduce fog drip (at least temporally until the canopy closes).
>
> The effect on ground water and stream flow is less clear. Although fog drip is reduced by removal of canopy through logging, evapotranspiration is also reduced by the removal of the tree. Loss of evapotranspiration from forest harvest may be a more significant variable to changes in watershed hydrology than fog drip (Keppeler 1998). The few studies assessing the impact of
>
> Findings: Since this THP is close to the coast vegetation receives a significant amount of moisture from fog drip, according to these studies. This is balanced by the fact that much of the plan is on the flood prone area of the Rockpile Creek and the water table is significantly more available to the standing timber than in upslope areas. In addition, the high canopy retention standards mean that the overstory canopy will only be reduced by approximately 20% at most in the Inner Zone A and at most 50% in the Inner Zone B and will only have a short-term effect on the amount of fog drip water available as the canopy will soon close back in. Any reduction in timber growth from less fog drip will probably be more than made up for by the increase in sunlight available to the residual stand. No

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> significant effects on stream flow either positive or negative would be expected from this light harvest.

For issues that are determined to be non-significant, the CEQA Guidelines state that a lead agency need not consider an effect significant if the project's incremental effect is not cumulatively considerable. (Ref 14 CCR § 15130(a))[13] The concern did not explain how the project's incremental effect might be cumulatively considerable. The concern contains ambiguous references to large areas of canopy loss and extended droughts, but it is unclear how this relates to the proposed plan. This THP will not result in permanent canopy loss and the harvesting of trees in and of itself does not cause drought.

The proposed plan includes only one silvicultural prescription of Single Tree Selection. The light harvesting proposed along with the post-harvest retention should not result in a significant change in the sites ability to intercept fog.

The remainder of the area outside of the proposed harvest area will remain in a forested condition and will continue to facilitate fog drip. Any decrease in moisture from fog drip would be offset by a very minor positive effect on summer base flows created by a short-term reduction of evapotranspiration (Hicks, Beschta, & Harr, 1991); (Sendek, Rice, & Thomas, 1988). Large trees consume large amounts of water during the summer period. This water is removed from the soil by the tree's roots, transported up the stem to the leaves where it is released to the atmosphere in the process of photosynthesis and transpiration. Research on the effects of logging on streamflows by (Evans & Patric, 1983) (Hess, 1984), (Hicks, Beschta, & Harr, 1991), (Rice, Tilley, & Datzman, 1979), (Rothacher, 1973), (Sendek, Rice, & Thomas, 1988), (Wright, Rice, Sendek, & Thomas, 1990), and (Ziemer, 1981) have shown that in rain-dominated hydrologic environments (including those with fog drip contributing to seasonal precipitation), logging or forest road construction is unlikely to adversely change the flow regime of a stream. Groundwater availability is not expected to decrease. Harvest of trees will reduce transpiration and potentially slightly increase the amount of groundwater available for stream recharge, especially in the critical summer months. See also (Aravena, Suzuki, & Pollastri, 1989), (Morgan & Azvedo, 1974), (Byers, 1953), (Cameron, Murray, Fahey, Jackson, & Et. al., 1997), (Cannon, 1901), (Cavelier & Goldstein, Mist and fog interception in elfin cloud forests in Colombia and Venezuela, 1989), (Cavelier, Solis, & Jaramillo, Fog interception in montane forest across the central cordillera of Panama, 1996), (Cooper, 1917), (Dawson, 1996), (Del Moral & Muller, 1969), (Eckern, 1964), (Freeman, 1971), (Gardiner, 1977), (Goodman J. , 1982), (Goodman J. , 1985), (Gurnell, 1976), (Harr, 1982), (Harris, 1987), (Hutley, Doley, Yates, & Boonsaner, 1997), (Ice, 1987), (Ingram & Matthews, Fog drip as a source of groundwater recharge in northern Kenya, 1988), (Ingram & Matthews, The importance of fog drip water to vegetation - Point Reyes peninsula, California, 1995), (Jagels, 1991), (Keppler, 2004), (Kummerow, 1962), (Lerner, 1991), (Loewe, 1960), (Marloth, Results of experiments on Table Mountain for ascertaining the amount of moisture deposited from the S.

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[13] 15130. DISCUSSION OF CUMULATIVE IMPACTS

(a) An EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable, as defined in section 15065(a)(3). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

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E. clouds, 1903), (Marloth, Results of further experiments for ascertaining the amount of moisture deposited from the S. E. clouds, 1905), (Nagel, Fog precipitation on Table Mountain, 1956), (Nagel, Fog precipitation measurements on Africa's southwest coast., 1962), (Nicholson, 1936), (Oberlander, 1956), (Parsons, 1960), (Rubner, Fog precipitation and its measurement, 1932), (Rubner, Fog precipitation in forests and its measurement. II., 1935), (Schemenauer, 1992), (Simon, 1976), (Twomey, 1957), (Vermeulen, Wyers, Romer FG, & Vanleeuwen, 1997), (Vogelmann, SIccama, Ovitte, & Ovitte, 1968), (Walmsley, Schemenauer, & Bridgman, 1996), (Went, 1955), (Yin & Arp, 1994)

Response #10 (Harmful Algae Blooms)

The presence of downstream algae blooms can be caused by a variety of factors, low steam flow, higher temperatures and increased nutrients. These conditions can be exacerbated by many human activities including, but not limited to, agriculture, viticulture, human developments (homes, golf courses etc.), grazing etc. The degree to which a Timber Harvesting Plan could contribute to these conditions is analyzed as part of the Cumulative Effects Analysis in the following areas, among others:

Sediment Potential: Pages 193-208
Organic Debris: Pages 203-204
Temperature: Pages: 201-202

The THP analyzed these, and other, possible factors and concluded that no significant adverse effects are anticipated from the proposed operation. CAL FIRE, having examine the entire record, concurs with this conclusion.

Response #11: (Reduction in Biomass Linked to Decline in Flow)

As described in Response #7 above, without knowing any of the specifics related to the modeling of standing volume within the watershed, there is no way to validate the results that show declining biomass. The observed declines in streamflow match the statewide reduction in precipitation rates for the last several years. It is inappropriate, however, to conclude that two metrics trending in the same direction prove direct causality. In many forested landscapes, increased harvesting of vegetation leads to short term increases in flows, not decreases. Again, it is difficult to provide additional comment on this concern without speculating.

Response #12 (Plan does not Address Wild and Scenic Rivers Act):

The THP is not required to comply with the Wild and Scenic Rivers Act because the designated section of this river starts at the confluence of the North and South Forks of the Gualala and runs to the Pacific Ocean.

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SUMMARY AND CONCLUSIONS

The Department recognizes its responsibility under the Forest Practice Act (FPA) and CEQA to determine whether environmental impacts will be significant and adverse. In the case of the management regime which is part of the THP, significant adverse impacts associated with the proposed application are not anticipated.

CAL FIRE has reviewed the potential impacts from the harvest and reviewed concerns from the public and finds that there will be no expected significant adverse environmental impacts from timber harvesting as described in the Official Response above. Mitigation measures contained in the plan and in the Forest Practice Rules adequately address potential significant adverse environmental effects.

CAL FIRE has considered all pertinent evidence and has determined that no significant adverse cumulative impacts are likely to result from implementing this THP. Pertinent evidence includes, but is not limited to the assessment done by the plan submitter in the watershed and biological assessment area and the knowledge that CAL FIRE has regarding activities that have occurred in the assessment area and surrounding areas where activities could potentially combine to create a significant cumulative impact. This determination is based on the framework provided by the FPA, CCR's, and additional mitigation measures specific to this THP.

CAL FIRE has supplemented the information contained in this THP in conformance with Title 14 CCR § 898, by considering and making known the data and reports which have been submitted from other agencies that reviewed the plan; by considering pertinent information from other timber harvesting documents including THP's, emergency notices, exemption notices, management plans, etc. and including project review documents from other non-CAL FIRE state, local and federal agencies where appropriate; by considering information from aerial photos and GIS databases and by considering information from the CAL FIRE maintained timber harvesting database; by technical knowledge of unit foresters who have reviewed numerous other timber harvesting operations; by reviewing technical publications and participating in research gathering efforts, and participating in training related to the effects of timber harvesting on forest values; by considering and making available to the RPF who prepares THP's, information submitted by the public.

CAL FIRE further finds that all pertinent issues and substantial questions raised by the public and submitted in writing are addressed in this Official Response. Copies of this response are mailed to those who submitted comments in writing with a return address.

ALL CONCERNS RAISED WERE REVIEWED AND ADDRESSED. ALONG WITH THE FRAMEWORK PROVIDED BY THE FOREST PRACTICE ACT AND THE RULES OF THE BOARD OF FORESTRY, AND THE ADDITION OF THE MITIGATION MEASURES SPECIFIC TO THIS THP, THE DEPARTMENT HAS DETERMINED THAT THERE WILL BE NO SIGNIFICANT ADVERSE IMPACTS RESULTING FROM THE IMPLEMENTATION OF THIS THP.

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PC1

From: Friends of the South Fork Gualala <info@fosfg.org>
Sent: Friday, August 5, 2022 2:50 AM
To: Santa Rosa Public Comment@CALFIRE
Subject: significant environmental concerns regarding THP #1-22-00043-SON "Rock"
Attachments: 1-22-00043-SON-Rock-public comment.pdf

Warning: this message is from an external user and should be treated with caution.

Dear Review Team,

We have significant environmental concerns regarding THP #1-22-00043-SON "Rock" which were submitted to CalTrees as Record Number 22PC-000000087 along with 14 relevant exhibits.

(the same public comment is attached to this email)

- Friends of the South Fork Gualala

Submitted through CalTREES 08/05/2022

Attachments not routed due to volume. They are available for review in the Santa Rosa Forest Practice Office or online at: https://caltreesplans.resources.ca.gov/caltrees

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AUG 05 2022
COAST AREA OFFICE
RESOURCE MANAGEMENT

Significant Environmental Concerns regarding THP #1-22-00043-SON "Rock"

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To: CDF THP Review Team
SantaRosaPublicComment@fire.ca.gov
Attn: Dominik Schwab, RPF #2823, Director of Santa Rosa Office
Shawn Headley, Second Review Chair
Review Team, Santa Rosa Office

July 22, 2022

Significant Environmental Concerns regarding THP #1-22-00043-SON "Rock"

I. Introduction

I am submitting this comment to the California Dept of Forestry's (CDF) Timber Harvest Review Team regarding plan number 1-22-00043-SON named Rock THP. This plan is inside the same Lower Rockpile Creek watershed planning area as both the recently submitted "Holly" THP, 1-22-00043-SON and "Vista" THP, 1-20-00003-SON. All of the problems that the public wrote about regarding those plans are still present or exacerbated here.

The Rock THP continues the ongoing practice of providing no factual, valid cumulative impacts analysis, continues to ignore the downstream cumulative effects documented and raised in previous public comments, and does not satisfy CEQA's informational mandate. The THP fails to "include sufficient detail to enable those who did not participate in its preparation to understand and to consider meaningfully the issues the proposed project raises, as CEQA requires." (*Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 510.) Approval of this plan by CDF will fail to uphold the environmental protection requirements of the California Environmental Quality Act (CEQA) and may trigger a legal challenge.

The following comments are submitted on behalf of Friends of the South Fork Gualala (FSFG).

Please consider these comments as Significant Environmental Concerns raised during the review team process.

These comments and substantive evidence show that the material submitted by the RPF:

1. is misleading and false;
2. is largely not relevant to the logging plan, the watershed area affected by the plan, or plan-related adverse cumulative watershed effects, and does not provide meaningful information on those topics;
3. fails entirely to address the significant environmental concerns raised here, and fails to provide sufficient information to enable meaningful public review;
4. is based on subjective, unsupported conclusions and speculation;
5. does not provide a substantial, factual, evidentiary basis for CDF to determine that this logging plan is in conformance with the Forest Practice Act and Rules and will not add to significant cumulative impacts which already exist. In light of the full record, approval of this plan would be an abuse of discretion. A full list of additional information and materials being submitted as part of these comments is at the end of this document.

II. Friends of the South Fork Gualala Background

Friends of the South Fork Gualala (FSFG) is an unincorporated association of concerned citizens of California's northern coast whose mission is to conserve, protect, and restore the South Fork Gualala River watershed and neighboring watersheds. Its members promote science and evidence-based solutions to limiting the effects of climate change on the coastal river watersheds and endangered wildlife. The group is actively engaged in many aspects of conservation, including establishing a historical record of logging in the entire Gualala River basin, conducting data collection and public outreach, and advocating before state and local agencies.

III. Lower Rockpile Creek Planning Watershed; Cumulative Harvested Acres

At only 2,947 acres, Lower Rockpile Creek [calwater 1113.820003] is the *smallest* planning watershed in the entire Gualala River basin by far. It is also the fifth most harvested, with over 10% of the watershed acreage subjected to harvesting in just the past few years.

#1

Table 1. Gualala River Basin planning watersheds and 10-year harvested acreage totals

Planning Watershed	Name	Watershed Acres	THP Acres	ECA	Cumulative ECA %	Cumulative Acres %
1113.850202	Mouth of Gualala River	5305.35	1044.15	728.56	13.7	19.7
1113.850103	Middle South Fork Gualala Riv	7910.29	1837.6	969.03	12.3	23.2
1113.810003	Doty Creek	4628.21	715.82	565.17	12.2	15.5
1113.850301	Stewarts Point	4946.65	787.97	524.07	10.6	15.9
1113.820003	**Lower Rockpile Creek**	**2946.81**	**316.54**	**300.1**	**10.2**	**10.7**
1113.850201	Big Pepperwood Creek	6531.54	678.49	512.63	7.8	10.4
1113.810002	Robinson Creek	8793.06	887.84	649.33	7.4	10.1
1113.840303	Annapolis	7580.04	381.65	305.05	4	5
1113.830003	Grasshopper Creek	5766.82	330.91	198.62	3.4	5.7
1113.850304	Black Point	4621.39	159.13	153.38	3.3	3.4
1113.810004	Billings Creek	10651.3	315.45	236.59	2.2	3
1113.840304	Tobacco Creek	8061.58	226.2	169.65	2.1	2.8
1113.810001	Stewart Creek	6585.38	196.53	139.42	2.1	3
1113.850303	Kolmer Gulch	5769.82	158.42	93.37	1.6	2.7
1113.830004	Little Creek	5869.02	108.27	67.55	1.2	1.8
1113.850104	Upper South Fork Gualala River	8403.28	182.61	91.44	1.1	2.2
1113.820001	Middle Rockpile Creek	8165.85	97.72	73.29	0.9	1.2
1113.840301	Haupt Creek	6043.85	93.62	46.81	0.8	1.5

Sadly, this tiny Lower Rockpile Creek planning watershed has also been hammered by relentless timber harvest plans (THPs). With 2 THPs currently proposed in the watershed, 4 plans completed or in progress over the past 10 years, and 5 additional plans completed in the 15 years preceding that, Lower Rockpile Creek has seen over 26% of its forestland laid waste by tractors, skidders, and cable yarders in the very recent past.

Table 2. Proposed+Past THPs in Lower Rockpile Creek planning watershed, 1997-present

	THP Year	THP Acres	ECA	% Watershed	% ECA Watershed
2022 PROPOSED THPs					
1-22-00042-SON	2022	23.74	18.05	0.80%	0.60%
1-22-00043-SON	2022	84.46	42.23	2.90%	1.40%
SUBTOTAL PROPOSED		**108.2**	**60.28**	**3.70%**	**2.00%**
THPs 2012-2022					
1-20-00003-SON	2020	135.38	123.84	4.60%	4.20%
1-17-104-SON	2017	51.1	49.15	1.70%	1.70%
1-15-042-SON	2015	0.85	0.43	0.00%	0.00%
1-13-023-SON	2013	129.21	126.69	4.40%	4.30%
SUBTOTAL 2012-2022		**316.54**	**300.1**	**10.70%**	**10.20%**
THPs pre-2012					
1-06-009-SON	2006	2.16	1.08	0.10%	0.00%
1-06-010-SON	2006	199.96	99.98	6.80%	3.40%
1-03-075-SON	2003	126.66	126.66	4.30%	4.30%
1-99-445-SON	1999	13.41	6.71	0.50%	0.20%
1-98-336-SON	1998	0.53	0.53	0.00%	0.00%
SUBTOTAL pre-2012		**342.72**	**234.96**	**11.60%**	**8.00%**
Total Harvested Acres		767		26.00%	

#1

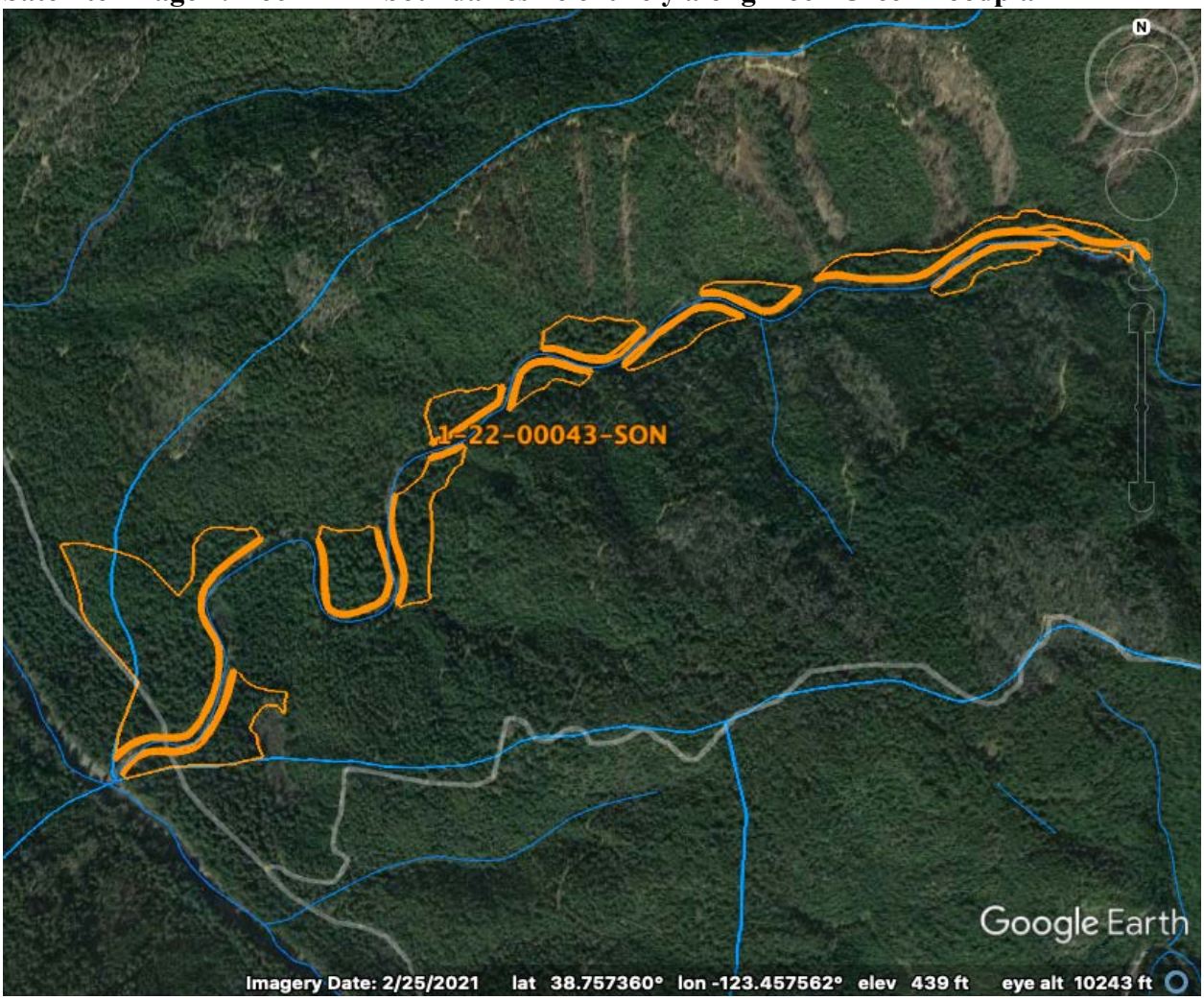
Satellite Imagery

The following satellite imagery shows THP boundaries in the Lower Rockpile Creek planning watershed.

