Attention: Forest Practice
California Department of Forestry and Fire Protection
135 Ridgeway Ave,
Santa Rosa, California 95401
santarosapubliccomments@calfire.ca.gov

Subject: THP 1-15-042 SON - "Dogwood," Reopened Public Comment Period
Date: November 26, 2017

Friends of the Gualala River (FoGR) is a non-profit, grassroots watershed protection association formed to share common concerns and research regarding the welfare of the Gualala River, its estuary and habitat. FoGR's goal is to protect the Gualala River watershed and the species that rely on it. Please submit this letter for the Dogwood THP file as resubmitted after the court remanding of the approval of the original submission.

Baseline conditions for cumulative effects analysis on listed species have changed substantially since the original THP was written and submitted. High water flows of the winter 2015-2016 season have changed fish habitat, sediment deposition, and have affected wetlands and special status plants. The pre-injunction harvesting done to date of portions of the THP with its floodplains operations using large equipment has added to the impacts of the high water events.

CalFIRE has approved additional THPs that have direct, indirect, and cumulative impacts on the Gualala River. The submitted THP analysis for the original and, surprisingly, for the resubmitted project only identifies a list of plans and does not provide analysis of the cumulative impacts to the floodplain related resources. Most odd in its omission is the mention of the "Plum" floodplain THP, (1-16-094MEN). Due to the size of the cumulative impacts presented by this plan to the total floodplain acreage of the watershed with its unique resources and natural services, it is astonishing that the submitter has erred in the face of the requirements of the FPRs in letter and spirit. The Forest Practice Act, which was formulated in 1973, was enacted to "ensure that logging is done in a manner that will preserve and protect our fish, wildlife, forests and streams" Additional rules, such as the Anadromous Salmonid Protection Rules, are also included within the FPRs. The public will thus not be provided with proper review of Dogwood under the FPRs and these additional rules due to the submitters omission of the Plum project.

The Plum THP impacts the North Fork of the Gualala River which enters the mainstream near the river's mouth and directly adjacent to Dogwood THP operations. The North Fork is recognized to be the last and best habitat and refugia available for the remaining Steelhead population in the watershed and for possible habitat for reintroduction of Coho salmon which have been have been effectively extirpated from the river. The lack of inclusion and analysis of the impacts of this 154-acre Plum project that marches down the North Fork and its dogleg bends is an alarming misstep by the submitters. It harbors the river's best recovering salmonid habitat conditions of cool water and shade. See the three attached maps below.

In order to effectively capture and characterize conditions and potential sources of cumulative impacts in the THP area, the cumulative impact Watershed Assessment Area used by the RPF must consider THP projects throughout the entire upstream watershed, not just a non-scientific Planning Watershed that contains the timber harvest areas delineated by the RPF in the THP. The Plum THP for instance is adjacent to and just upstream of Dogwood and is being excluded, it appears, by virtue of it being listed in another planning watershed.

Additionally, the resubmitted plan still fails to present evidence based and documented description and analysis of floodplain wetlands and potential impacts of the project. There is a lack of proposed seasonally appropriate and properly timed surveys conducted by qualified botanists.

The central scientific guidance directive for analysis of floodplain impacts is the 2005 white paper by CAL FIRE's riparian protection committee. "Flood Prone Area Considerations in the Coast Redwood Zone - November 2005" (Cafferata et al. 2005). The paper makes it clear that the FPRs are the minimum or baseline standards and sensitive flood plain areas require additional study, review, and mitigation controls and that analysis must be present in the plan. The THP contains flood plain areas that are very sensitive (as acknowledged by conditions outlined in the Calfire white paper) and deserves the serious assessment and protections noted in the paper.

From the document:
"The existing California Forest Practice Rules (FPRs) require RPFs to evaluate flood prone areas and to consider the ecosystem functions of these areas when developing protection measures. In the past this rule has been misunderstood and inconsistently applied."

Consistency with CEQA regulations also demand these considerations be employed as the THP is the functional equivalent of an Environmental Impact Report.

The submitter continues to disregard the guidance of this multi-agency report to aid in the avoidance of floodplain impacts. Additionally the submitter's requested exemptions to the Anadromous Salmonid Protection Rules for the construction and use of skid trails in flood

prone areas will result in significant impacts to these areas and listed salmonids who depend on them.