Orange = Proposed THP boundaries
Red = Active or completed THPs
Blue = Planning watershed boundary, rivers and tributaries.
Shading inside THP boundaries indicates the type of Silviculture used:
Clearcuts: dark shading
Group Selection: light shading
Selection: no shading

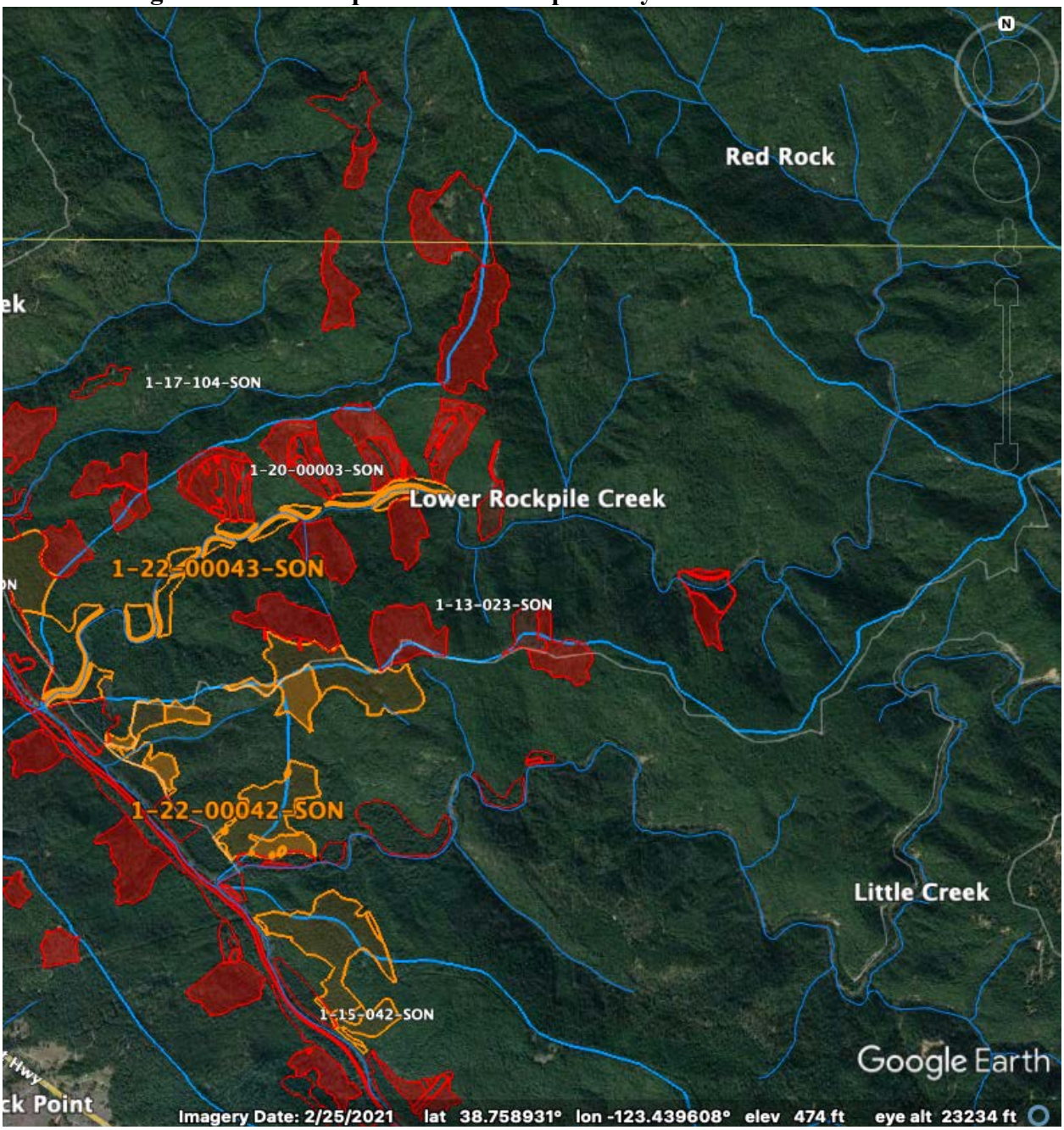
Satellite Image 1. Rock THP boundaries lie entirely along Rock Creek floodplain

#1



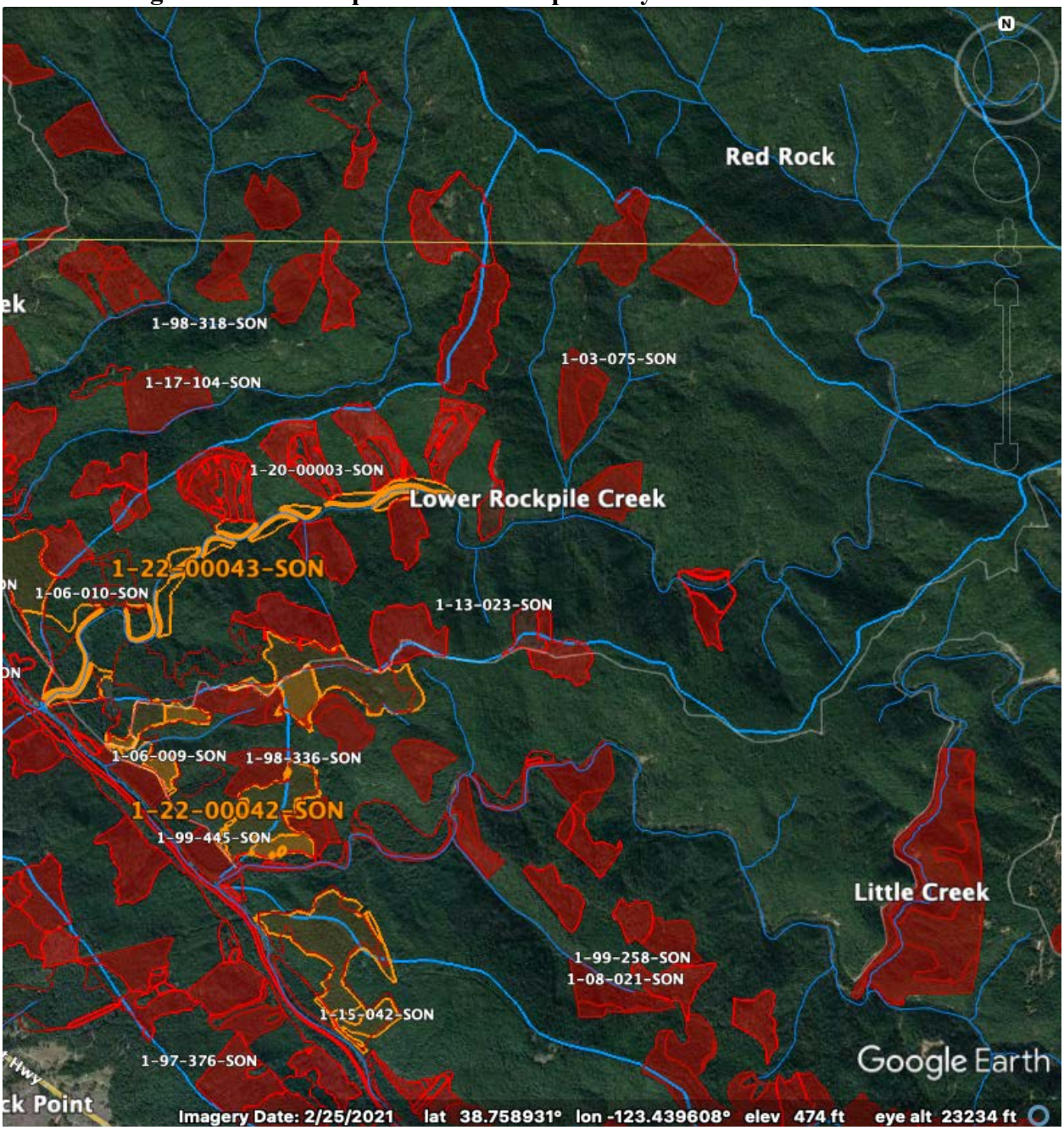
Satellite Image 2. Lower Rockpile Creek THPs past 10 years

#1



Satellite Image 3. Lower Rockpile Creek THPs past 25 years

#1



IV. CDF practices do not require, gather or disperse information needed by their agency and the public to make informed decisions.

The California Association of Environmental Professionals (AEP) is a non-profit association of public and private sector professionals with a common interest in serving the principles underlying the California Environmental Quality Act (CEQA).[1] These professionals have summarized CEQA's requirements regarding the obligations of Lead Agencies such as CDF in establishing Thresholds of Significance as follows:

> CEQA requires a Lead Agency to determine the significance of all environmental impacts (California Public Resources Code [PRC] § 21082.2; 14 CCR [State CEQA Guidelines] § 150641). A threshold of significance for a given environmental impact defines the level of effect above which the Lead Agency will normally consider impacts to be significant, and below which it will normally consider impacts to be less than significant (See State CEQA Guidelines § 15064.7(a)). Thresholds of significance may be defined either as quantitative or qualitative standards, or sets of criteria, whichever is most applicable to each specific type of environmental impact.
>
> Lead Agencies have discretion to formulate their own significance thresholds (See State CEQA Guidelines § 15064.7(b)). Setting thresholds requires the Lead Agency to make a policy judgment about how to distinguish significant impacts from less-than-significant impacts.
>
> Lead Agencies can set thresholds on a project-by-project basis, or they can adopt thresholds to be consistently applied to all projects. For the Lead Agency, having clearly established thresholds promotes predictability and consistency (over time and across reviewers) in the environmental review process, can bolster the defensibility of significance determinations in the agency's CEQA documents, and can focus the analysis on impacts expected to be significant rather than impacts that are simply controversial. However, CEQA does not require that a Lead Agency use the same significance threshold for different CEQA documents.
>
> Lead Agencies are responsible for establishing the thresholds of significance for all documents they prepare. They can rely on several sources, including: Appendix G of the State CEQA Guidelines; CEQA's mandatory findings of significance (State CEQA Guidelines § 15065); thresholds established by regulatory agencies; thresholds provided in General Plans or other local planning documents; or thresholds established by other agencies. For example, many jurisdictions rely on thresholds established by a local or regional air district when analyzing air quality impacts.
>
> Thresholds of significance are key elements of any CEQA document, as the level at which thresholds are established can determine whether the impacts of a project are deemed significant (thus requiring mitigation) or less than significant (thus not requiring mitigation). Further, if significant project impacts are identified that cannot be reduced below the threshold of significance through mitigation, the Lead Agency is obligated to

#2

[1] AEP also maintains annual compilations of CEQA's statutory and regulatory provisions. (See https://www.califaep.org/statute_and_guidelines.php .)

prepare an EIR rather than a Negative Declaration or Mitigated Negative Declaration (PRC § 21082.2(d); State CEQA Guidelines § 15064(a)(1)).

#2 The development and use of thresholds of significance are not required by CEQA. However, ***it is good and accepted practice to do so in both Initial Studies and EIRs because it allows readers to more easily understand the chain of facts and logic that led the Lead Agency to their significance conclusions.***

[https://ceqaportal.org/tp/CEQA%20Portal%20Topic%20Paper_Thresholds%20of%20Signifcance_2020%20Update.pdf]

CDF is repeatedly ignoring the California Code of Regulations

The California Code of Regulations addresses logging plans (THPs):

> **14 CCR 897** The information in [THPs] shall also be ***sufficiently clear and detailed to permit adequate and effective review by responsible agencies and input by the public***. . .
>
> **14 CCR 898.2** The Director shall disapprove a plan as not conforming to the rules of the Board if ... there is evidence that the information contained in the plan is incorrect, incomplete or misleading in a material way, ***or is insufficient to evaluate significant environmental effects***.

#3 CDF is violating both of these regulations by not collecting or providing sufficient information needed by the public to effectively review the plan or CDF's process. Withholding this information also does not provide the public with sufficient information to ascertain whether CDF has adequately evaluated significant environmental effects. This violates the FPA. Sierra Club v. Board of Forestry (1994) 7 Cal.4th 1215, 1236. This practice is part of CDF's ongoing pattern of dismissing the public and refusing to answer questions the public asks.

Many CEQA lawsuits have provided a clear foundation of the expectations by both CEQA and the court as to CDF's responsibilities towards cumulative impacts analyses:

1. "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." *Golden Door Props., LLC v. Cty. of San Diego*, 50 Cal. App. 5th 467, 527 (2020), quoting CEQA Guidelines § 15355, subd. (b).
2. An EIR must discuss cumulative impacts when they are significant and the project's incremental contribution is "cumulatively considerable." 14 Cal Code Regs §15130(a).
3. A project's incremental contribution is cumulatively considerable if the incremental effects of the 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." 14 Cal Code Regs §15065(a)(3).
4. "'[C]onsideration of the effects of a project or projects as if no others existed would encourage the piecemeal approval of several projects that, taken together, could overwhelm the natural environment . . . . This would effectively defeat CEQA's mandate to review the actual effect of the projects upon the environment.' The agency must interpret this requirement to 'afford the fullest

possible protection of the environment.'" *Id.*, quoting *Las Virgenes Homeowners Fed'n v. Cty. of L.A.*, 177 Cal. App. 3d 300, 306 (1986); *Friends of the Eel River v. Sonoma Cty. Water Agency*, 108 Cal. App. 4th 859, 868 (2003).

5. Further, "[t]he greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant." *Cmtys. for a Better Env't v. Cal. Res. Agency*, 103 Cal. App. 4th 98, 120 (2002).

#3

6. "The total absence of consideration of the existing environmental problems . . . is a legal failure that is potentially prejudicial to the FEIS/R's analysis." *AquAlliance, et al.* v. U.S. Bureau of Reclamation, et al., 287 F. Supp. 3d 969, 1037 (E.D. Cal. 2018).
7. "[I]t is vitally important that an EIR avoid minimizing . . . cumulative impacts." (*San Franciscans for Reasonable Growth v. San Francisco* (1984) 151 Cal.App.3d 61, 79.) "One of the most important environmental lessons evident from past experience is that environmental damage often occurs incrementally from a variety of small sources. These sources appear insignificant, assuming threatening dimensions only when considered in light of the other sources with which they interact." (*Kings County, supra,* 221 Cal.App.3d at p. 720.)

<u>CDF has an established Pattern and Practice of deferring obligations under CEQA</u>

For decades, professional hydrologists have made observations such as: "Examination of recently approved THPs and SYPs indicates that plans are being approved that do not contain technically valid cumulative impact assessments." (Reid 1999, see also Dunne et al. 2001)

CDF has a historical pattern and practice of accepting the same type of factually-void logging plans throughout the entire greater Gualala watershed, never providing the public or other decision makers with the information necessary to knowledgably assess the cumulative environmental impacts of each logging plan. While decisions concerning whether or not to ultimately approve a plan are matters left to the judgment of CDF, CDF does not have discretion to take short cuts through the environmental review process, compromise its core obligations under CEQA, and approve a plan with significant impacts that have not been fully analyzed.

#4

Although the Forest Practice Rules contain a number of generic best management practices (BMPs) or mitigation measures to reduce the environmental impacts of logging, experts have understood for decades that the measures are not sufficient to prevent cumulative watershed effects (CWEs) from occurring. CEQA does not permit mitigation measures to be used to avoid assessing whether a project's cumulative impacts will be significant (San Joaquin Raptor Rescue Center v. County of Merced (2007) 149 Cal.App.4th 645, 663). Merely the inclusion of mitigation measures in the plan description does not make any potential impacts automatically less than significant (Lotus v. Dept. of Transp. (2014) 223 Cal.App.4th 645, 656).

"Formulation of mitigation measures shall not be deferred until some future time," and the identification of the specific details of mitigation measures cannot be postponed unless CDF (1) commits itself to mitigation (2) adopts specific performance standards that the mitigation will achieve and (3) identifies the potential actions that could feasibly achieve the identified

performance standard. CEQA Guidelines section 15126.4(a)(1)(B). Here, contrary to CEQA, CDF does not identify any such specific performance standards, nor does it identify how to feasibly attain those nonexistent standards.

In a report titled, "A Scientific Basis for the Prediction of Cumulative Watershed Effects" (Dunne et al. 2001, "CWE Report") a blue ribbon panel of experts on the University of California Committee on Cumulative Watershed Effects comprehensively reviewed the Forest Practice Rules, dozens of logging plans, and ongoing water quality impacts. The CWE Report explains the inadequacy of CDF's application of the Rules to avoid cumulative watershed effects. The CWE Report pointed to three reasons why CWEs are occurring, despite CDF's application of the Forest Practice Rules.

The first problem is that CDF does not require that plans contain sufficient data to allow the agency and the public to assess existing and expected impacts. ("Information provided in
#4 individual THPs that we examined was often incomplete or too subjective to assess current resource conditions, lingering cumulative effects, or the potential for additional impacts.")

The second problem, the CWE Report explains, is that CDF operates under the premise that, even if a logging plan may have adverse impacts, "it can be mitigated out of existence by application of a Best Management Practice" found in the Forest Practice Rules.

The third problem is that CDF never looks at the watershed as a whole in assessing cumulative impacts. Having reviewed dozens of logging plans, the CWE Report records the damage caused to watersheds when CDF allows the "postage stamp" approach, looking only at a small fraction of the watershed in which the logging plan is located. This "postage-stamp", or "parcel-by-parcel", approach, in which only the immediate project area of a single, small timber harvest is ever reviewed ... does not capture the cumulative influence of multiple harvests over a long period of time in a larger watershed.

Ultimately, the CWE Report concluded that a process – indistinguishable from the review relied on in all of the Gualala River watershed logging plans – "contains no method for recognizing damage across entire ecosystems or watersheds" and "needs to be replaced with a true, watershed-scale assessment." While the CWE Report was written nearly 20 years ago, each of these problems remains, and can be seen once again in the Rock plan at issue here.

The public is still waiting for enough concrete information and specific data to enable them to understand the project's cumulative impacts, CDF is still acting under the unsupported and unsupportable assumption that mitigation measures render a cumulative impact analysis superfluous, and CDF continues to studiously avoid looking at the impacts of timber harvesting on the watershed as a whole.

V. Limiting the Assessment Area in the Rock Plan is an Attempt to Avoid the Required Cumulative Impact Analysis of the Downstream Watershed.

#5 For unknown reasons, CDF uses the calwater 2.2 planning watershed as its basis for the entire area subject to any cumulative effect. The calwater system was first developed in 1996.

According to this USGS link online,

> "This digital data set was created to provide a context for developing a statewide, comprehensive ground-water monitoring and assessment program as per the requirements of the California State Assembly bill AB599. The development of this data set facilitated analysis and identification of the priority basins and areas outside basins.
>
> This data set was developed from previously developed digital data sets of ground-water basins (California Department of Water Resources, 2002) and watersheds (California Department of Forestry and Fire Protection, 1999)."
> [https://water.usgs.gov/GIS/metadata/usgswrd/XML/ca_provinces.xml]

AB599 was filed in 2001.