These riparian flood plain forest areas have been historically preserved and used as protective measures to mitigate the effects of nearby upland clearcuts (see photo below showing riparian floodplain areas that have been used for mitigations for upslope clearcuts).

In other words, nearby clearcuts were approved in part on the understanding that the riparian buffer is an important ecological feature that would remain undisturbed.From an economic standpoint, it is easy to understand why timber companies are targeting the short-term profits to be gained from riparian or floodplain logging. However, the long-term impacts should be reason for pause.

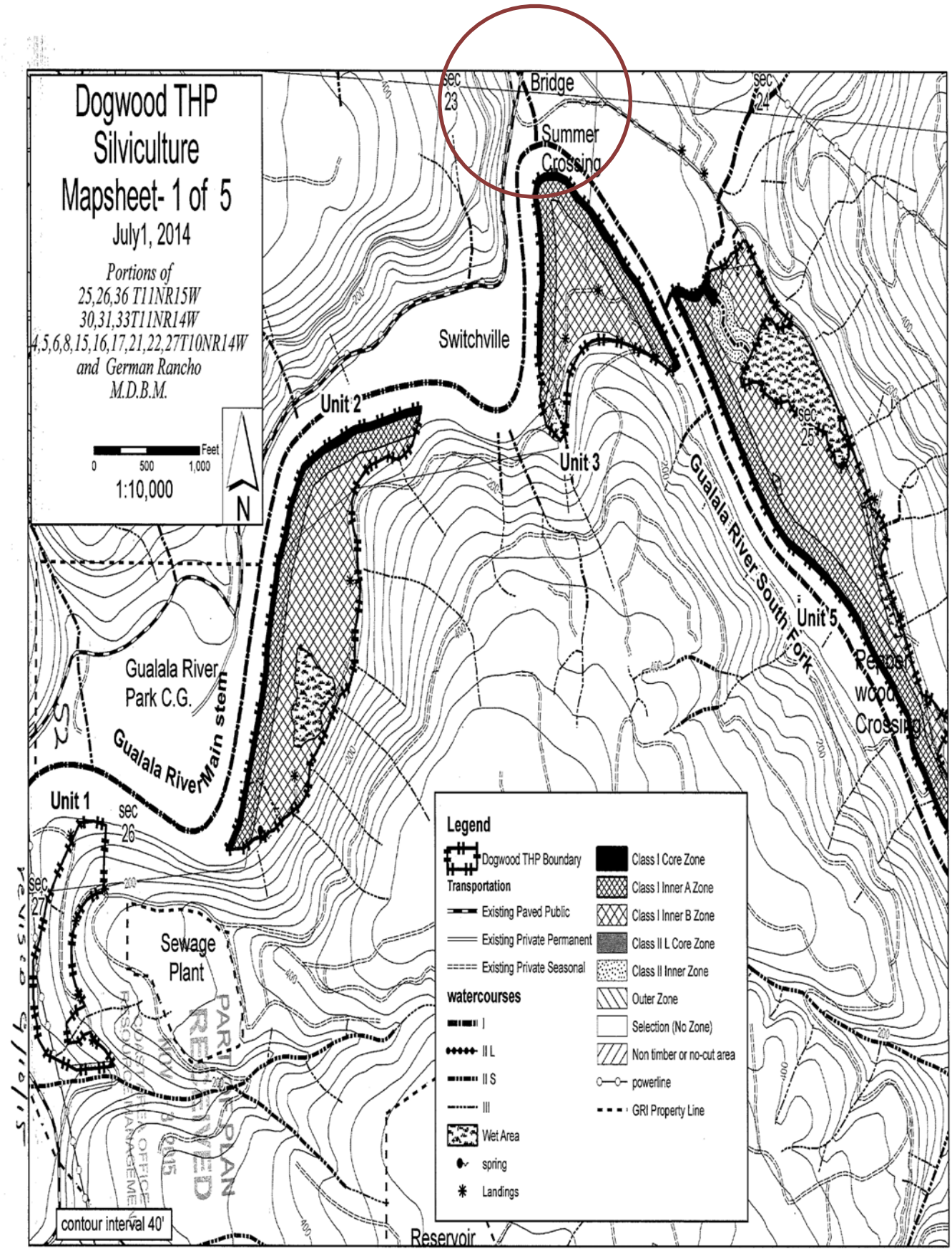
Logging these areas have long been controversial due to their crucial role in the recovery needed to restore fisheries. For instance, THPs in the footprint of the present Plum THP include the historical flood plains plans "Cassidy" and "Lily". The Cassidy plan (THP #1-00-101 MEN) in the floodplain of the north fork was denied by the Dept. of Forestry in October, 2001. The CALFIRE denial was concurred with recommendations by the National Marine Fisheries Service and the Regional Water Quality Control Board. Gualala Redwood's appeal was denied by the Board of Forestry in February 2002 and their legal appeal of that denial was denied by the Superior Court in February, 2006. See: www.http://gualalariver.org/forestry/floodplain/

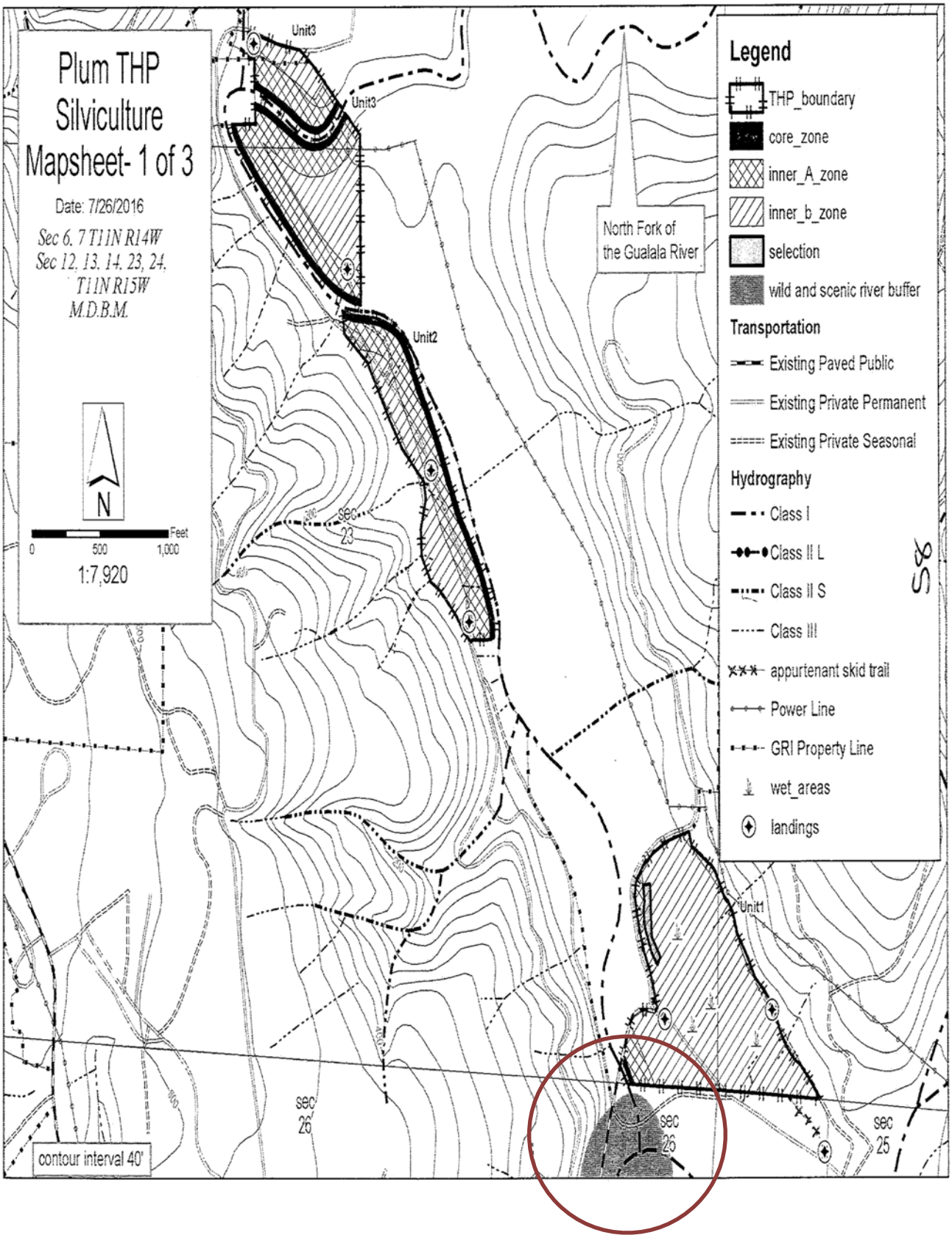
The inadequacies of this plan and the exceptions to the Forest Practice Rules and the resulting impacts to the flood prone areas warrant the disapproval of the THP as proposed.