> "AB 599, Liu. Groundwater contamination: quality monitoring program.
>
> Existing law declares that groundwater is a valuable natural resource in the state and should be managed to ensure its safe production and its quality. Existing law authorizes specified local agencies to adopt and implement groundwater management plans.
>
> #5 This bill would require the State Water Resources Control Board to integrate existing monitoring programs and design new program elements, as necessary, for the purpose of establishing a comprehensive monitoring program capable of assessing each groundwater basin in the state through direct and other statistically reliable sampling approaches, and to create an interagency task force to identify actions necessary to establish the monitoring program and to identify measures that would increase coordination among state and federal agencies that collect groundwater contamination information. The bill would require the state board to convene a described advisory committee to the task force. The bill would require the state board, in consultation with other specified agencies, to submit to the Governor and the Legislature, on or before March 1, 2003, a report that includes a description of a comprehensive groundwater quality monitoring program for the state."
> [http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200120020AB599&search_keywords=groundwater]

CDF has chosen to confine their assessments to the small planning watersheds for many years and has approved thousands of plans in California using this faulty assessment system. In past plans and approvals within the greater Gualala watershed, neither the NCRWQCB nor CDF have ever provided adequate justification, supported by substantial evidence, as to why they refuse to look for water quality impacts downstream of the individual plans beyond the planning watershed boundaries. As a result, both the past logging plans and this current one fail to inform the public and decision makers of the true environmental consequences which are occurring.

Although the Rules permit “planning watersheds” to be used as a *starting point* for cumulative watershed assessments, CDF is required to look *beyond* the planning watershed to ensure *all relevant information* is considered (such as the greater watershed and fluvial system). 14 CCR §

898; see also East Bay Mun. Utility Dist. v. Cal Dept. of Forestry & Fire Prot. (1996) 43 Cal.App.4th 1113, 1133 ("duty to require supplementations is entirely consistent with the agency's duty under CEQA to use its best efforts to find out and disclose all that is reasonably can").

The small geographic scope used by the RPF in this logging plan is exactly the type of inadequate analysis that the cumulative impact assessment is intended to prevent. EPIC v. Cal Dept. of Forestry & Fire Prot. (2008) 44 Cal.4th 459, 525. CEQA requires the scale of the cumulative impact assessment area to be based on the nature of the impacted resource, not the
#5 scale of the project. Kings County Farm Bureau v. City of Hanford (1990) 221 Cal.App.3d 692, 722-723.

The practice of the misuse of the planning watershed delineations has prevented any meaningful cumulative impact analyses and allowed many of California's important watersheds to be over-cut. There is no excuse for this and it must stop. CDF's approvals are not upholding the laws nor the intent of the laws, provide no meaningful information about the cumulative impacts of the proposed timber harvesting, and are not preventing or repairing the well-known significant adverse effects that are detailed in public comments and throughout many scientific studies.

VI. Reasonable Scientifically-based Thresholds for Sustainability Already Exist

Hans Burkhardt provides a rational, thorough, and thoughtful, scientific-based approach to answering this question of cumulative assessment in his publication "Maximizing Forest Productivity".

> "A healthy forest economy must be sustainable, that is, able to be carried on in perpetuity; any forest economy which is not sustainable cannot last, and is, therefore, not healthy.
>
> The way to achieve sustainability and a healthy economy is to live in balance with a
> #6 region's ecology.
>
> If harvests exceed forest growth, inventory and productivity gradually ***decline to the point where both the economic and ecological system simultaneously collapse***. If, on the other hand, harvest rates are below the rate of forest growth, inventory and productivity will steadily increase until the forest's full productive capacity is reached."

Burkhardt goes on to show that the optimal sustainable rates of harvest for this type of mixed redwood/conifer forest is between 1-2% yield of forestland per year; based on ***regrowth rates***, depending on conditions. (Burkhardt, H. J. 1994. Maximizing Forest Productivity, pgs. 3-7).

Research has shown that coastal redwoods grow faster in wetter areas and slower in dryer areas. Redwoods grow when minimum soil moisture ranges from 18 to 86%, but they grow best when soil moisture does not go below 60 %. Redwood has no taproot but its roots spread out over large areas. [Univ. of California, Agriculture and Natural Resources, Forest Research and Outreach]

Burkhardt's research was based on redwood/conifer forests that were not subjected to historic drought conditions. It can be reasonably assumed that growth rates today are not as high as they were in 1994, when Burkhardt published his research. As such, safe thresholds for cumulative effects should be considered even lower, inevitably in the 1.0-1.2% range to ensure recoverability and overall watershed health.

James Burke, lead reviewer on this THP representing the North Coast Regional Water Quality Control Board (NCRWQB) authored his own study of the North and South Fork Eel River in neighboring Humboldt County. Burke's study establishes thresholds for harvest rates based on controlling *sedimentation* (not regrowth or recoverability).

According to Burke, in the Elk River, "***Watershed-wide average annual harvest rates required under the Order equate to less than 1.5% equivalent clearcut acres.*** These rates are lower than required under the 2006 WWDRs, which allowed annual harvest rates of 1.9% in the North Fork and 1.8% and upwards in the South Fork... In addition, the Order requires that the rate of harvest in any subwatershed not exceed 2% equivalent clearcut acres per year averaged over any 10 year period. This is to ensure that proposed harvest rates are generally below a threshold that would cause concern for contributing to ongoing cumulative impacts on water quality and contribute towards control of sediment and improvement of impaired beneficial uses of water."

#6 [Note: Equivalent clearcut area (ECA) is a widely used methodology developed by the United States Forest Service (USFS) to account for the relative impacts of different types of silvicultural treatment. It assigns a weighting factor of one to clearcutting and a value less than one for partial harvesting silvicultural treatments. The weighting factor for a silvicultural treatment is multiplied by total area treated under each silviculture to arrive at a normalized disturbance calculation. Therefore, 100 acres of Selection harvest, which is typically assigned a ECA factor of 0.5, would be counted as 50 equivalent clearcut acres.]

Both Burkhardt's and Burke's research show inarguably that it is possible to formulaically calculate cumulative effects and harvest rates, contrary to CDF's repeated refusal to do so. The studies both indicate that a reasonable rate of harvest for sustainability in these watersheds is less than 1.5% ECA, or less than 3% Selective silviculture per year.

Additionally, research has shown that coastal redwoods grow faster in wetter areas and slower in dryer areas. According to E. Burns, "comparison of historically wet and dry forests reveals that redwoods produce biomass at highly variable rates as climate changes. For example, forests exhibited different responses to the severe drought of 2012-2015 with redwoods in wetter forests maintaining high productivity through the drought, and those in old-growth forests producing the most wood by far."

The second and third-growth Lower Rockpile Creek watershed has seen severe drought conditions for the past 5 years. It is not reasonable to assume that the trees have been growing here at their maximal rate during this time. Neither study takes into consideration historic drought conditions. ***During these conditions of low water flow and lower growth rates, establishing and enforcing a conservative harvest threshold between 1.0-1.2% ECA is absolutely critical to the recovery of these watersheds.***

VII. Watershed Modelling Shows No Carbon Increase since 2016

Computer modelling is the modern and accurate way to estimate sustainable practices when harvesting timberland. Using localized known stand data, models can provide estimates of forest growth, carbon sequestration, water storage, evapotranspiration, and more. There are several different timber/watershed modelling applications available and many responsible RPFs use modelling tools to inform their harvesting decisions (e.g. USAL Redwood Forest Company, etc.).

CDF and other reviewing agencies should similarly use a watershed modelling application in their review process, in order to provide the public with a meaningful ability to understand the environmental impacts of timber harvesting, as CEQA requires. (*Sierra Club v. County of Fresno*, 6 Cal.5th at p. 510.) Watershed modelling is a commonplace, fast, and low-cost tool in an age of computer technology. The approach can answer critical questions about long-term sustainability of a proposed harvest plan and identify cumulative impacts.

Plan Fails to Assess Cumulative Effects (Carbon)

Due to this lack of analysis in the THP, we have taken the burden on ourselves and modelled the second growth Lower Rockpile Creek watershed using a watershed modelling software
#7 application.

This application takes as input a basic configuration of existing stands in the watershed. It then uses scientifically published formulae of growth rates in these mixed conifer forests, as well as formulae for tree volumes as a function of basal diameter, to calculate a yearly estimated overall biomass in the watershed (in million-metric tons). Biomass is relatively easy to estimate and is directly correlated to the amount of carbon sequestered.

The application also analyzes each timber harvest that has occurred in the watershed over time, accounting for the number of acres harvested and type of silviculture used, and assumes restocking occurs as required in those harvested areas.

The input to the model was provided using the existing stand configuration as described in the Section 3, Part III (Vegetation and Stand Conditions) of the THP:

> "The plan area contains almost exclusively 100-110 year-old redwood in the flood prone areas except for some areas of alder, and an almost entirely depauperate understory as a result of the high canopy closure of the stand (80-100%)." (pg. 125)

And:

> "Stocking levels are approximately 300-400 ft2 /acre of conifers and less than 10 ft^2/acre of hardwoods. Retained basal area post-harvest will be 200-300 ft^2/acre." (pg. 126)

The estimated biomass was calculated using the formula provided in the study "Predicting Aboveground Biomass in Second Growth Coast Redwood". This study indicates the following formula most likely provides the most accurate estimate of in this case (page 9, formula #2):

$$\ln(TAGB) = -2.6327 + 2.4757 \cdot \ln(dbh)$$

`dbh` – diameter at breast height measured in centimeters
`TAGB` – biomass of all above-ground tree components in ODkg (oven-dried kilograms)

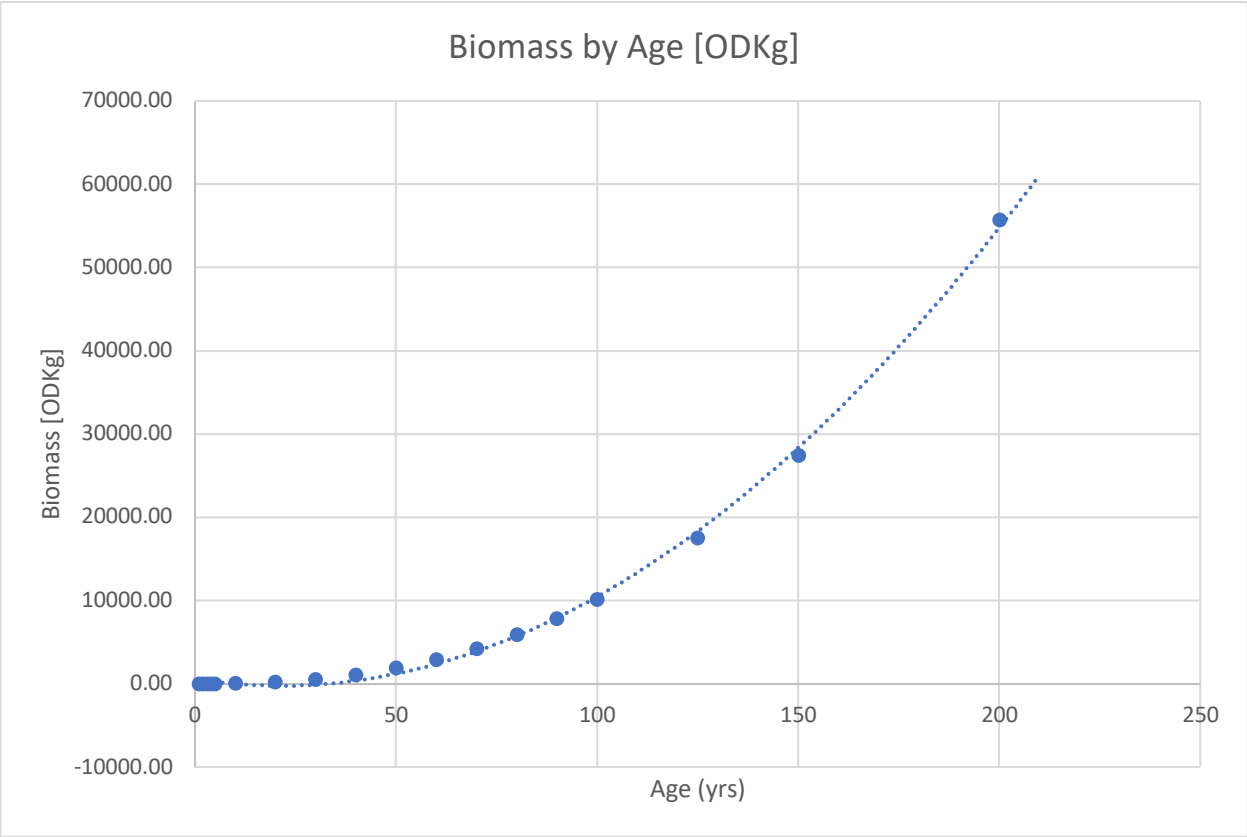
Additionally, from the study "Allometric equations for Sequoia sempervirens in forests of different ages" by Sillett et al., we use the simplified equation:

$$dbh = age <= 2.0 \ ? \ (1.5 \cdot age) \ : \ (1.19 \cdot age + 1.17)$$

Together these formulae produce the following biomass estimate as a function of tree age:

Chart 1. Biomass in Coastal Redwood Forest as a function of Age

#7

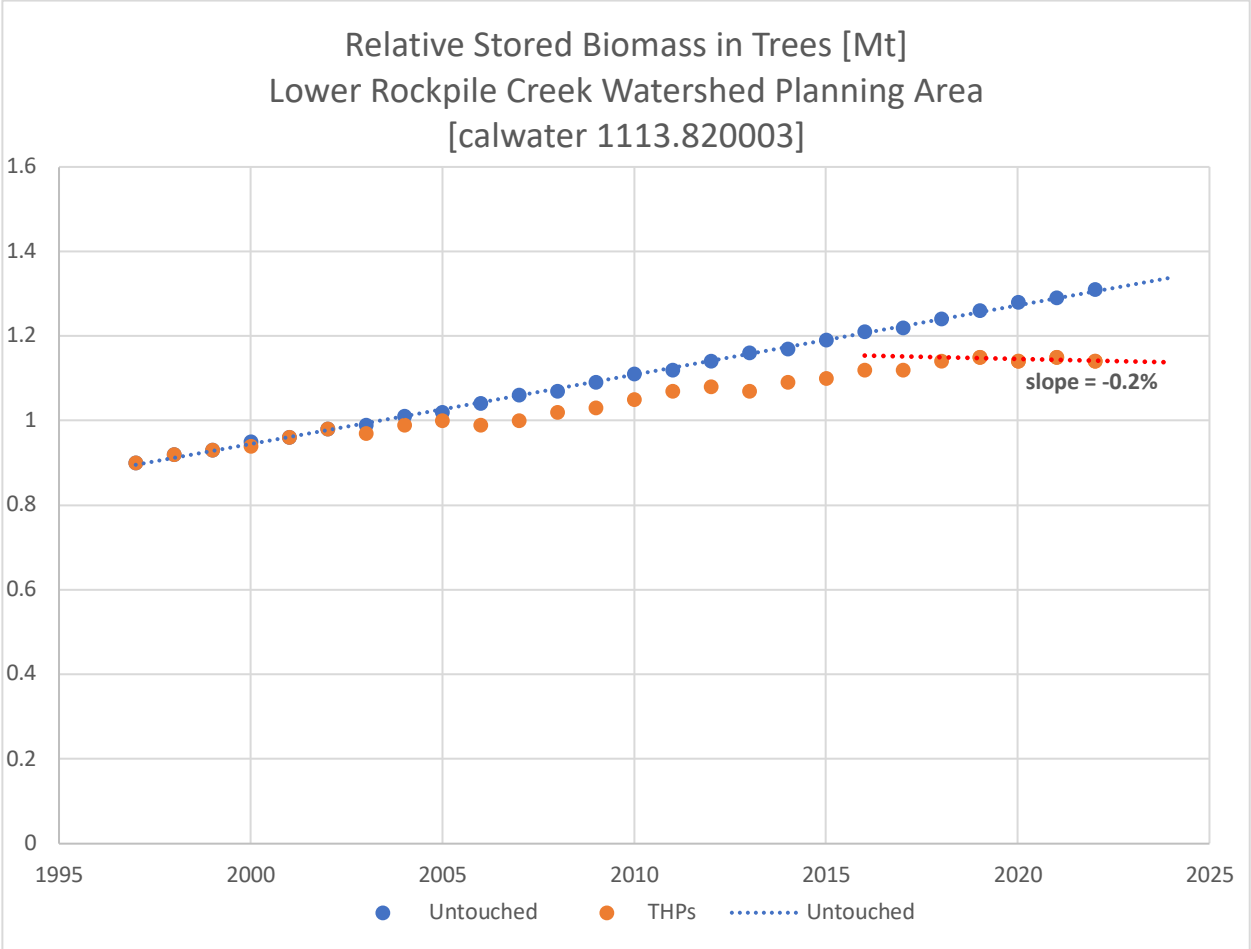


Using those inputs above and applying the timber harvest plans and silviculture methods that have occurred in the Lower Rockpile Creek planning watershed since 1997 (Table 2), we are able to generate a model that provides estimated accumulation and loss of stored carbon in the form of biomass.

The graph below shows the result of the model when applied to Lower Rockpile Creek. From the graph it is clearly visible that rates of harvesting until 2015 were more-or-less in-line with sustainable and restorative practices, and the watershed was accumulating carbon each year. After 2015 however, the cumulative impacts of the current rates of harvesting become very apparent: watershed recovery has flat-lined; no additional carbon has accumulated since 2016!

Chart 2. Estimated relative stored biomass in trees in Lower Rockpile Creek

#7



In Section 3, Part III the RPF states:

"The stands were first logged in the early 20th century, approximately 1900-1910, accessed by a rail line up Rockpile Creek along the configuration of the present-day seasonal road. Since then, the plan area has been selectively harvested multiple times, with two recent entries in 1987 (1-87-229-SON) and 1995 (1-95-407-SON). This more recent uneven-aged harvest history has generally moved the stand in the direction of more natural structure and greater ecological function." (pg. 125).

Yet no such improvement and function is present here, as shown above. The RPF has completely failed to list any of the 9 recent THPs that have occurred in this watershed since 1997, constituting 26% of the total planning watershed acreage!

The rules are clear about significant environmental impacts and cumulative effects. When one actually "does the math", we quickly realize that the cumulative effects of harvesting in this watershed have brought growth to a total stand-still.

These mischaracterizations, and the inadequate information and inaccurate wording in the THP, obscure the environmental impacts of the proposed logging plan and prevent the public and CDF from meaningfully understanding or reaching their own conclusions about the consequences and long-term effects of THP approval. Therefore, the THP is legally inadequate.(*Sierra Club v County of Fresno,* 6 Cal.5th at 510.)

We already know, from Hans Burkhardt above, ***"If harvests exceed forest growth, inventory and productivity gradually decline to the point where both the economic and ecological system simultaneously collapse."***

Burkhardt's conclusion is very evident here, where harvests have clearly exceeded growth, inventory is on the decline and we are on the brink of ecological collapse. The watershed has already turned the corner for the worse, and this THP will only increase the rate of ecological demise.

#7

Biomass, Stored Carbon, and Stored Water

Healthy conifers contain on-average 50% water and redwoods have been measured at 60% water by volume. "Biomass", by definition, is the "oven dry weight" of that tree volume, which is all of the mass with the water removed. Given that healthy trees contain 50% water, we know that each tree stores an equivalent amount of water as biomass.

Simply put, using 50% water by volume:

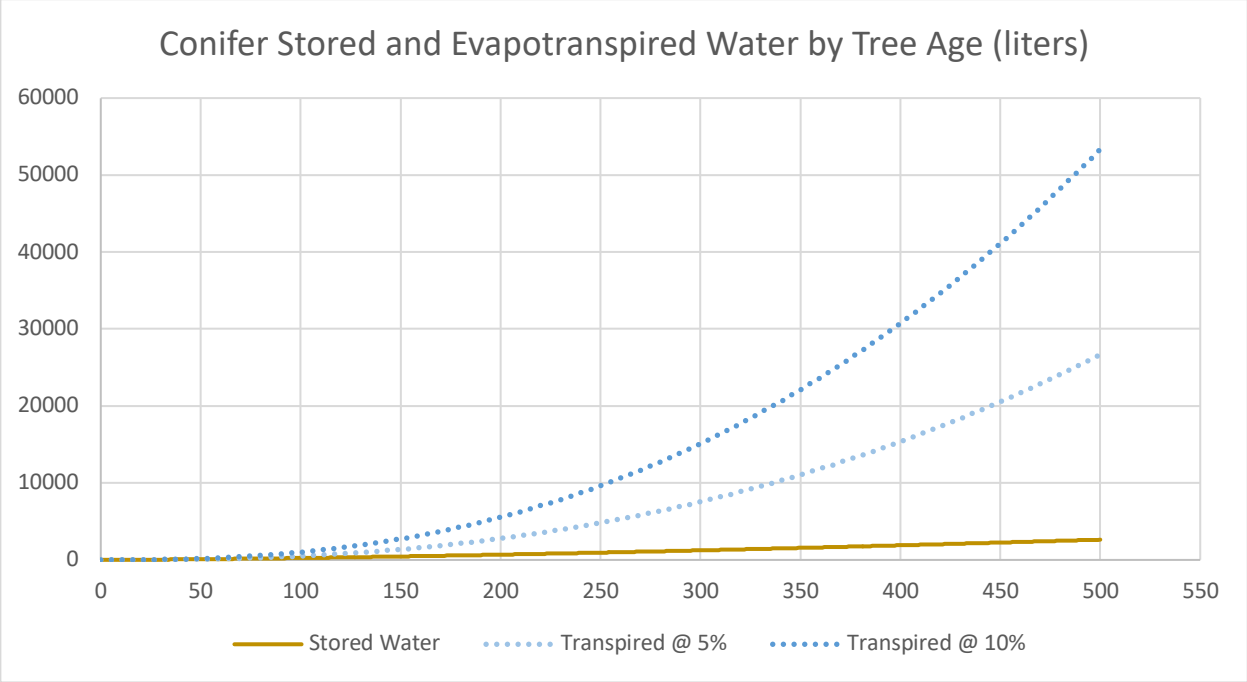
1 metric ton of biomass = 1,000 liters of stored water (1 kg water = 1 liter water)

Redwoods and all trees participate in "evapotranspiration", where they actually transpire 5-10x the amount of water they store into the air through the year. Transpiration cools trees and every organism around it. A large oak can transpire 150,000 liters of water every year, a redwood possibly more!

When we graph evapotranspired water per year as a function of tree age, we see a very interesting result. Conifers under 30-50 years of age are net water *consumers*, storing more water in the tree than transpiring it. However, after age 50, the tree becomes a net water *contributor.* At this point it is transpiring more water than it stores per year, and this effect grows exponentially as the tree ages. For this reason, older trees provide nearly all of the moisture in a healthy forest.

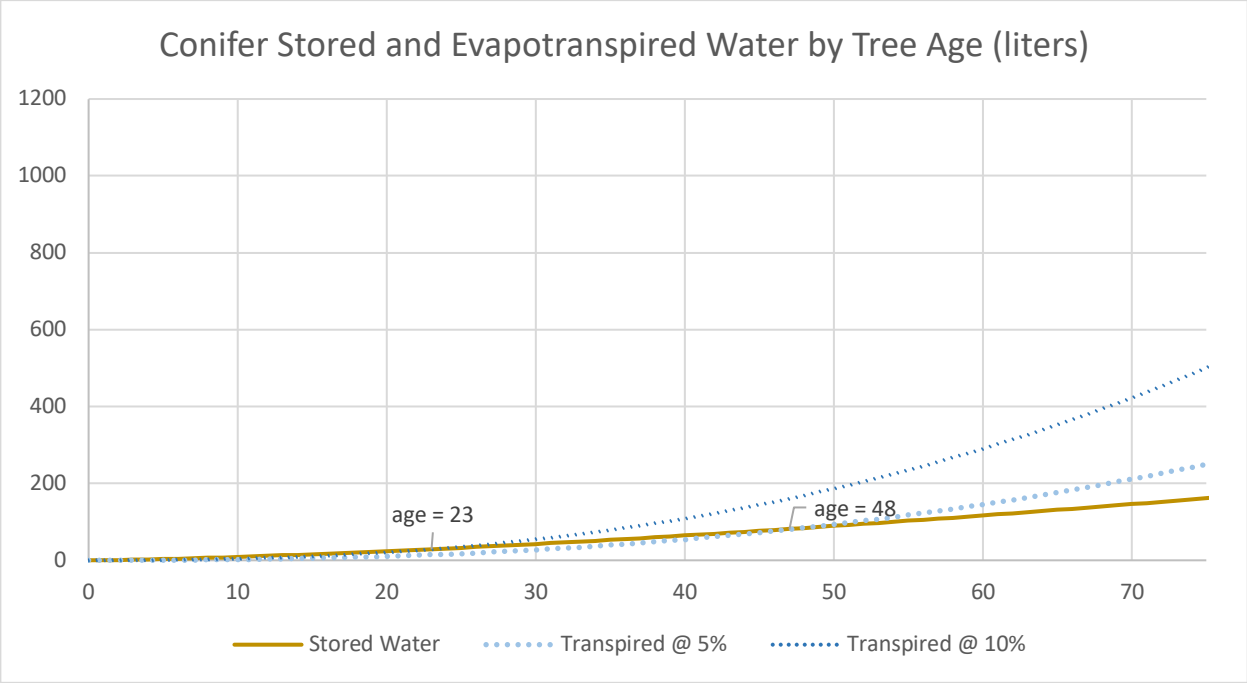
As shown it is the older trees that create the local microclimates that keep watershed forest and stream temperatures regulated:

Chart 3. Transpiration Liters per Year From a Single Conifer as Function of Age



#7

Chart 4. Transpiration Liters per Year From a Single Conifer as Function of Age < 75 yrs



From this one simple graph comes a clear message: take away the older trees and the watershed will dry out! This is exactly what we are seeing across California (see yearly rain data below).

California's forests are drying out essentially because of broken Forest Practice Rules. Having no quantitative thresholds for cumulative effects anywhere results in CDF approving all THPs without an adequate cumulative impacts analysis. This in turn has allowed Registered Professional Foresters to remove most of the older trees in most of our State's watersheds, most of which are now dried out or already burned, well beyond the point of simple recovery. Even-aged forest management and restocking post-harvest adds to the negative cumulative impact on the amount of water available for transport in the watershed.

Plan Fails to Assess Cumulative Effects (Water)

The very foundation of a watershed's ecosystem health is the water cycle, yet there is no discussion in the plan of the cumulative effects that the vast changes to the landscape are producing.

Removing forest cover opens the land to more solar radiation, producing land degradation effects by drying out the soil more quickly, and increasing groundwater temperatures. Removal of larger trees significantly reduces evapotranspiration and greatly affects the local microclimate. Logging leaves combustible slash about while drying out the cutover and surrounding areas.

#8 Global warming and climate change also contribute to a reduction in evapotranspiration, amplifying the effects of removing forest canopy. According to a 2020 peer-reviewed study by Williams et. al.,

> "60-80% of the [study] region's increased potential for evaporation stemmed from human-induced warming.
>
> …Warmer air can hold more moisture than cold air. So, as temperatures rise, the air becomes thirstier, Williams explained. And thirstier air can suck more moisture out of the ground.
>
> The difference between the amount of water the air can absorb and the amount the land can provide is what scientists call the vapor pressure deficit. When the land can supply more than the air can hold -- as when the air temperature drops to a predawn low -- you get condensation, like the early morning dew. On the other hand, when the air is thirstier than the amount of water the ground can provide, it pulls moisture from the earth drying it out. Warmer air over dry soils will be thirstier, leading to more rapid [drying].
>
> … What's more, there are strong feedback cycles between the atmosphere and the land, which the study left out. When the air soaks up all the available moisture in the soil, evaporative can no longer cool the ground. The result is a dramatic spike ground temperature, which exacerbates the situation."

The fact is this plan will continue to contribute to climate change, produce land degradation, and impact the water cycle by:

- **Increasing soil and air temperature**
  impacts: less rain and humidity→ increased fire danger → fire leads to more loss of forest cover → dryer landscape
- **Increasing erosion**
  impacts: soil loss → water pollution from point- and non-point sources → degradation of aquatic habitat → population loss in aquatic species
- **Causing loss of soil fertility from loss of nutrients and organic matter**
  impacts: less vegetation growth → less evapotranspiration → less atmospheric moisture transport → higher, drier air and soil temperatures → more vegetation death and increased fire probability

As far as we are aware, there has been no attempt at the local, regional, or state level to prevent or constrain these effects, or to collect factual evidence to determine what effects are occurring. There is no general or site-specific evidence provided in this plan regarding water cycle and climate change cumulative effects from logging, nor has there been in the multitude of past plans CDF has approved.

Lukovic et al. (2021) observes: "Californian hydroclimate is strongly seasonal and prone to severe water shortages. Recent changes in climate trends have induced shifts in seasonality, thus exacerbating droughts, wildfires, and adverse water shortage effects on the environment and
#8 economy... We discover that the onset of the rainy season has been progressively delayed since the 1960s, and as a result the precipitation season has become shorter and sharper in California."

Ellison et al. 2017: "Effects of forests on water and climate at local, regional and continental scales through change in water and energy cycles. (1) Precipitation is recycled by forests and other forms of vegetation and transported across terrestrial surfaces to the other end of continents. (2) Upward fluxes of moisture, volatile organic compounds and microbes from plant surfaces (yellow dots) create precipitation triggers. (3) Forest-driven air pressure patterns may transport atmospheric moisture toward continental interiors. (4) Water fluxes cool temperatures and produce clouds that deflect additional radiation from terrestrial surfaces. (5) Fog and cloud interception by trees draws additional moisture out of the atmosphere. (6) Infiltration and groundwater recharge can be facilitated by trees. (7) All of the above processes naturally disperse water, thereby moderating floods."

Ellison further explains: "By evapotranspiring, trees recharge atmospheric moisture, contributing to rainfall locally and in distant locations. Cooling is explicitly embedded in the capacity of trees to capture and redistribute the sun's energy (Pokorný et al., 2010). Further, trees' microbial flora and biogenic volatile organic compounds can directly promote rainfall. Trees enhance soil infiltration and, under suitable conditions, improve groundwater recharge. Precipitation filtered through forested catchments delivers purified ground and surface water (Calder, 2005; Neary et al., 2009)."

Pokorny et al. (2010) wrote: "Ecosystems use solar energy for self-organisation and cool themselves by exporting entropy to the atmosphere as heat. These energy transformations are achieved through evapotranspiration, with plants as 'heat valves'... While global warming is commonly attributed to atmospheric CO2, the research shows water vapour has a concentration

two orders of magnitude higher than other greenhouse gases. It is critical that landscape management protects the hydrological cycle with its capacity for dissipation of incoming solar energy."

This plan fails to provide any assessment or mitigation for these ongoing cumulative impacts that affect lives locally, regionally, nationally, and internationally. Barnosky et al. wrote of these problems: "Localized ecological systems are known to shift abruptly and irreversibly from one state to another when they are forced across critical thresholds. Here we review evidence that the global ecosystem as a whole can react in the same way and is approaching a planetary-scale critical transition as a result of human influence. The plausibility of a planetary-scale 'tipping point' highlights the need to improve biological forecasting by detecting early warning signs of critical transitions on global as well as local scales, and by detecting feedbacks that promote such transitions. It is also necessary to address root causes of how humans are forcing biological changes."

#8

There are many studies available throughout science that pertain to these effects. The availability of science that documents well-understood processes within the water cycle makes the absence of any discussion or consideration of the cumulative effects that this plan increases even more disturbing. Absent such information, the THP is inadequate as a matter of law because it fails to fulfill its informational function. (*Sierra Club v. County of Fresno*, 6 Cal.5th at p. 510.)

This THP should be revised to discuss this issue and recirculated.

<u>Importance of Fog; Reduction of Fog; Reduction of water intake in water cycle</u>

The redwood's range seems to be determined more by the distribution of summer fog than the actual amount of rainfall. Fog actually condenses on tree crowns and drips down to water the roots of the tree and into the watershed during the dry summer months. The humidity of fog also decreases trees' water loss from evaporation and transpiration. Redwoods can even generate their own fog, from the up to 2000 liters of water a large tree may transpire into the air per day.

The disruption from ongoing climate change, coupled with the loss of thousands to millions of acres of canopy cover, has produced lengthier hot and dry seasons and fire seasons both here and in California in general, as documented in Williams et al. 2019, and Williams et al. 2020. Droughts and low water years have been more frequent and extreme in the first 20 years of the 21st century, yet there is no mention in this plan, or past plans, of how intricately linked forests are with the water cycle (Fischer et al. 2014, EPA 2017, Vose et al. 2017, Cook 2018).

#9

Previous public comments on past THPs in this watershed and other nearby watersheds have underscored the importance of fog in this coastal redwood ecosystem.

According to a 1998 study by T.E. Dawson on the effects of fog in the California redwood forest entitled "Fog in the California redwood forest: ecosystem inputs and use by plants":

> "During the [3-year] study period, 34%, on average, of the annual hydrologic input [by plants inhabiting the heavily fog inundated coastal redwood forests of Northern

California] was from fog drip off the redwood trees themselves (interception input). When trees were absent, the average annual input from fog was only 17%, demonstrating that the trees significantly influence the magnitude of fog water input to the ecosystem."

#9 … In summer, when fog was most frequent, ~19% of the water within *S.sempervirens* [coastal redwood], and ~66% of the water within the understory plants came from fog after it had dripped from tree foliage into the soil; for *S.sempervirens*, this fog water input comprised 13–45% of its annual transpiration. For all plants, there was a significant reliance on fog as a water [input] source, especially in summer when rainfall was absent."

Clearly, this plan will cause an additional loss of hydrologic input into the watershed by eliminating fog drip that would normally occur in the harvest areas.

VIII. Rock Plan Will Affect Downstream Areas

Rockpile Creek empties into the South Fork Gualala River at the intersection of the Southwest corner of the Lower Rockpile Creek and the Southeast corner of the Big Pepperwood Creek planning watershed areas. This confluence constitutes the north end of the South Fork Gualala and lies just south of the section of the river protected under the Wild and Scenic Rivers Act.

Harmful Algae Bloom in Big Pepperwood; Increased Water Temperatures

In previous public comments we alerted CDF and the NCRWQCB THP reviewers to a recent harmful algae bloom in the Gualala River in October of 2020 which they were previously unaware. We explained the many possible links between the continuous upstream logging and this first-ever recorded HAB. HABs thrive on increased temperatures and more nutrients in the water, both by-products of timber harvesting.

#10 In this case, a swimmer developed a skin rash after touching algae in the river. The NCRWQCB determined that a HAB had occurred, "warning" signs were posted and the estuary was closed to the public.

In another case, a dog became sick and died from drinking water from the river at the "Hot Spot", a popular tourist and local destination just downstream of the proposed THP.

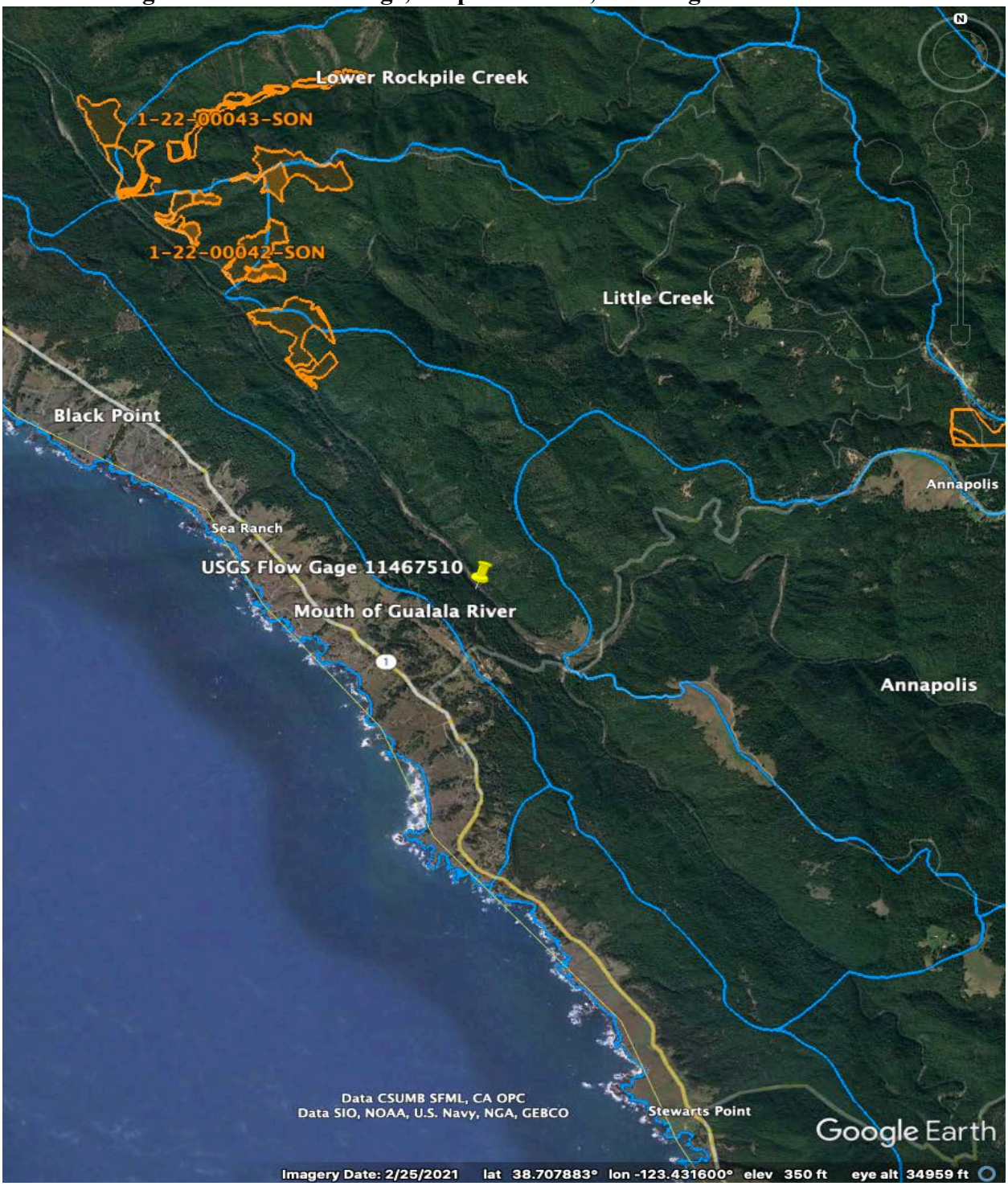
Additionally, water samples taken on the Gualala River in June 2021 inside the Big Pepperwood Creek watershed detected more low levels of HABs. This information along with an alert was posted on the Water Board's Surface Water and Ambient Monitoring Program (SWAMP). Notwithstanding all of these alarming facts, the THP contains no substantive information about how the proposed timber harvesting will affect the formation of HABs.

The Gualala River is listed on the Clean Water Act 303(d) list for impairments associated with excessive sediment and high temperatures, and the NCRWQCB is tasked with sustaining and improving the water quality of the river. The only possible way to do this is with a quantitative, scientific, measured and validated approach to water quality monitoring.

Before approving this THP, CEQA law requires that thresholds for tolerance for cumulative impacts are first established. Many indicators, such as all of the scientifically-backed indicators listed in this document, must be measured. Baselines must first be established. A lack of resources is not an excuse of lack of required oversight. CEQA is clear in this regard: not performing the required CIA is simply against the law.