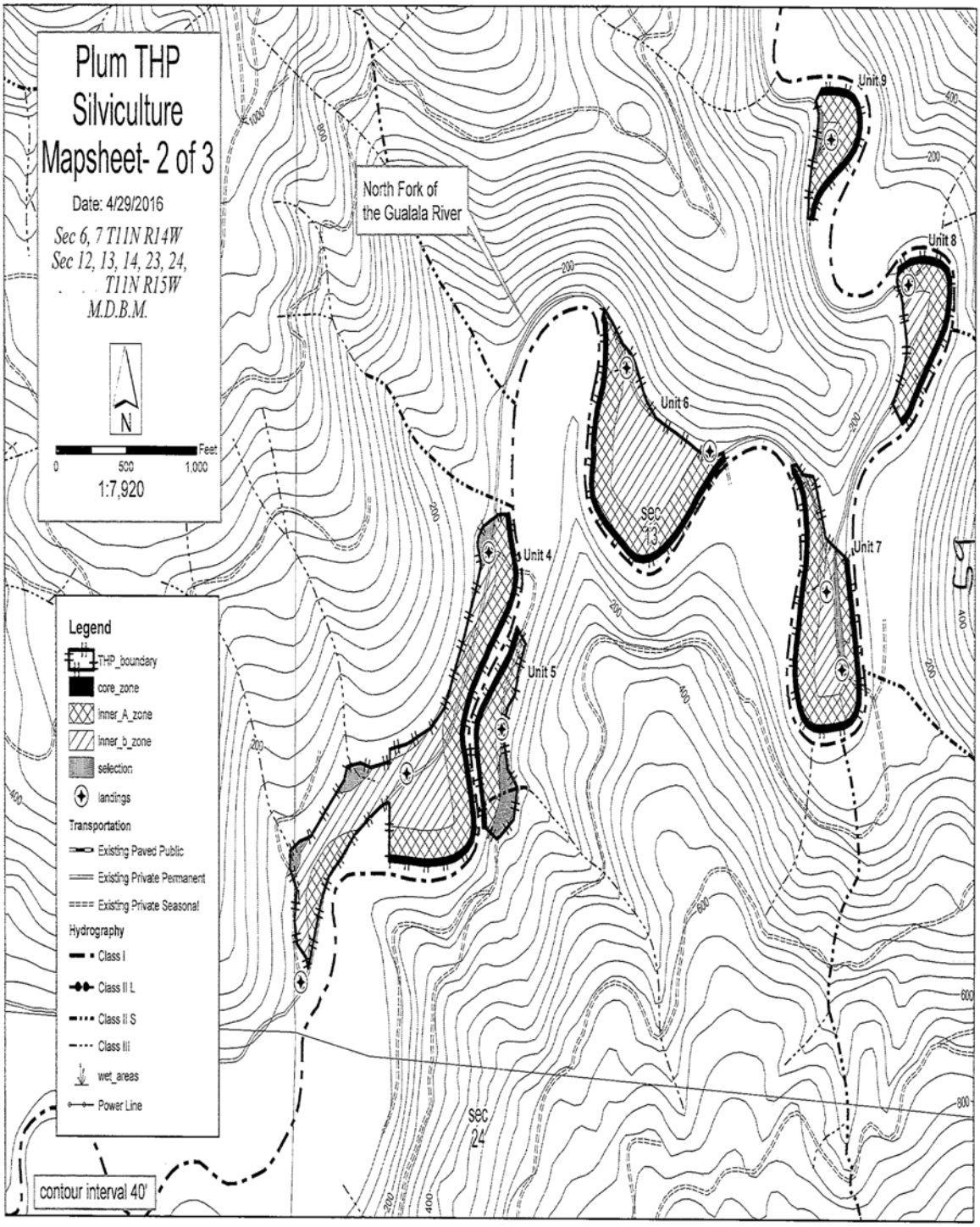
Respectfully submitted,

Chris Poehlmann
Friends of Gualala River

Following are examples of Dogwood and Plum floodplain logging units.The meeting confluence of the North Fork and the main-stem of the river in the red circles are shown in the next two maps below for Dogwood and Plum. This shows the close proximity of the two plans and potential for additive cumulative effects.