Satellite Image 4. USGS Flow Gauge, Proposed THPs, Planning Watershed

#10

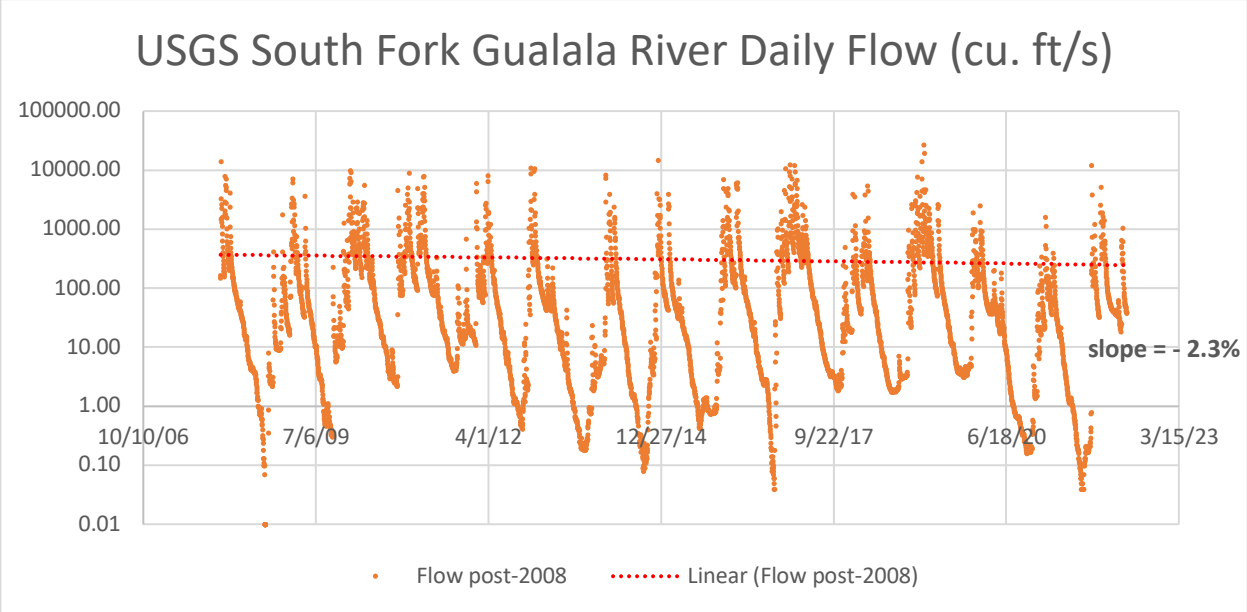


Historically Low Flow Rates in South Fork

Over the past few years, historically low flow rates have been measured at the USGS Flow Gauge #11467510, just upstream of the watershed. These flow rates have been declining at an average annual rate of 2.3% per year for the past 13 years, with the lowest flow rate ever recorded on the South Fork happening just last year! This data has only been available consistently since 2008.

Chart 5. Flow rates for South Fork Gualala River (cu ft/sec), Source: USGS

#11



In their Official Response to Public Comment to the THP #1-22-00029-MEN, dated 5/13/2022, the CDF reviewer responded to our concern about this decline in annual stream flow with the following statement:

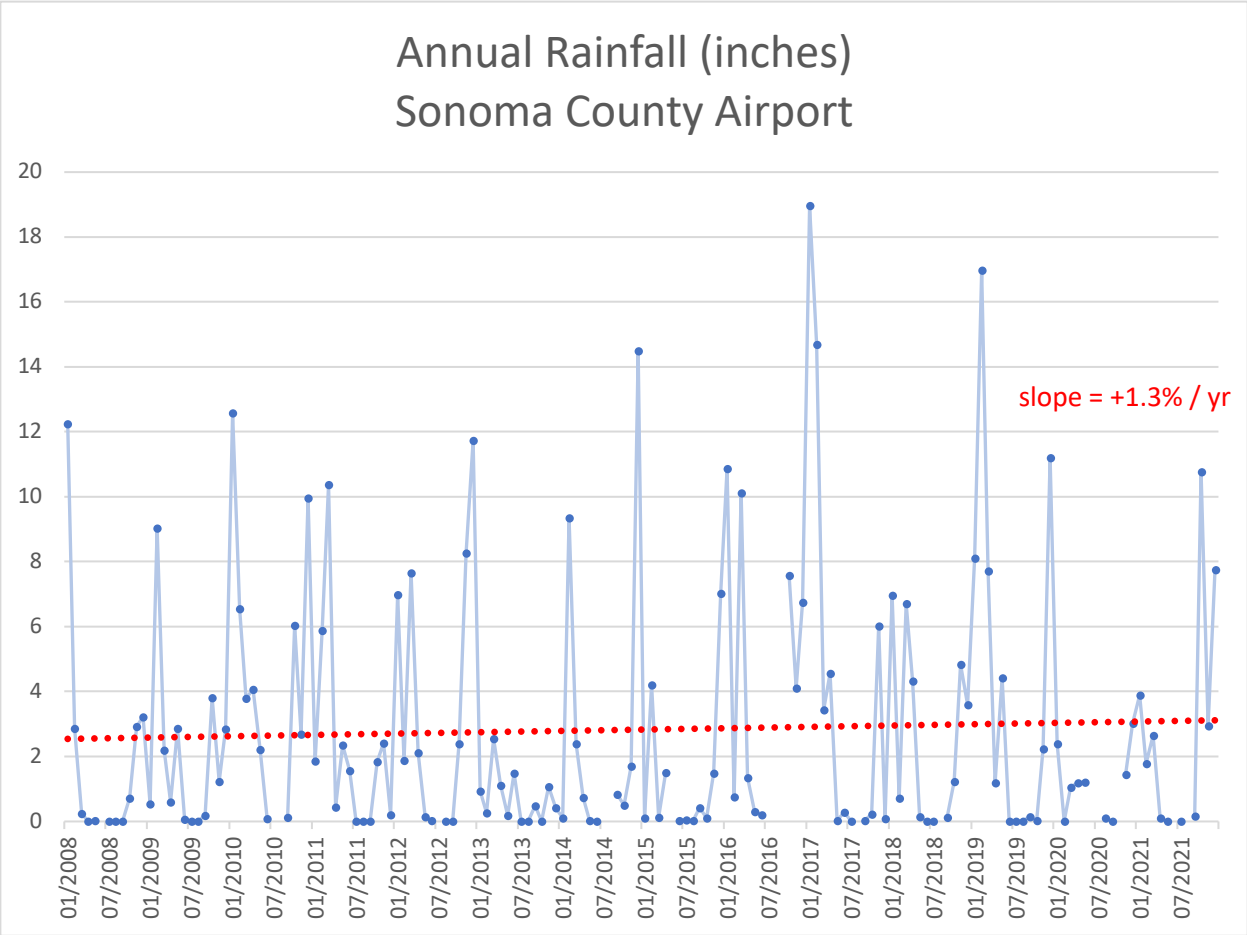
> "The observed declines in streamflow match the statewide reduction in precipitation rates for the last several years." [Response #14, pg. 62]

First, the response attempts to imply that a *statewide* precipitation rate somehow applies here. As far as precipitation goes, California is about as diverse and varied as it gets. Is the reviewer attempting to correlate this local flow rate in the Gualala River to flow rates in other parts of California like the Mojave Desert where it is extremely dry, or Crescent City where it is extremely wet? There is no basis for comparing local stream flow data to statewide values.

Furthermore, the reviewer doesn't provide any data to back up their claim.

We looked at yearly rainfall data for the Sonoma County Airport, which is the closest location to the Gualala River watershed that we could find with historical rain data (36 miles from USGS Flow Gage #11467510). This rain data shows surprisingly - and completely contradictory to the CDF reviewer's statement - that average rainfall in this area has actually trended upward slightly since 2008!

Chart 6. Annual Rainfall at Nearby Sonoma County Airport (inches)



#11

There is no indication whatsoever that the average rainfall in the area correlates to the decline in stream base flows. Rather, we have shown clearly that the decline in base flow is related to the reduction in water moving through the water cycle, which in turn is directly related to the amount of biomass in the watershed. It is the elimination of the larger trees in the watershed that is driving the consistent decline in annual base flows that we are now seeing every year.

In fact, many recent studies confirm our conclusions, including a 2020 research paper in the Journey of Hydrology entitled "Long-term effects of harvesting on summer low flow deficits in the Coast Range of Oregon". (Segura et al., Exhibit 10). According to this multi-author paper,

> "In a recent analysis of 60 years of daily streamflow data from eight paired watersheds in the Cascade Range, Oregon, USA, summer streamflow fell below pre-treatment levels within 15 years after old-growth forest harvest (Perry and Jones, 2017). Additionally, these low flow deficits persisted and intensified for ~50 years as the Douglas-fir (Pseudotsuga menziesii) plantations became established (Perry and Jones, 2017). Long-term declines in low flows associated with forest harvesting and plantations raise concerns about aquatic ecosystem health and water supply, especially in dry years (Leppi et al., 2012; Luce and Holden, 2009).

Sadly, CDF has consistently relied on outdated and inaccurate *short-term* studies to make an argument that a reduction in base flows are either a) not related to timber harvesting or b) do not create a significant effect on base flows. As clearly demonstrated with significant evidence, data, and math herein, both of those arguments are entirely false.

Given all of the data provided, one can only conclude that approval of this THP will contribute significantly to these cumulative impacts both in loss of carbon accumulation as well reduction in flow rates in Rockpile Creek and the South Fork Gualala. This will inevitably put an even greater strain on everyone: the public who rely on the river as well as all species that attempt to call the river "home".

#11

CDF Review Team: please investigate whether this decrease in biomass as a result of this THP will result in a decrease in annual flow. Our research clearly shows this to be the case. All the data is available to the public and free. Watershed modelling applications are also available and easy to use. Please provide real data and science in any response to our concerns. This investigation must occur before approving this THP.

Plan Fails to Provide Information Required by the California Wild and Scenic Rivers Act

California's Legislature passed the Wild and Scenic Rivers Act in 1972, following the passage of the federal Wild and Scenic Rivers Act by Congress in 1968. Under California law, "Certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state, together with their immediate environments, for the benefit and enjoyment of the people of the state."

The Gualala River is on the list of California rivers receiving state and federal protection under the Wild and Scenic Rivers Act.

#12

Designated wild and scenic rivers are often managed by multiple agencies and in some cases tribal governments. An example of general steps required by these agencies when analyzing a proposed project, and a list of the laws governing these rivers, is laid out clearly in California DOT's Standard Environmental Reference (SER), Volume 1 "Guidance for Compliance", Chapter 19 "Wild and Scenic Rivers":

> "1. Interagency Coordination
>
> Consult with the designated river managing agencies as identified in the list of Wild and Scenic Rivers Decision Tree. It may be necessary to also consult with the National Park Service (NPS) Regional Office in San Francisco.
>
> The purpose of this consultation is to determine whether the proposed project could have an adverse effect on the free-flowing characteristics of the river and whether the action could have the potential to alter the river segment's ability to meet the criteria that classify it as wild, scenic, or recreational The results of this consultation must be included in the environmental documentation. If the

consultation results in the determination that there would be an adverse effect, subsequent coordination would be required to develop appropriate mitigation measures.

2. Early Coordination Meeting
   - Will the proposed project have an adverse effect on the free-flowing characteristics of the river?
   - Does the action have the *potential* to alter the river segment's ability to meet the criteria used to classify it as wild, scenic, or recreational?
   - Can impacts be avoided by using an alternative design?
   - Is mitigation possible and feasible?

3. Report Content
   The environmental document shall discuss the issue, all coordination among agencies, any impacts to the qualities that support the river's designation, and any mitigation measures."

#12 [https://dot.ca.gov/programs/environmental-analysis/standard-environmental-reference-ser/volume-1-guidance-for-compliance/ch-19-wild-scenic-rivers].

As far as we can tell, this THP does not mention the Wild and Scenic Rivers Act, nor the fact that the Gualala River is protected under this act. There is no mention of any interagency coordination meeting specific to this act, and no environmental document was produced or provided that discusses the issue.

Clearly, this THP has the potential to alter the Lower Rockpile Creek river segment which is directly upstream of the Mouth of the Gualala watershed - protected under the Wild and Scenic Rivers Act. At minimum this THP, and the lack of review and factual cumulative analysis therein, demonstrably undermines and ignores California's Wild and Scenic Rivers Act and the effects that will inevitably occur downstream.

IX. The CDF Reviewer may be implicitly and unconsciously biased

State agencies, including CDF, are bound by ethics laws. One of the key concepts of those laws is that a public agency's decisions should be based solely on what best serves the public's interest. CDF's behind-the-scenes, biased review practice does not uphold the intent of the State's laws and rules, nor does it uphold the part of CDF's stated mission to protect California's natural resources.

"Unconscious bias (UB) arises from a feature of the human brain that helps us make decisions faster via a series of shortcuts. It shapes our perception of the world and our fellow human beings and can lead us to make questionable decisions. It means that we often end up treating people and situations based on unconscious generalizations and preconceptions rather than using a set of objective qualitative or quantitative parameters."
[https://www.elsevier.com/open-science/science-and-society/unconscious-bias]

It is well established that unconscious bias exists in every workplace and at every level of human decision making, from hiring a new employee to reviewing a timber harvest plan. Good people can – and do – make biased decisions.

In our experience with the THP review process, we have found it is quite often the case that the Review Chair on the THP review team is a RPF themself and may already have a personal relationship, through past work or school experiences, with the RPF submitting the proposal. Often these RPF's are alumni of the same University Schools of Forestry, may be or have been members of the same Forestry Clubs, Logging Sports Teams, etc. These kinds of close associations and kinship, as described, can provide a CDF Review team member with an immediate and undeniable implicit and unconscious bias.

Any CDF reviewer who recognizes an unconscious bias should recuse themselves immediately from reviewing a THP for which the bias exists.

CDF must immediately take steps to tackle unconscious bias:

1. Introduce bias testing.
2. Introduce double blind peer review and/or other forms of peer review for THPs where appropriate.
3. Issue internal briefings to raise staff awareness of the subject and provide tools and resources to further spread awareness among reviewers and staff.
4. Draw attention to UB – and give advice on how it can be reduced – in guides for reviewers and staff.
5. Review and address the gender diversity of reviewers, staff, and applicants.
6. Produce analytics and studies on potential implicit and unconscious bias in the industry.
7. Review and address implicit and unconscious bias at organized conferences and events.
8. Strive for greater transparency and diversity with regards to reviews and reviewers.

X. Conclusion

Given the overwhelming and irrefutable scientific and factual evidence provided throughout this public comment, it is clear that THP 1-22-00043-SON "Rock", is woefully misguided, is misleading and false, has completely failed to provide an accurate cumulative impacts analysis as required by law, and does not provide the public with enough clear and consistent information to understand the consequences. The Lower Rockpile Creek planning watershed should be off limits to any future timber harvesting until adequate cumulative impacts, baselines, and thresholds have been scientifically established, and river base flows have returned to pre-2010 levels.

Sincerely,

Ethan Arutunian
Friends of the South Fork Gualala

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APPENDIX B

COMMENTS AND CORRECTIONS ON: UNIVERSITY OF CALIFORNIA WILDLAND RESOURCE CENTER REPORT NO. 46 "A SCIENTIFIC BASIS FOR THE PREDICTION OF CUMULATIVE WATERSHED EFFECTS"

California Department of Forestry and Fire Protection
Forest Practice Program

April 2003

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Overview

Members of the UC Committee should be commended for their willingness to contribute time and expertise to the difficult question of how to assess cumulative impacts of forestry activities. However, with constraints on time and funding, the Committee did not have the benefit of background information about California's Forest Practice Program that could have prevented misconceptions and allowed a more thorough consideration of recommendations.

The recommended use of modeling to evaluate the risk of cumulative effects from different scenarios of timber operations and climatic stress could be very helpful in identifying differences between various watershed-wide timber harvesting alternatives. Unfortunately, the Committee's Report does not recognize many of the past and on-going efforts by the Department of Forestry and Fire Protection (CDF) to address cumulative watershed effects (CWEs), and the proposed use of modeling overlooks many serious deficiencies that have prevented agencies from using this approach in regulatory programs. The Report's criticism of current agency efforts also fails to recognize cases where modeling could complement or be integrated into existing programs.

The only reasonable conclusion that can be drawn from information and examples cited in the Report's Appendix is that currently available models are not adequate for prediction of cumulative watershed effects. As a result, the Committee's proposed approach cannot be substituted for current timber harvesting plan (THP) assessments. This does not mean that we should not investigate the modeling approach for future applications or conduct pilot studies. But it does clearly indicate that we should not rely on current models to make land use decisions.

It is also possible that there is a philosophical difference in approach that leads academic reviewers to favor new, but unverified, methods of decision making, while agencies place more reliance on tangible research results to guide the development of practices that are used to regulate the activities of private landowners. In contrast to the UC Committee's description of CDF's past efforts, the Department has actively promoted and supported research related to the potential on-site and cumulative impacts of timber operations in California (Dodge et al 1976, Peters and Litwin 1983, Durgin et al 1988, Lewis and Rice 1989, Euphrat 1992, Hawkins and Dobrowolski 1994, Rice 1996, Ziemer 1998, and MacDonald and Coe 2001, to name a few) and has been open to the development and application of workable cumulative impacts assessment methods. These and other studies of erosion sources and causes of large erosion events have been used to improve California's Forest Practice Rules. The Department's studies of cumulative effects have not found major impacts related to modern harvesting practices (Hawkins and Dobrowolski 1994, Bottorff and Knight 1996, Dahlgren 1998, Ziemer 1998, Holloway et al. 1998). However, data developed as part of the Caspar Creek watershed studies has shown that there can be downstream effects on both base and peak flows. Past research and reviews have not provided

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workable CWE models (Reid 1993), and the UC Committee's proposal is an approach to analyzing cumulative effects, rather than a currently available method, with an expectation that operational models can be developed after more research.

Some of the Committee's criticisms and concerns appear to have come from lack of information about the Forest Practice Rules, the THP review process, and the role of the California Environmental Quality Act (CEQA) in setting standards for cumulative impacts assessment. It is unfortunate that the UC Committee did not interview CDF's watershed staff or the California Geologic Survey (CGS) THP review staff, who have been major contributors to the Department's efforts in dealing with cumulative impacts. CDF and CGS staff could have provided background information and answered questions that might have avoided misconceptions and errors in the Report's findings and conclusions. This lack of communication has led to a one-sided view of forest practice regulation, and the Committee has also strayed far from the task of assessing cumulative impacts with poorly informed comments about agency abilities and behavior.

The following observations on the UC Committee's Report are lengthy because there are numerous inconsistencies and points of concern. Comments on similar topics from throughout the Report have been grouped together as shown in the Table of Contents. Specific items of concern are referenced using the chapter number, appendix section (where appropriate), page number and the paragraph number to identify the location of the statement or issue in the hardcopy version of the Report. This gives a reference with the following parts:

(Chapter # - Appendix section - Page # - Paragraph #).

It is hoped that this review will answer some of the questions raised in the UC Committee's Report and will contribute toward greater focus on realistic improvements in cumulative impact assessment that meet both statutory requirements and the need for environmental protection.

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CEQA Process

The Committee's suggestion that CWE analysis for policy making be separated from CWE analysis for THP approval or that the responsibility for review of CWE assessments be taken out of CDF and the Forest Practice Program (ES-1-1, C5- 52-2, C7-61-#1, C7-61-#2) needs to be considered in relation to the purpose for conducting these assessments. The requirement for including CWE assessments in THPs is based on legislative and judicial direction that discretionary approval by CDF makes these projects subject to provisions of the California Environmental Quality Act (CEQA), with CDF designated as the lead agency for project review. The required standards, and limitations, for cumulative impacts analysis are contained in both the California Public Resources Code and the CEQA Guidelines (CELSOC 2002). Section 15130(b) of the CEQA Guidelines states that:

> "The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided of the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness."

Section 15130(b) also specifies the elements that "are necessary to an adequate discussion of cumulative impacts." These include:

> "(1)(A) A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, …
> "(2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available, and
> "(3) A reasonable analysis of the cumulative impacts of the relevant projects. …"

The standards for adequacy of the EIR, which includes its cumulative impacts analysis, are given in CEQA Guidelines Section 15151 as follows:

> "An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure."

In addition, Section 15149(b) of the Guidelines states that:

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> "In its intended usage, an EIR is not a technical document that can be prepared only by a registered professional. The EIR serves as a public disclosure document explaining the effects of the proposed project on the environment, alternatives to the project, and ways to minimize adverse effects and to increase beneficial effects. …"

In other words, CEQA requires:

- Identification of past, present and reasonably anticipated projects related to the environmental effects being considered.
- Identification of other information used in the analysis.
- A summary of expected effects.
- A reasonable analysis that 1) does not require the same level of detail as project specific impacts, 2) is guided by the standards of practicality and reasonableness for the project under review, and (3) provides information that allows a decision that intelligently accounts for environmental consequences.

CDF's authority to require a specific cumulative impacts analysis under current Forest Practice Rules is further constrained by the court ruling in East Bay Municipal Utilities District (EBMUD) vs. CDF (1993), which found that the Department had created an underground regulation when it used the CDF Guidelines for Cumulative Impacts as a standard of comparison to judge the adequacy cumulative impacts assessments included in submitted THPs.

This discussion illustrates that the scope and purpose of the project level analysis required under CEQA is different than the separate, watershed wide program proposed in Recommendation #1 of the UC Committee's Report. Therefore, the state needs to decide if it wants to establish a new program to analyze cumulative watershed effects that is not required for CEQA project review – keeping in mind that other legislation may require more protection for resources affected by timber harvesting than is specified in CEQA.

THP Process

The UC Committee Report includes several misconceptions about the THP Process, including the statement that neither applicants nor CDF regulators recognize that any significantly adverse, cumulative effects are likely to result from timber harvest (C4-21-3). The THP development and review process is intended to produce harvesting plans with few impacts, and these plans are revised during both preparation and review to prevent or reduce potentially significant effects; so it should not be surprising that plan submitters and CDF do not report the presence of significant impacts in proposed and approved plans, respectively.

In addition, the UC Committee has stated that the Department is responsible for arguing on behalf of plan submitters when a THP is challenged by the public or in court (C4-18-

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1, C4-21-4). This is not correct. In disputes about THPs with other agencies and in court, the Department supports its own decisions about plan approval and the decision making process, rather than advocating on behalf of the plan or plan submitter. In reaching a decision, however, CDF must often chose between positions taken by plan submitters in support of their proposed activities and the positions of agencies who are advocates for other resource values. As the lead agency for approving THPs, CDF has the responsibility for identifying potentially significant impacts, deciding on what mitigations to require, and supporting these decisions. This frequently results in changes to submitted THPs. In contrast, other agencies are free to criticize without the responsibility of demonstrating the need for or the feasibility of their recommendations – including the need for complex CWE analyses in light of less stringent regulatory requirements.

A related comment by the UC Committee refers to the defense of THPs by CDF and CGS against public challenge (C6-55-3). It is not clear what this means, but if it is a reference to the Department's response to comments that is prepared for each THP, CDF is required by law and legal precedent to respond to significant issues raised by the public in comments on a given THP. This is not a post-approval defense of the THP, and THPs are frequently revised to address significant concerns raised by CDF, other agencies, and the public prior to plan approval and preparation of the Department's official response.

The UC Committee is also recommending that the Department's decisions about impact significance be based on an analysis of risk (C5-31-1 and C5-32-4). This suggestion makes sense because the interaction between landscape and the climatic events that drive watershed events are best described in terms of probability. However, the regulatory criteria for assessing environmental conditions are generally expressed in terms of quantitative limits rather than the risk that the criteria will be exceeded.

CWE Regulatory Requirements

The UC Committee members have not had the benefit of experience with preparing timber harvesting plans, so it is not surprising that they are not familiar with Forest Practice Rule requirements for preparing CWE assessments or how the THP process works. Therefore, it is unfortunate that the Committee did not interview or otherwise discuss CDF's cumulative impacts assessment process with members of the Department's watershed staff, which could have allowed misconceptions and errors to be addressed prior to publication of the Report.

Two minor corrections to the Committee's findings are that the requirement for including CWE assessments in THPs was established by a court decision in 1985, rather than 1974 (C1-6-4), and it is not true that "other rules do not mention cumulative effects directly …" (C3-10-3). There are several references to cumulative impacts in the Rules, including an entire section describing the requirements for cumulative impacts assessment, which the Committee does cite in other sections of its Report.

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The Committee is correct that Technical Rule Addendum No. 2 does not include a methodology (C6-55-4). They miss the point, however, that this was done on purpose by the State Board of Forestry and Fire Protection (BOF), because the only off-the-shelf method available when these rules were adopted was the USFS Equivalent Roaded Area method, which is not well correlated with instream conditions (Roby 1991). It is also inaccurate to state that "CDF and resource agencies in other states have been unable to promulgate any defensible methodology for defining the presence and source of any CWE, even when they have consulted the scientific community" (C3-14-1). Although the methods used in THPs apparently do not measure up to the standards of the UC Committee, they have been found to meet the CEQA standards for which these assessments are conducted (East Bay Municipal Utilities District v. CDF 1993). This does not mean that improvements are not needed, but the UC Committee's proposal is a hypothetical approach that does not provide a workable method for conducting CWE analyses. Even a quick reading of the Report's Appendix shows that models are not currently available to implement the recommended approach (see additional comments under "Modeling Limitations"), which means that the Committee has left the development of models and procedures needed to implement its recommendations to the future efforts of others.

The UC Committee's statement that THP preparers are simply asked if they recognize the possibility of CWEs is not accurate, and their characterization of the required assessment area and use of mitigation is also incorrect (C1-5-3). Each THP must include an affirmative statement that the proposed timber operations will not create or add to significant impacts. The assessment area for making this determination is required to be an area where cumulative impacts are most likely to be significant, and mitigation is specified to eliminate or reduce those impacts that could create or contribute to significant cumulative impacts. In addition, the statement that "virtually no one filing a THP admits to the presence of any CWE" (C314-1) does not recognize that many THPs identify the presence of potential cumulative impacts and provide mitigations to prevent or offset any significant increase related to the proposed timber operations.

The UC Committee also incorrectly states that the terms "significant" and "adverse" are not defined (C6-55-2). These terms are defined in CEQA and the CEQA Guidelines through the phrase "significant effect on the environment," which is described as "a substantial, or potentially substantial, adverse change in the environment." This definition is admittedly not very helpful, but it not under the jurisdiction of the BOF or CDF, and legislation would be required to change it. However, the UC Committee's subsequent statement that "This often makes prevention of negative CWEs unenforceable" is wrong. CWE requirements are made enforceable by language incorporated into THPs requiring specific mitigation measures or other actions to prevent or reduce problems that were determined to be significant in the plan approval process.

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The UC Committee's description of the connection between the Regional Water Quality Control Boards' waste discharge permit process and the THP process (C6-54-Legal Impediments) is also not correct. Agencies are not granted waivers. Instead, CDF and the State Water Resources Control Board have entered into a Management Agency Agreement that authorizes the Department to oversee state non-point pollution requirements, with Regional Boards retaining the ability to require waste discharge permits.

The Committee comment that requiring release of pesticides from two or more locations as a criteria for identifying CWEs in Technical Rule Addendum No. 2 "appears to be an example of misdirected complexity that could overlook direct effects of these contaminants originating from a single location" (A-VIII-100-2) shows a lack of understanding of state pesticide regulations and misses the point of cumulative impacts. The direct impacts of pesticide application are regulated by the California Environmental Protection Agency under a separate permitting process, which is administered by County Agricultural Commissioners and is not controlled by CDF. TRA No. 2 focuses on release of contaminants from two or more locations to address the potential cumulative, as opposed to direct, impacts of contaminant releases.

The UC Committee concludes its comments about pesticides with the following paragraph (A-VIII-100-3):

> "However, the application of forest herbicides is rarely addressed in THPs. Application rates are not well documented and effects on biota are generally unknown except in laboratory situations. There is a lack of monitoring data, except for the few studies conducted that have shown little or no evidence of transfer of pesticide residues to aquatic ecosystems or animals. There is also no predictive modeling capability. It is suspected that fat-soluble pesticide constituents may be transferred by runoff from roads that are sealed with oil, but there are few of these in the north coast of California and no experiments have yet been conducted to measure biological responses to this potential source. Even consistent and credible, qualitative predictions of watershed-scale effects of pesticide application await resolution of some of these technical issues, but the CWE modeling efforts of runoff and sediment transfer into aquatic habitat outlined above could provide a framework for field studies that might yield some predictive capacity."

This is a convoluted criticism of the Department's process for analysis of cumulative impacts that does not account for the label requirements for applying herbicides and pesticides, monitoring requirements for aerial applications, and the County Commissioner's role in the permit process. The concern about lack of information about potential pesticide impacts in current CWE assessments is contradicted by the statement that available studies "have shown little or no evidence of transfer of pesticide residues to aquatic ecosystems or animals" and, at the same time, this analysis is found to be infeasible since "There is also no predictive modeling capability." Then the Committee goes on to criticize the current CWE analysis process for not providing the

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framework for a research project to test a hypothesis that road oil might mobilize fat soluble pesticides. At best, this seems to have slipped off the topic of CWE assessments for THPs.

Forest Practice Rule Requirements

The UC Committee conclusion that the Forest Practice Rules are not backed by empirical studies (C6-55-4) either ignores or dismisses the work of many well qualified experts in forestry, hydrology, geology, soils, and other fields related to natural resource management over a period of more than 25 years. These scientists and agency specialists have relied on the best available published literature to guide the development of Forest Practice Rules, and CDF has both directly sponsored and participated as a cooperator in many studies that have led to a better understanding of landscape responses to timber harvesting. However, research is not available to answer all questions, and science often does not provide clear thresholds to make decisions about limits and cut-off points, which must then be based on the best judgment of the BOF and RPFs applying the Rules.

The date and details of changes to WLPZ widths described by the UC Committee (A-II-80-4 and A-II-83-1) are incorrect. And although the Report's description of potential reductions in riparian zone composition with multiple operations is mathematically accurate, CDF does not interpreted the Rules to allow such progressive reductions, and the Department's Hillslope Monitoring Project (Cafferata and Munn 2002) has not found the large decreases in WLPZ canopy that would accompany reductions in basal areas from "100% to 25% to 6%" for Class I watercourses, as listed by the UC Committee. In fact, this serves as a good example of how even simple modeling outcomes can be driven to false conclusions by incorrect assumptions.

The follow-up comments that the effectiveness of the watercourse and lake protection zone rules has never been established (A-II-80-4, and A-II-83-2) are also incorrect. Rule compliance and the effectiveness of Class I and II WLPZs in maintaining required canopy levels and the frequency of disturbance features such as gullies and bare areas is being determined as part of CDF's Hillslope Monitoring Project (Cafferata and Munn 2002). Measurement of Class III watercourse conditions has begun more recently, but the UC Committee statement that "the effectiveness of current regulations for ensuring woody debris recruitment is certainly very low" (A-II-80-4) both presumes an outcome and assumes that woody debris requirements for these non-fish bearing and ephemeral channels are well established when, in fact, this is still being determined.

The UC Committee comments that "There is an escape from every rule" (C3-14-1) and "virtually all rules are written with escape clauses" (C4-21-3) show a lack of understanding of both the requirements and application of the Forest Practice Rules. In fact, relatively few rules allow exceptions or in-lieu practices, and these require equal or better protection along with explanation and justification in the THP. Additionally, the requirements for proposing and justifying alternatives to the standard watercourse and

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lake protection rules, as specified in 14CCR Section 916.6, are very difficult to meet; and alternatives to the harvesting practices rules (14 CCR Section 914.9) must be approved by all agencies involved in the THP review process. It is worth noting at this point that the Rules are also frequently criticized as lacking flexibility to meet site specific conditions.

The Report section on "Conceptual impediments" (C6-55-4) includes many criticisms that are addressed elsewhere in this review. However, the part titled "Excessive reliance on rule-making rather than problem solving" (C6-55-4) needs to be specifically addressed. CDF cannot impose requirements on property owners that fall outside of authorities contained in state law and the Forest Practice Rules, which are developed by the BOF under authority included in the Forest Practice Act and must follow requirements for promulgating regulations specified in the state Administrative Procedures Act. One of the tenets of representative democracy is that government is supposed to follow the law, as laid down by the voter's elected representatives, despite the inconvenience that this may cause agencies and other interested parties.

CWE Assessment

The need for larger CWE assessment areas is a central theme of the UC Committee's report (C4-24-1). However, the Report does not account for the scope of the project under review. The assessment area used for THPs is constrained by both the scale of the project and the potential to detect impacts from one or more projects. It is, of course, true that sediment from a THP will travel downstream. But at some point, the connection between upstream sources and downstream impacts, whether measured or modeled, becomes so tenuous in large watersheds that it can no longer provide a reasonable basis for decisions about plan approval.

For example, the analysis area of 40-80 square miles (25,000 to 50,000 acres) recommended by the UC Committee (C5-43-4) does not recognize many situations where smaller watersheds drain into large rivers where it makes more sense to concentrate on the smaller watershed while also considering the downstream condition of the receiving channel.

Relieving THP submitters from the responsibility for "basin-wide" analysis (C5-29-1) does make sense, because this is beyond the scope of reasonable review for individual THP projects. However, the presence of a watershed wide assessment, by itself, does not relieve plan submitters from the CEQA requirement for CWE assessment. In addition, the UC Committee at this point recognizes that a separate process is needed for these larger scale inventories and assessments, but is still critical of THP assessments for not accomplishing what they are not designed or required to do (C4-23-8). This criticism is, at best, disingenuous. And a state-sponsored program of multi-disciplinary watershed analysis for CWEs (C3-17-2) could easily turn into an extremely large and low utility undertaking if it isn't preceded by some recognition of overall

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landscape sensitivity that would direct more intensive analyses to areas where the “risk” of cumulative impacts justifies such an effort.

The results of basin-wide assessments are usually constrained by the level of detail of inventory information available for resources that need to be considered. This is why assessments covering large areas, such as Sustained Yield Plans (SYPs), do not usually include CWE analyses that can be used with individual THPs. Faced with local analyses that do not adequately deal with big picture issues, and basin-wide analyses that are too general to evaluate local impacts, the best approach would be to use basin wide analyses to identify potential impacts on downstream resources and to incorporate information from these smaller scale analyses into plan-specific assessments that can be used to determine how proposed activities will or will not contribute to cumulative impacts.

Assembling a digital database on “the spatial pattern of physical, chemical, biological and socio-economic properties of California landscapes” along with “Digital maps of topography, stream channel networks, lithology, landslides (from CGS or other sources), roads and skid trail, fish distribution, vegetative cover, and THP submissions” and then combining these into “a common geographic framework” (A-IX-100-4) would not be a trivial or simple task. In effect, the UC Committee is asking for a complete, digital landscape description. This data is going to vary in availability, quality, formats, scale, registration, and a myriad of other ways that make putting it together in a useful way extremely difficult. It should be recognized that going through the time and expense of developing this digital watershed database is not necessary to make generalized interpretations about potential salmonid habitat. And the suggestion of using computerized tools to generate interpretations to make region-wide comparisons of watersheds (C5-51-3) would require assembling a database for the entire North Coast.

The state may chose to implement a program to “correctly formulate predictions of how land use affects water quality, biodiversity, and other resources at a whole-watershed scale” as recommended by the UC Committee (C7-61-#2), but this would be well beyond the scope of CEQA compliance. However, the Department must also meet conditions mandated by the Endangered Species Act and water quality standards that can go beyond CEQA requirements. But it should be recognized at the outset that a new program established in response to this recommendation would be primarily involved with research and development activities that may or may not lead to useful products and that this should build on the work of existing efforts, such as North Coast Watershed Assessment Program.

A program requiring 3 PhD employees, 5 Masters Degree employees, some field technicians, and several GIS specialists (C5-43-2) along with analysts, clerical staff, a significant computing environment, office space, and vehicles would easily cost more than $1,500,000 per year, not counting start-up costs. Before asking for new or redirected fees to finance this new CWE technical unit and related research activities

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(C7-63-#8), a specific plan of action should be prepared in addition to the recommended plan for funding.

With the body of the report focusing on cumulative watershed effects, which was the purpose of the undertaking, it is surprising that the first and very lengthy description of modeling methods deals with terrestrial wildlife (A-I-76-2). If the recommended Scientific Committee and CWE modeling effort are expected to deal with terrestrial wildlife in addition to water-related issues, it will greatly expand the number of Committee members and data needed to implement the proposed program.

Including the effect of roads and skid trails on increasing large flood flows as a component of CWE analysis (C3-15-3) is hypothetically possible, but has yet to be demonstrated or quantified. And the UC Committee's discussion of the effect of timber harvesting on flood runoff (C3-15-4 through 16-1) seems to be saying that we can't measure this effect, so we will predict it, then establish risk based on what we think is happening but can't actually determine. This level of certainty does not create much confidence for making decisions about land use.

The UC Committee is also proposing the use of generalized models to "assign" specific timber harvesting prescriptions before the watershed analysis work is done (A-IX-101-4). This leap from cumulative effects analysis to developing site specific prescriptions is hard to justify considering the Committee's listing of problems with the available models.

CDF agrees with the UC Committee's conclusion about the inadvisability of relying on threshold values in CWE analysis (C5-36-2, C6-56-2). It is not clear how the UC Committee concluded that CDF has a different view.

The UC Committee conclusion that THPs use mitigation to avoid acknowledging cumulative effects (C6-56-3) is incorrect. Many THPs conclude that the potential for creating or adding to existing CWEs is "no with mitigation". This clearly acknowledges that CWEs are possible and indicates that something has been done about them. Whether the UC Committee agrees that on-site and off-setting mitigation works or not, it should at least recognize that the issue was identified.

Modeling Limitations

The UC Committee's statement that "The process of constructing conceptual models should not be seen as a complicated or exclusive process" (C5-47-2) would seem to indicate that constructing the models needed to implement their recommendations is a simple task. But after further discussion, the task becomes more complicated, with "a tremendous amount of work to be done just to implement a number of these linked models to predict CWEs for a single watershed" and "In the appendix, we will also refer to issues for which modeling is still in a crude state, employing statistical and other empirical rules transferred to the site from elsewhere. These are subjects requiring research …" (C5-50-3). In fact, information in the Appendix clearly indicates that few, if

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any, of the recommended models are capable of even stand-alone application. The take-home message from this seems to be that conceiving the model is easy, but developing working models is hard and will require research. In other words, the UC Committee is recommending a research project from which useful models may someday emerge. This is clearly beyond the CEQA requirements for CWE assessment.

The UC Committee concept of matching model complexity to "the sophistication of our understanding and data available for calibration or testing" (C5-49-2) creates a situation where models would be relying on currently available data of questionable accuracy, with gaps in data availability for key resources. This is certain to result in unreliable outcomes, while obtaining data of adequate scope and better quality would be very time consuming and expensive.

The discussion about using spatial databases and remote sensing tools (C5-44-1) recognizes the difficulty of acquiring data for analysis and that there will be gaps in data, but still concludes that models of unknown reliability combined with low resolution remotely sensed data can be used to assess risk and restrict land use. The effort and expense of any such program needs to be considered with the understanding that the resulting "predictions of models will not be precise" (C5-50-2). And it is not clear what is achieved by expressing communal understanding through "computing their best estimate of the consequences of that belief" (C5-50-2)?

The UC Committee seems unwilling to accept qualitative evaluations of physical watershed conditions and impacts, as are used in CDF's CWE Guidelines (CDF 1994), but then finds similarly qualitative assessments as being adequate for making "generalizations" about the effects of watershed conditions on aquatic populations (A-VII-93-3). This means that after the time, effort, and expense of model creation, data collection, and model running, final interpretations would still be based on professional judgment. But in this case, it would be the judgment those developing and using models, rather than experienced RPFs who are familiar with the project site. And the implication of this section is that these judgments will not include the effects of downstream conditions on fish populations, which defeats a primary objective of conducting more quantitative analysis.

The UC Committee's recognition that models can be used imperfectly as well as responsibly (C5-Modeling-35-4) points out the influence of both model developers and users on predicted outcomes. The Committee describes the model parameterization process as "estimating coefficients that represent the average behavior of various small-scale mechanisms that are too fine-grained for the model to represent explicitly" (A-III-84-2), which comes down to assigning values to model coefficients that cause the model to give expected outputs. Even with the best of intentions, the assignment of coefficients and parameters will reflect the judgment of the model developers about how the world should work and the consequences of management activities. And the transference of model coefficients (A-III-85-3) based on the skill, experience, and

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viewpoints of the modeler would simply replace the judgment of field personnel with the judgment of model developers and users.