Plum THP
Silviculture
Mapsheet- 1 of 3
Date: 7/26/2016
Sec 6, 7 T11N R14W
Sec 12, 13, 14, 23, 24,
T11N R15W
M.D.B.M.
N
Feet
0
500
1,000
1:7,920
Unit3
Unit3
Unit2
Unit1
North Fork of
the Gualala River
sec
23
sec
26
sec
26
sec
25
contour interval 40'
Legend
THP_boundary
core_zone
inner_A_zone
inner_b_zone
selection
wild and scenic river buffer
Transportation
Existing Paved Public
Existing Private Permanent
Existing Private Seasonal
Hydrography
Class I
Class II L
Class II S
Class III
appurtenant skid trail
Power Line
GRI Property Line
wet_areas
landings


Plum THP
Silviculture
Mapsheet- 2 of 3
Date: 4/29/2016
Sec 6, 7 T11N R14W
Sec 12, 13, 14, 23, 24,
T11N R15W
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North Fork of
the Gualala River
Unit 9
Unit 8
Unit 6
Unit 7
Unit 4
Unit 5
Sec 13
Sec 24
Legend
THP_boundary
core_zone
inner_A_zone
inner_b_zone
selection
landings
Transportation
Existing Paved Public
Existing Private Permanent
Existing Private Seasonal
Hydrography
Class I
Class II L
Class II S
Class III
wet_areas
Power Line
contour interval 40'

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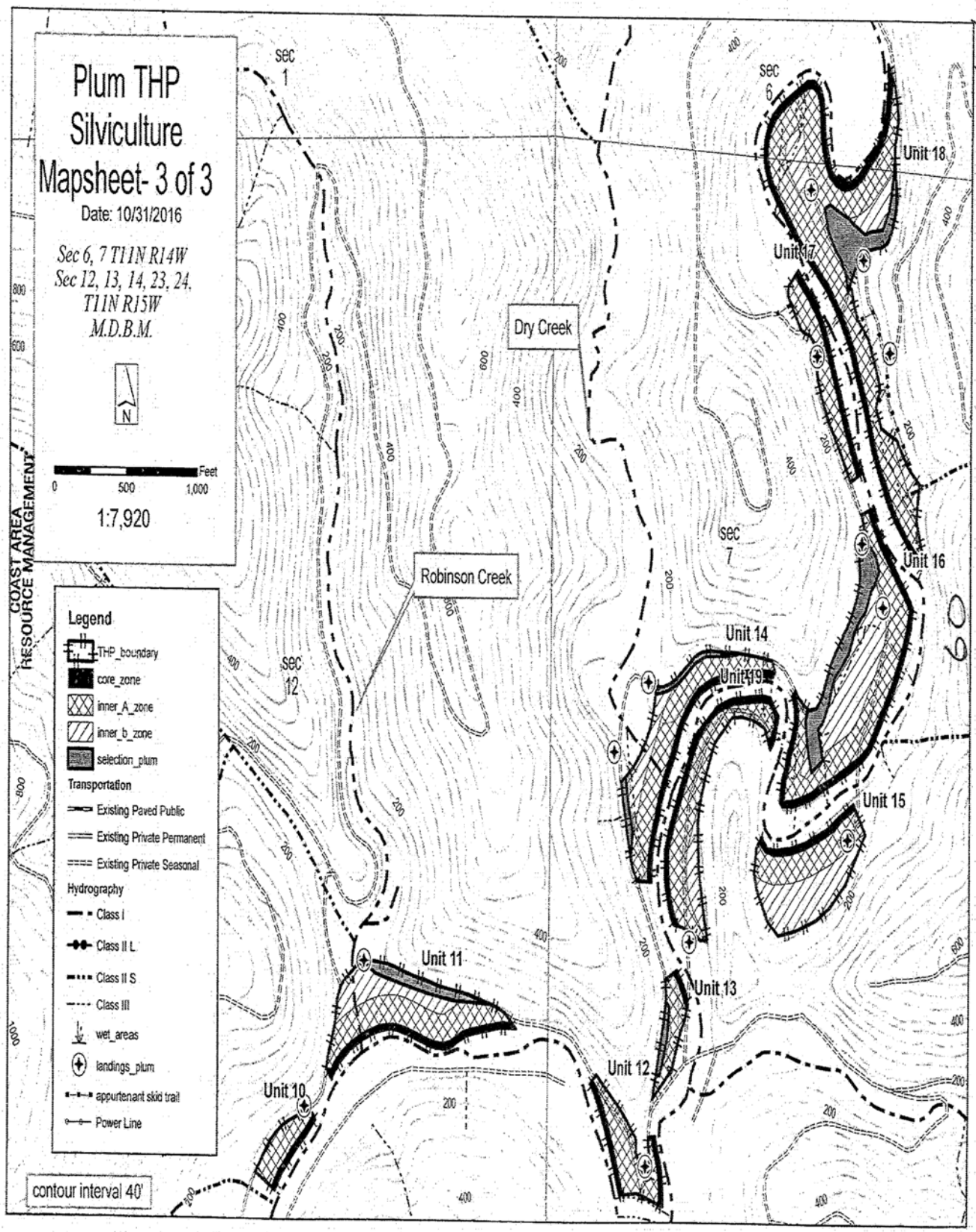
RESOURCE MANAGEMENT