More specifically, the UC Committee is proposing that models be used to determine the "spatially registered calculation of risk to resources such as biodiversity, ecosystem functioning, and water quality" to "distill policies about allowable rates of cutting, differential requirements for BMPS … and other guidelines, depending on the risk they are willing to accommodate" (C5-29-3). In each of these cases (biodiversity, ecosystem function, and water quality), predictions will require linking separate models that represent different ecosystem and watershed functions, and then comparing outputs to criteria establishing risk. This approach may provide useful information about how the world might work for a given set of assumptions, but it has serious limitations as a predictive tool for land management. Each of the assumptions and relationships built into a model has its own range of uncertainty and potential errors, and the accumulation of this uncertainty for all of the model components leads to much greater potential prediction errors. And when model predictions exceed our quantitative experience with the variable being predicted, or the range of data on which component relationships have been established, the determination of whether predicted outcomes are reasonable must be based on individual judgments that are not backed up by data or experience. The UC Committee confirms these problems when it states that "Unfortunately, the technical state of the art of environmental prediction is, and for the foreseeable future will be, unable to avoid large uncertainties" (C5-30-3), and the discussion of model misuse (C5-36-2) describes further difficulties in assigning values to variables and parameters (C5-36-3). As a result, watershed models can be useful for investigating relationships and refining questions, but they do not, as yet, provide good decision making tools.

The scenario described by the UC Committee for predicting harvesting and road effects on flood peaks and sediment transport (A-III-85-1) serves as an example of the complications faced even in those situations where individual processes (such as evaporation, compaction, and infiltration) are well understood. The question of runoff generation from harvest units may be answered with some confidence by available models, but adding the effects of roads on runoff generation adds much uncertainty to model results because of large differences in road system configurations and because the relationship between roads and runoff is not well established. Using these modeled flows to predict sediment production and transport adds more uncertainty because sediment inputs are very difficult to predict, the point at which bedload transport is initiated varies with the changes in channel characteristics along the length of the stream, and channel transport capacity varies with flow, channel characteristics, and the nature of the load being carried. In addition, the relationship between flow and risk is not easy to establish for these processes. Return periods for flows are known for some streams and can be modeled based on anticipated or assumed rainfall characteristics for others. But data from which to extrapolate sediment production return periods or other criteria for expressing the risk are much harder to come by.

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The UC Committee's risk based decision making approach (C5-31-1) also suffers from the problem that the large errors in model outcomes, as described above, are translated directly into the prediction of risk. And the recognized unreliability of numeric predictions (C5-36-2) combined with limitations on information available for assigning risk to extreme climatic events and to effects on individual species (C5-36-3 and A-VII-93-3) make it even more difficult for models generate trustworthy estimates of risk for decision making. In addition, this uncertainty increases as the geographic area shrinks toward a determination of the risk at any particular site (e.g., we may be certain that landslides will occur every year in a large area, but we don't know where for any given year). So predicting quantitative differences in risk, which requires a comparison of numeric outcomes, becomes problematic. In other words, one cannot reliably base a decision on differences in risk if there is no confidence in the predictions. Instead, we end up with risk evaluations that are no better than the current practice of avoiding or modifying practices on potential problem sites. However, modeling based on relationships established from data can provide a valuable tool for identifying those site characteristics and combinations of characteristics where avoidance or modification of practices should be applied, which links modeled risk to the site specific application of Forest Practice Rules and THP mitigations.

The statement that "The whole watershed view of the CWE problem requires that broad patterns of risk be computable" (C5-50-1) captures the main difficulty in relying on the Report recommendations. If this were easy or clearly feasible, it would have already been done. In fact, the Committee is recommending an expensive experiment to see if such an approach will work. This is clearly beyond the scope of what is envisioned in CEQA and the Forest Practice Act.

While the UC Committee's concerns about the effects of time lags and the difficulty of measuring downstream impacts (A-X-103-2) are certainly true, this serves an example of the problems involved in verifying results of CWE modeling. The Team's basic recommendation is to use process based models to predict CWEs in large watersheds. Therefore, it is the modeled CWE projections, rather than individual processes, that need to be verified by monitoring. However, the UC Committee indicates that such monitoring could take decades (A-X-103-2) and is even more pessimistic in its statement that "It is impossible to analyze and predict the long-term consequences of land use on erosion, sedimentation, ecosystem structure and function, or aquatic habitat through experiments or other empirical approach because to do so would require monitoring large, complex watersheds during land use of varying nature and intensity for many decades of variable weather" (C5-33-4). This begs the question of how we can successfully develop and verify CWE models if it is not possible to measure the effects that we would be modeling.

The Report section on Cumulative Effects of Watershed Changes on Sediment Sources (A-IV-86-3 through 88-3) gets to the heart of problems associated with modeling of land use effects. Here we find that spatially registered modeling of sediment loading is in its infancy, and that "models would not be able to match short-term measurements … nor meet the standards of replication established in the laboratory sciences." We are also

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informed that such models "should be physically based yet parameter-poor such that it can be calibrated, however crudely …" which means that those variables that we can't calibrate will be left out, along with their influence on sediment production. And it is pointed out that models of the effects of root reinforcement "are difficult to calibrate due to the large number of parameters and the large spatial (and temporal) variation in those parameters." The same could be said of most other landscape processes related to sediment production. But this constraint is ignored in order to make predictions of "general magnitudes of sediment loads" (that are not tested or validated) for assigning risks that become the basis for regulating timber operations. In addition, we are informed that current models are likely to overestimate the intensity of shallow landsliding unless data on soil depth is available, which is almost never the case at the scale needed to make these predictions, while deep seated landsliding "is more of a challenge to modelers." In addition, we are informed that aerial photos can be used to estimate mean flow rates of large landslides, but not quantitatively, to analyze the approximate magnitude of changes resulting from land use, although it is not clear how quantitative differences are derived from non-quantitative flow rates. Then we are supposed to estimate the frequency of gullies related to land use and destabilizing of channels, for which no models are available. This is clearly the realm of research and pilot projects, rather than an operational approach to land use regulation.

Following are more specific comments on the Committee's proposed use of modeling:

- The statement that "in a landscape which contains a large amount of spatial variability of topographic form and material properties, including transient properties such as evolving tree-root reinforcement of hillside soils, or aquatic primary production, all of which may be sufficiently variable that it is impractical to measure or map them with foreseeable resources in a particular application" (C5-39-Item a) points out that watershed scale modeling will not be able to account for some of the basic, site specific factors that control erosion resistance and susceptibility.

- The proposal to use the empirically based ESI model (A-IV-90-2) seems inconsistent with the recommendation to use physically based modeling. Also, the UC Committee appears to be placing great reliance on an unpublished model for surface erosion without commenting on currently available approaches, such as WEPP and SEDMODL.

- The translation of the paragraph about the state of the art in sediment routing (A-V-91-3) seems to say that we understand the process of sediment transport, but the physically based models don't work very well in quantifying downstream sediment transport, and the state could help overcome the problems with current models by paying for more research on sediment routing (A-VI-92-3). This does not sound like an operational approach to land use regulation.

- The discussion of modeling sediment from roads (A-IV-89-3) acknowledges the lack of information about actual quantities of sediment from roads in California, which reinforces the argument against using such modeling without verification. But the

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Report fails to mention that use of best management practices, such as outsloping, can greatly reduce the noted concerns about road sediment without resorting to the uncertainties of modeling sediment production.

- The use of empirical rating curves for estimating turbidity is not as easy or straight forward as is implied by the UC Committee (A-VIII-99-4). There are large differences related to time of year, rising and falling limbs of individual storms, instantaneous sediment inputs that vary by both antecedent watershed conditions and storm size, and other factors. Also, no model is cited, and the Report is silent about where the sediment budgets and suspended sediment samples that are required for calibrating turbidity to both suspended sediment and flow will come from.

- Modeling of stream water temperature should be more straightforward than flow, sediment, habitat, and populations. However, documentation for the Stillwater Sciences model cited by the UC Committee needs to be provided (A-VIII-99-3).

- The Appendix section on Riparian Biota (A-II-79-4 through 83-3) seems to have much to say about the Forest Practice Rules, but contains little in the way of useful information about modeling the impacts of timber operations on riparian resources.

- The Report contains a good discussion of the dilemma faced when trying to establish criteria for large woody debris and for many other natural features (A-II-81-1). One approach that is not mentioned is to identify a desired habitat condition, and then estimate the amount of woody debris that would be needed to provide it.

- The discussion of large woody debris source areas (A-II-81-6) does not address the likelihood and importance of providing larger diameter woody debris as distance from the stream increases within the length of a site potential tree. This larger diameter wood is much more likely to come from trees falling at the bank or very near the stream, with the proportions varying by topography, tree type, and degree of bank undercutting (Benda et al. 2002). The other significant source of larger diameter wood is from landslides that directly enter the stream system (A-II-81-6), which means that risk assessment models should also distinguish the benefits of LWD from the consequences of sediment.

- The UC Committee's statement implying that larger streams don't need wider buffer strips because the larger wood that is important for these streams is produced closer to the stream bank (A-II-82-1) should be qualified to recognize that buffers provide benefits for resources other than large woody debris. For example, buffers are intended to help minimize sediment inputs, prevent streamside landsliding, and provide wildlife habitat.

- It also seems inconsistent for the UC Committee to state that the empirical record of large floods is too short to define land use effects on risk, and then argue that we

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should evaluate the impacts of how such changes in flow frequencies would affect scour of gravels and large woody debris (A-III-85-2).

- The statement that "… the prediction of morphological change in aquatic habitat remains difficult, or at least undeveloped" (A-VI-91-4) means that despite much effort in modeling effects on the physical state of the watershed, the tools for linking this to impacts on habitat have not been developed. And the step from habitat to actual impacts on stream biology would be even more tenuous.

- The discussion of gradient effects on channel characteristics (A-VI-92-2) provides a description of generally expected conditions, but gives no guidance on how or what models would be used to predict changes to these characteristics and makes no linkage to aquatic habitat, which is the subject of this section of the Report.

- The idea of using digital elevation as a surrogate for "guiding, interpreting, and extrapolating field work … as a foundation for a general model linking ecological and geomorphic processes" (A-VI-91-5) stretches the limits of correlation past the breaking point. This puts the UC Committee in the position of first rejecting the use of studies based on statistical correlation, and then proposing to use guesses based on an assumed relationship to channel gradient to represent complex processes.

- Combining the statement that there is no mechanistic modeling capability available for changes in aquatic habitat characteristics caused by logging of headwater streams (A-VII-94-1) with the proposal to use available censuses from sample environments to make quantitative statements in probabilistic terms integrated over entire watersheds (A-VII-94-1) is substituting assumptions about transference of inventory results in place of the previously recommended process modeling, and then somehow extending the result across an entire watershed. This is followed by another statement that methods for predicting mainstream habitat changes from fundamental mechanics are not well developed, while proposing to predict habitat changes based on empirical evidence that is "extended to yield some credible predictive capability" (A-VII-96-1). The Report goes on to say that that the capability to predict changes in rearing habitat is "seriously limited by the lack of population models that contain information on habitat quality" (A-VII-96-3). And after stating that the lack of predictive population models is a serious limitation, the Committee suggests using an approach for prediction that is heavily reliant on the estimation of many parameters (A-VII-98-4). With this level of confidence in model capabilities, it is hard to imagine how combining highly uncertain predictions of sediment, wood, and habitat impacts could be used to make operational decisions about THP prescriptions and mitigations.

- Considering the limitations on use of models described above, the UC Committee's statement that "CWE prediction needs to … establish causal linkages between land use and ecosystem condition" (C5-38-item 1) indicates that there is still a major disconnect between what is needed for cumulative impacts analysis and the available models.

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- The UC Committee's proposal for using landslide susceptibility interpretations to identify habitats at risk of excessive sedimentation (A-IX-101-3) oversimplifies a much more complex problem that often includes other sediment sources and would require linkage to habitat conditions that other sections of the report clearly state are not available. The difficulty of doing this has already been described earlier in the Report's Appendix.

- It is not encouraging that the Report does not recommend using the example models given in Appendix A (C5-49-2). If the best examples are not good enough, where are the models required to implement the Report's recommendations going to come from? And if research is needed on quantitative model development, linkage analysis, methods for field quantification, and monitoring methods (A-X-101-5), what is left that is ready for application?

CDF Guidelines

The CDF cumulative watershed effects assessment Guidelines (CDF 1994) critiqued by the UC Committee (C4-18-3) were designed to work in concert with Forest Practice Rule and CEQA requirements. This procedure is intended to walk the THP preparer though the gathering of information on field conditions, consideration of information available from other sources, applying professional experience, and the integration of this information in a way that leads to a conclusion about the potential impacts of the proposed activities. It is not clear whether the Committee members were provided access to Appendix A of the Guidelines, which includes instructions and definitions of terms that answer several of their comments, and the Committee also appears to have criticized the Guidelines without any effort to see if they provide reasonable conclusions. Following are responses to the Committee's specific "editorial comments" (C4-18-3 through C4-20-3):

1) What an RPF will be "aware" of in conducting a watershed assessment under the Forest Practice Rules is based on the requirements of Technical Rule Addendum No. 2 and other sections of the rules that require information development. These include:

    - The use of information that is "… reasonably available before submission of the THP."
    - Specific information sources listed in the Addendum to TRA#2 that must be identified in the THP.
    - Information about past and future projects, where:
        - project is defined as "… an activity which has the potential to cause a physical change in the environment, directly or ultimately, and that is: 1) undertaken by a public agency, or 2) undertaken with public agency support, or 3) requires the applicant to obtain a lease, permit, license or entitlement from one or more public agencies [including THPs].

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  - Past projects are defined as "… previously approved, on-going, or completed projects which may add to or lessen impact(s) s created by the THP under consideration. These generally include, but may not be limited to, projects completed within the last ten years."
  - And "reasonably foreseeable probable future projects" can be summarized as "projects with activities that may add to or lessen impacts(s) of the proposed THP", such as another THP under control of the current THP submitter and expected to commence in 5 years, THPs on other ownerships where the plan has been submitted or on-the-ground work has materially commenced, non-THP projects requiring a permit that are under review by a public agency, or a project that has been announced by a public agency.
- Information about past and future activities obtained from "… plan submitters (timberland or timber owner), and from appropriate agencies, landowners, and individuals …".
- Other information or conditions that the RPF may have personal knowledge of based on current and previous work in the assessment area or downstream.

For the most part, these requirements are based on the CEQA Guidelines, which form the legal basis for cumulative impacts assessment. By the time the task of assembling and reviewing this information has been completed, an RPF will have amassed a substantial amount of background data on which to base judgments about what has happened in the watershed.

Conducting an on-site review of channels is required by the Rules and, as used in the CDF Guidelines, is intended to provide the RPF with both an understanding of current conditions and a context in which to consider how past projects have interacted with the landscape. Riparian zone protections are also specified in the rules. The Committee's implication that channel and riparian zone conditions are not considered is simply not correct and shows a lack of understanding of both the rules and the THP development process.

As part of Technical Rule Addendum No. 2, an RPF is required to determine the beneficial uses of water that exist on the plan site and downstream. These beneficial uses establish which water quality parameters must be protected. Consideration of effects on peak flow (including flooding) is specified in TRA # 2. And assessing the effects of timber operations on slope stability is also required by the rules.

2) Assessment area instructions in Appendix A of the CDF Guidelines specify using an area where cumulative impacts of the project may be significant. The Guidelines also include specific instructions for considering downstream effects.

3) Instructions for the qualitative evaluation of channel condition features and for assigning ratings are given in Guidelines Appendix A. The rating of these channel features is based on observed presence and relative frequency. Criteria

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for whether gravels are buried in sediment, pools are filled, the channel is downcutting, and the requested characteristics of other listed features are based on field observations that foresters can determine.

4) See no. 1 above regarding how RPF is aware.

5) See no. 1 above regarding how RPF is aware.

6) The interpretation of whether practices used in the past have resulted in particular impacts is to be based on the RPFs observations in the field, information available for the THP, and the RPFs experience in the plan area.

7) The criteria for determining whether the potential for an impact is “High, Medium, or Low” is contained in Appendix A of the Guidelines.

8) Identification and evaluation of potential impacts from future projects is a requirement of CEQA. Types of projects to be included are described in the Forest Practice Rule definition of “reasonably foreseeable probable future projects.”

9) The criteria for determining the potential for cumulative impacts are given in Appendix A of the Guidelines.

10) The criteria for determining the potential for cumulative impacts after mitigation are given in Appendix A of the Guidelines. Whether it is realistic to give a one word answer or not, a statement of whether the project will result in significant cumulative impacts (which comes down to yes or no) is required by CEQA.

THP Mitigations

The Report does note in passing that THP level identification of problem sites and implementation of mitigation measures is helpful and is complementary to the recommended, larger effort (C5-50-1).

The BMP “leaks” described by the UC Committee (C3- 13-1) may be widely identified by some environmental scientists, although this is not documented, but are rarely measured. And when carefully measured, the overall effects of these “leaks” are usually found to be small (Bottorff and Knight 1996, Dahlgren 1998, Holloway et al. 1998, Lewis et al. 2001, Cafferata and Munn 2002).

The UC Committee recommendation that modeling and gaming strategy be used to overcome deficiencies in the THP process and application of site-scale BMPs (C5-53-1) would substitute generalized and highly uncertain predictions in place of the site specific field information that is presently used to prescribe BMP mitigations.

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The report recognizes that loss of downstream rearing habitat has had a major effect on fish populations, which is then used to justify restricting upstream activities to preserve remaining small pockets of rearing habitat (A-VII-96-2). However, preventing habitat loss is already a focus of the WLPZ Rules, and working to restore the original, downstream habitat that is important to outward migration would seem to be a more productive solution to the problem of forcing under-developed fish into the ocean.

The UC Committee's criticism of using mitigation to reduce or offset potential cumulative impacts (C6-56-3) is disingenuous and inconsistent with the Report's earlier recognition of the potential for "positive CWEs resulting from rehabilitation projects" (C3-13-3). While the Report's authors conclude that cumulative effects are not quantifiable and recommend that these impacts be addressed in terms of risk through the use of unverified models, the UC Committee would then require that the benefits of practices aimed at offsetting CWEs be quantitatively substantiated. In effect, the Committee is requiring that non-quantified impacts be compared to quantified mitigations, from which no conclusion can be reached, and they are not willing to accept the basic premise that fixing clearly evident problem sites and known sources of sediment can be used to off-set unknown and un-measurable impacts. Before CDF adopts this viewpoint, there needs to be at least some documentation of why we would be better off by not fixing existing problems.

The UC Committee observation that CDF rarely considers mitigations outside of the plan area (C3-12-4) is the result of ownership constraints and because plan submitters have not proposed that outside activities be used to mitigate project area impacts. There have been exceptions – primarily through the use of road system mitigations within an assessment area, such as PALCO and Georgia Pacific in the Mokelumne River Watershed. In addition, the Committee's concern over lack of mitigation outside of the plan area seems to be inconsistent with the Report's criticism of using mitigation to off-set potential CWEs in general (C6-56-3).

The UC Committee has also incorrectly concluded that CDF expects impacts to be "mitigated out of existence by application of a Best Management Practice" (C4-21-3). Instead, THP mitigations for cumulative effects, whether included in the rules or required during the THP review process to meet a specific problem, are viewed as reducing a plan's contributions to CWEs to a point where they no longer meet the definition of a significant adverse effect.

Past Studies

It is not clear what the UC Committee considers to be a "short-term empirical study" (ES-3-1), but the results of past studies should provide the best information for forming a "communal understanding", and the results of these studies, such as the work at Caspar Creek (Ziemer 1998), should not be dismissed in the absence of better information. For example, the work reported by Hawkins and Dobrowolski (1994) on the cumulative impacts of watershed management on stream biota is dismissed by the UC

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Committee as a region-wide statistical analysis of watershed conditions (C1-6-3), presumably because it did not find widespread adverse effects resulting from cumulative impacts, when this study had, in fact, specifically tried to identify impacts at the watershed scale that the UC Committee now recommends we use modeling to predict.

The UC Committee's discussion about prediction and its criticism of statistical studies in the section about "Spatially Registered Simulation Models and Gaming" (C5-39-Item 4) can be paraphrased as – an educated guess is better than results of a study that identifies significant factors. This is equivalent to looking at the world with blinders that prevent seeing or considering how or why statistically identified watershed factors are important in controlling or correlated with watershed responses. Statistical studies can show us preferred methods of expressing environmental variables that can actually be measured. And the best of both worlds is to use statistical methods to identify and quantify coefficients and parameters used in mechanistic models.

Statistics provides a systematic approach for interpreting data, which may or may not start with variables that have been selected or structured to represent expected processes. At one extreme, variables can be entered into a statistical model based solely on their ability to improve correlation and significance. At the other extreme, statistical methods can be used to determine best fit values for coefficients for process based models in which variables have been pre-selected and structured to represent a hypothesis of how the world works. In either case, the accuracy of such models is likely to be greater than models created from un-calibrated assumptions about natural systems, which are actually hypothesis waiting to be tested.

After criticizing the use of empirical studies and promoting processes based models, the Committee states on page 96 of the Appendix that "The lack of predictive population models, even of the coarse-grained, conceptual type … remains a serious limitation for resource managers and policy makers …" and that we will need to rely on formalized judgments and empirical statistical relationships (A-VII-96-4).

Although the data and tools available now are likely to have improved, it is worth mentioning that an extensive ranking of watershed sensitivity as suggested by the UC Committee (C5-51-3) has already been completed under a contract sponsored by the BOF's Monitoring Study Group (McKittrick 1994). This work was conducted by CGS based on available geology, slope, and precipitation data. The application of satellite imagery to analyze changes in land cover has also been used in the past by CDF's Fire and Resources Assessment Program with results that should encourage further investigation. And more recent work on watershed level analysis and sensitivity has been conducted by several of the state's resource agencies, including CDF, as part of the North Coast Watershed Assessment Program.

In addition, it is unclear what studies the UC Committee is referring to in its comments about nutrient losses related to timber harvesting in California that have raised concerns about the potential for eutrophication of lowland and estuarine habitats (A-VIII-99-5).

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Water quality effects of harvesting have been measured in the Caspar Creek Watershed by Dahlgren (1998), who found only minor increases in nutrient flux, while Bottorff and Knight (1996) found no significant adverse effects on stream biology. Another water quality study in the Mokelumne River Watershed found that nutrient concentration increases occurred below the timber management zone in areas of residential and commercial development and, unexpectedly, as a result of leaching from one, specific rock formation (Holloway et al. 1998). Each of these studies was supported by CDF, and one reason that more work has not been done is that the magnitude of observed impacts has been small.

Agency Efforts

An uncritical or uninformed reading of the UC Committee's Report, and Chapter 4 in particular, would lead one to believe that modeling can accurately predict where and when to limit timber harvesting, can establish the risk of in-unit landslides, can monitor channel effects, and can determine the long-term impacts of timber harvesting on landsliding and aquatic habitat, among other things. This, however, ignores the limitations of available information and models that are described later in the Report's Appendix and pointed out in this review. The Committee would also lead readers to believe that CDF, with the complicity of CGS, has been accepting without question plan submitter denials of landslide potential and that CDF uses best management practices to avoid analysis of timber harvesting impacts. In addition, the Committee has determined that there is no monitoring despite pre-harvest inspections, active inspections, post-harvest inspections, systematic follow-up studies of hillslope and WLPZ impacts, periodic reviews of mitigations to prevent landslides, studies of instream impacts, and CDF sponsored watershed research projects (Ice et al., in press). In fact, the UC Committee has ignored the ongoing efforts by hundreds of scientists and agency "technical specialists" over the past 20 years that have resulted in radical changes in the way that timber operations are conducted and the impacts of these operations on the landscape.

Agency scientists and "specialists" who have been working on problems related to timber operations know that, in reality, timber harvesting rates and the magnitude of even-aged treatments have been effectively reduced by adjacency requirements, smaller unit sizes, and restrictions placed on both unit locations and type of harvesting as a result of land stability and other concerns identified during THP development and review. A Hillslope Monitoring Program and complementary Modified Completion Report Monitoring Program have been established as an additional check on compliance and to determine long-term effectiveness of the Forest Practice Rules as best management practices. These programs are focused on roads, skid trails, landings, and watercourse crossings because previous studies sponsored by CDF and others (Rice and Datzman 1981, Rice and Pillsbury 1982, McCashion and Rice 1983, Peters and Litwin 1983) have shown that these disturbance features produced much more erosion and sediment than in-unit erosion. Watercourse and lake protection zones are also included because of concerns about canopy and riparian impacts, and a

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Class III watercourse survey has recently been added to the Hillslope Monitoring Program (Cafferata and Munn 2002). Much work has also been done to try to characterize instream impacts and to determine instream monitoring methods (Rae 1995, Barber 1999, CDF and NCRWQCB 2002), but these efforts are hampered by real world problems of access, high study costs, long time frames (especially for determining trends related to larger flows), and the recognition that large flow events often reset channel conditions and interrupt shorter-term trends.

Agency Expertise

The UC Committee has concluded that "The personnel currently in charge of recognizing and regulating CWEs could not provide the conceptual leadership and guidance with methods for CWE prediction described in this report and its 'tool-box' Appendix." (C6-57-3). This conclusion does not come as a surprise since the UC Committee has not found anything done by CDF sufficient for addressing cumulative effects. However, it is worth noting that the Committee made this determination without meeting with or otherwise interviewing CDF's watershed staff and that the Report Appendix does not provide a tool box, since the described models are not operational. In fact, the only possible conclusion that can come from reading the Appendix is that the proposed modeling approach to CWE analysis cannot be implemented with currently available watershed models. In contrast, CDF is constrained by a requirement for using feasible measures and cannot impose untested hypothesis on private landowners.

The UC Committee's further statements about "agency personnel" being unaware of developments in the technical literature, having an "insular view of what constitutes the best scientific information on a subject", and "hiring consultants to make quick, 'policy relevant' surveys as a basis for short-term decision-making" (C6-58-5) are highly critical CDF and other state agency staff. To provide some substance to support these findings, it would be helpful to know more specifically what agencies being criticized, in what way views of the scientific literature are insular, and in what situations quick policy-relevant studies are being misused.

In comments about available data, (C5-48-2 through 48-4), the Report makes some optimistic projections about data availability, followed by a pessimistic view of the usefulness of available data, then acknowledges the probable need for field inventories, while minimizing the difficulty of conducting such inventories by assuming that the people who have done this work in the past were not sufficiently experienced. In other words, the UC Committee would be able to more efficiently acquire the necessary data than hydrologists and fisheries biologists conducting stream surveys, geologists conducting mass wasting inventories, soil scientists conducting soil surveys, and other professionals engaged in inventorying the resources in their areas of expertise However, the outcome of "an analysis" based on low quality data and using, as described in the Report Appendix, inadequate models should not be expected to yield results from which land management decisions can be made.

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The purpose of the UC Committee's recommendation that "the State needs to recruit appropriate professionals (working for Industry, State agencies, or other groups) with documented ability and knowledge of management to become involved in CWE analysis" (C7-63-#5) is not clear because there is no apparent reference in the Report about how these management skills would be used in conducting or implementing CWE assessments. In light of the Team's criticisms of the preparation and review of CWE analyses, it would seem more helpful for the Department to 1) provide better training about cumulative impacts for RPFs and agency Review Team personnel, 2) provide direction to take a closer look at submitted CWE assessments, and 3) to hire at least one additional staff member with a background in watershed processes to work directly with Review Teams on improving the quality of approved CWE assessments.

Adversarial Relationships

After describing agency personnel as unable to provide conceptual leadership and guidance, being unaware of developments in the technical literature, and having an insular view of what constitutes the best scientific information, the Committee also criticizes the state and industry for creating an adversarial relationship with scientists (C6-60-2 through 60-4). In addition, the Committee has determined that agency personnel are "perverse" based on events where they have heard only one point of view. At this point, it might have been useful for the Committee members to have given their recommended use of skepticism (C6-60-4) a trial run.

Having aired their opinions and complaints, the Committee then makes a preemptive strike on the possibility of disagreement by stating that "The inability of many people in the resource industries and associated State agencies to use skepticism constructively places serious constraints on transparent investigations of issues such as prediction of cumulative watershed effects. They see all questioning as judgmental, rather than as an approach for improvement of a product, technique, approach, and ultimately of sustainable development of the resource they profess to value" (C6-60-4). In other words, pointing out where scientists are wrong is bad, but criticism by poorly informed scientists is okay. What would be more helpful is for peer review of new research results and proposed models to occur within the scope of scientific publications instead of during the public review process of state and federal permitting agencies that require response to comment.

The Committee's final recommendation to support public debate on CWEs while denouncing "attacks" on participants (C7-64-#9) does not recognize the freedom of expression that is involved in the project review process, and the expectation that scientists who become advocates will be given special status in debates over controversial issues is a viewpoint that agencies can't enforce. Greater perspective on this issue could have been gained by reviewing comments about agency personnel that are received in the course of making decisions on controversial projects.

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Consensus

The UC Committee's recommended analysis process assumes that there will be "multi-stakeholder accord on conceptual models" (ES-1-2). However, the process for reaching such agreement on models, data, and decision making depends on a willingness by those involved to reach consensus that past experience would indicate is often hard to find among interest groups with differing and firmly entrenched beliefs. Requiring agreement among people with conflicting interests as a condition of a cumulative impacts assessment (C5-45-1) would turn this analysis into a political exercise. And if the Committee really thinks that global warming is an example of how a modeling based approach will provide consensus (C5-34-4), then the polarized and politicized viewpoints on this topic should serve as a warning about the potential for modeling to reduce controversy in the THP review process.

Without the requirement for consensus, most of the community input that the UC Committee recognizes as necessary for identifying significant issues (C5-45-All, C5-46-3 and 4) can be provided by the CEQA process, where concerns are identified at the start of analysis and their disposition described in the agency's response to comment. However, this should not be expected to result in agreement on the part of individuals who may remain unconvinced.

The UC Committee also anticipates that the recommended CWE Committee would be able to mediate the concerns of various interest groups to determine issues that would be included in the CWE analysis for a given watershed, with assumption that technical knowledge and reputation will allow the Committee to bring the different parties to consensus (C5-47-1). This has been done before, and the result has been the labeling of participants as being for or against the interests of one or the other of the participating groups, which created similar adversarial circumstances of which the UC Committee is so critical.

Research Support

The limitations of current models cited in the Report and pointed out in the comments in this review clearly indicate that the use of models to predict CWEs is a research effort. The UC Committee also emphasizes the need for research as a part of their recommended modeling effort (C7-63-#6). An issue that would come up immediately in any current discussion of new research is the availability of funding at a time when state budgets are being cut. However, CDF could re-evaluate its priorities for coordinating and supporting research activities and seek funds from a variety of state and federal sources.

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Documentation and Background Information

The Report states that environmental scientists agree that timber harvesting continues to cause “radical” alterations in water quality, habitat conditions, and flood risk (C1-6-4). However, there is no documentation offered to support this opinion. And it is ironic to note that research underlying current estimates of the effects of timber operations on flood risk in rain-dominated environments came from the CDF supported Caspar Creek study that is discounted by the Committee.

The UC Committee’s statement that there is “almost a complete lack of data on water quality, streamflow, terrestrial biota, aquatic populations, the physical condition of streams, components of the water balance, and the degree to which they are altered by timber harvest in the region” (C6-57-1) either shows a lack of familiarity with or disregards the large amount of information that is available. CDF has been conducting hillslope monitoring, which includes evaluation of watercourse and lake protection zones, for 6 years and has accumulated information on 300 THPs statewide, with the largest proportion from the North Coast (Cafferata and Munn 2002). The Department of Fish and Game has been collecting information about fish populations and channel conditions for decades, and this is now being brought together as part of the North Coast Watershed Assessment Program and other efforts. The forest industry has an extensive program for measuring stream temperatures (Lewis et al. 2000), and individual companies have on-going stream monitoring programs. Studies have been done to evaluate watershed impacts across a range of conditions, including the work described in both the Cited and Related References listed at the end of this review, among others. In particular, CDF has been cooperating with the PSW Research Station on studies of the impacts of timber operations on sediment production and channel conditions in the Caspar Creek watershed since the 1960’s, along with ancillary studies of water quality, stream biology, fish habitat, and others that would require a reference list too long to include here (see list of Caspar Creek references summarized by the Pacific Southwest Research Station at http://www.rsl.psw.fs.fed.us/projects/water/caspubs.html).

The Committee’s finds fault with a lack of “yes” answers in the Pape and CGS surveys to the question of whether a proposed plan would cause significant adverse impacts or contribute to existing impacts (C4-21-5 through 23-3). However, review of Report Table 1 (C4-22-2) shows that about half of the THPs in each of these surveys reported that there were continuing, significant adverse impacts from past projects in the assessment areas of the proposed THPs, about a third stated that significant cumulative impacts would not occur following mitigation, and two-thirds found that there were no significant cumulative impacts without additional mitigation. The absence of “yes” responses has already been explained in the earlier discussion of the THP Process, and the Committee does not present any information demonstrating that the conclusions reported in these THPs are not correct. The presence of features in the Redwood Creek watershed that were not included in THPs covering this area may point to a need for follow-up, but this does not demonstrate that the operations conducted under these plans have contributed to significant adverse cumulative impacts.

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In addition, the UC Committee does not present any data or other evidence to support its contention that exceptions and in lieu practices, which must be explained and justified in the THP review process, have resulted in additional impacts (C6-55-4). And this point does not seem to have been related to the issue of cumulative impacts.

The comments of a CDF "reviewer" about mass wasting (C6-58-2) are presented by the Committee without providing any context for these observations, and they do not appear to have evaluated the THPs in question to see if these comments were addressed in the final product. In addition, the question of whether the referenced landowner's map of landslides was used to address the Team's concerns in the actual review of plans was not answered. On most North Coast THPs, and especially where mass wasting is a concern, interpretation of landslide hazards is done by licensed geologists who are employed by the California Geologic Survey, rather than by CDF staff.

Similar criticism of the THP review process, based on a state employee's comment about lack of forestry related landsliding that was not consistent with a map observed by the Committee showing numerous mass failures, (C6-58-3) lacks documentation that the mapped slides were actually related to timber operations, and there is not sufficient description in the Report to check the accuracy of this assumption. Simply put, more information is needed to support the Committee's conclusions.

There is also no foundation for the UC Committee's criticism of cumulative impacts analyses in SYPs (C4-25-3, C6-55-4). Cumulative impact assessment for use with individual THPs is not a required element in SYPs, and CDF determined that the Pacific Lumber Company SYP did not provide an adequate analysis to substitute for plan specific assessments. The only other SYP that had been approved at the time the UC Committee was preparing its Report was the Surdna plan in northeastern California, which had only three miles of class I waters on the entire 70,000 acre plan area.

In addition, CDF is not aware of any studies or other documentation that would support the UC Committee's conclusion that Forest Practice Rules pertaining to landsliding, road wash, skid trails, and non-fish bearing channels have not been based on scientific evidence (C6-56-1). Actually, CDF staff and others involved in the development of Forest Practice Rules have relied heavily on the best available research and have considered the "communal understanding" of both problems and solutions related to the impacts of timber operations, as described in more detail in the comments on "Forest Practice Rule Requirements." The Committee's implication that CDF staff have not responded to concerns about harvesting in the Freshwater Creek watershed because "logging does not cause flooding" (C6-58-1) is also not correct. In fact, CDF has limited the annual harvest in this watershed specifically to address the flooding issue, as described below.

The UC Committee comment that "Other rules, such as limitations on the size of areas that can be harvested within a short period of time, are easily circumvented" (C6-56-1) is both inflammatory and wrong. Circumventing the Rules results in violations or a

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citation. If this comment by the UC Committee is supposed to be a judgment about the adequacy of the Rules, then the authors should chose their words to say so. And even the example used by the Committee is misleading. The reference to clearcutting 15 percent in the Freshwater watershed during the same decade that 35 percent has been harvested with alternative (non-clearcut) prescriptions is supposed to somehow justify a comment about circumventing harvest unit size rules. But there is no analysis or discussion about how this circumvented or was an inappropriate application of the Rules. A quick review data available for harvesting on the Pacific Lumber Company's 19,600 acres of timberland in the Freshwater watershed shows that the various types of harvesting removed approximately 3 percent of the canopy per year from 1988 through 1997, which is significantly less that the 5 percent average that the UC Committee numbers imply, and CDF has subsequently reduced this to about 2 percent per year based on more recent information on potential peak flow effects (Munn 2001).

The UC Committee has apparently decided that the rules for Class II and III watercourses are ineffective (A-II-80-4) without feeling the need for any data to support this conclusion. And the UC Committee's statement that the effects of partially harvested buffers on stream temperatures is unknown (A-II-83-2) is surprising since the effects of streamside vegetation removal on stream temperature have been studied for many years and is one of the more easily modeled impacts of timber harvesting (McGurk 1989). In fact, information that was available in CDF's Interim Hillslope Monitoring Report (BOF 1999) showed that high levels of canopy are being retained in Class I or Class II WLPZs under the current Forest Practice Rules, and an additional two years of data collection has provided nearly identical results (Cafferata and Munn 2002). In addition, the Committee makes no case for their concern about Class III watercourses, which only carry water in direct response to storm events. This points out a discrepancy in the Committee's approach to criticism, where not having quantitative data to prove the Forest Practice Rules work is bad, but it is okay to say the Rules don't work without the benefit of supporting data.

The UC Committee also does not provide any indication of the information it is relying on to claim that state agency personnel have adopted a view that prevention of negative CWEs can be accomplished just through enforcement of the existing Rules (C6-56-1 and C6-56-3). CDF watershed staff, in particular, have not made this claim. But it would be correct to say that the Rules have substantially reduced sediment production from roads, landings, and harvested areas; that potential increases in water temperature have been minimized by restricting streamside canopy removal; and that reducing inputs of sediment and heat related to a project will also lessen the potential cumulative impacts of project activities. Where additional measures are needed, the Rules allow the Department to require mitigation measures that are not specifically included in Rule language, and it is on this point that improved CWE assessment would be most useful.

The UC Committee does not provide any indication of what information it is using to support a conclusion that CDF and others are relying on the concept of "threshold of concern" (C6-56-2). One of the major concerns expressed by CDF staff regarding use

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of the USFS equivalent roaded area (ERA) procedure is the use of a threshold value, and CDF Sacramento staff have been clear that there is no single threshold that can be used to define what is significant in all watersheds (CDF 1987).

In addition, it is not clear how the UC Committee arrives at the conclusion that mitigation measures used to off-set cumulative impacts have not been tested (C6-56-3). Examples of such “testing” would include literature showing that rocking roads reduces sediment (Coe and MacDonald 2002), and reports from work in Redwood Park describing the benefits of removing unstable crossings and fills (Madej 2001). This list could be continued to include most of the mitigation measures for water quality protection that are included in the Rules and THPs.

Finally, the UC Committee recommendation about monitoring (C7-63-#7) does not appear to recognize the many on-going monitoring efforts related to timber harvesting activities, including the activities of the BOF’s Monitoring Study Group, the Hillslope Monitoring Program, Modified Completion Reporting Program, CDF sponsored research projects, and many timber industry sponsored efforts. If they had been asked, Department staff would have been glad to describe and discuss these, and other, monitoring projects. Before embarking on another monitoring project or program, existing efforts should be evaluated to see what additional work is really needed.

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