PART OF PLAN

REVISED 10/31/16

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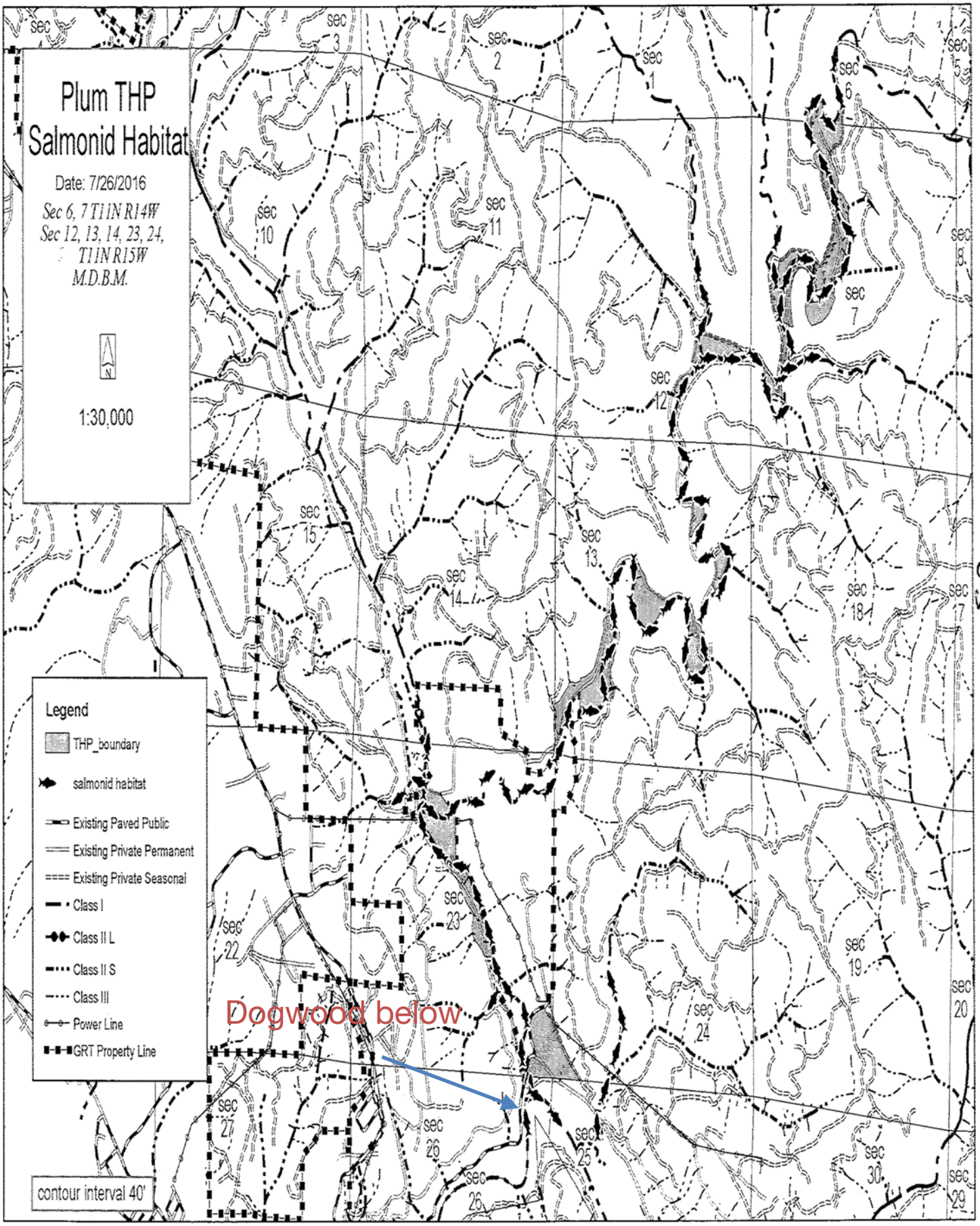
Plum THP
Salmonid Habitat
Date: 7/26/2016
Sec 6, 7 T11N R14W
Sec 12, 13, 14, 23, 24,
T11N R15W
M.D.B.M.
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THP_boundary
salmonid habitat
Existing Paved Public
Existing Private Permanent
Existing Private Seasonal
Class I
Class II L
Class II S
Class III
Power Line
GRT Property Line
contour interval 40'
Dogwood below
sec 1
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sec 13
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sec 30

"Flood Prone Area Considerations in the Coast Redwood Zone" -
California Dept. of Forestry & Fire Protection November 2005

The Dogwood plan has failed to meet the standards set forth in this Calfire white paper. The assessment procedures contained in the paper are what is necessary to assess potential impacts of timber harvest activity given all the number of variables that must be considered. Following these standards, as formulated by and in the opinion of this three agency task force, was judged necessary to address cumulative effects issues and CEQA compliance. The paper makes it clear that the FPRs are the minimum or baseline standards and sensitive flood plain areas require additional study, review, and mitigation controls and that analysis must be present in the plan.

Highlights of the standards that apply to Dogwood and all other floodplain THPs are as follows with my emphasis added in red:

Flood Prone Area Considerations in the Coast Redwood Zone -
California Dept. of Forestry & Fire Protection November 2005
Prepared by Riparian Protection Committee (CDFG, CDF, RWQCB)

Section IV.
We outline three steps that should be utilized when completing a field examination per 14 CCR § 916.4(a)(1) to analyze potential impacts associated with the biological, physical and hydrological functions found on flood prone areas proposed for management. 14 CCR § 916.4(a)(1) currently requires an RPF to evaluate areas near and areas with the potential to directly impact watercourses and lakes for sensitive conditions, including changeable channels, overflow channels, flood prone areas, and riparian zones. Therefore, we are providing suggested approaches for using the existing California Forest Practice Rules to address potential impacts within flood prone areas. The functions listed in Table 1 can be used in evaluating potential impacts.

Step 1. Inventory of Flood Prone Area Functions

Inventory/evaluate the flood prone area within the proposed plan and consider the hydrologic, geomorphic, and biologic functions listed in Table 1 that might be affected by the proposed timber operations (i.e., possibly producing significant adverse impacts). Conduct a detailed field examination based on the proposed level of activity, using suitable protocols and involving personnel with appropriate education and experience. Document (possibly including photographs) the floodplain functions present.

Step 2. Determine Frequency of Inundation Category
Identify the category for frequency of inundation of the flood prone surface proposed for management (i.e., very frequent, frequent, moderately frequent, or infrequent) [see Section II]. This can be established by a combination of short-term and long-term field

observations, local contacts, published and unpublished reports, and possibly a flood frequency analysis using existing USGS gaging station information. The frequency of overtopping flows is very important in determining floodplain sensitivity to timber operations. One approach for determining the of a floodplain is to compare the environmental characteristics of the site to the numerous physical and biological characteristics of floodplains described in the literature (Benda 2004). These characteristics include:

Evidence of periodic flooding/disturbance by flooding
Recent sediment deposition
Natural river levees
Diverse fluvial landforms and substrates
Wetlands and bogs
Close proximity to the groundwater table
Evidence of channel migration
Oxbow lakes (Figure 13)
Multiple channels, side channels, and backwater alcoves
Hydric vegetation (e.g., scouring rush, horsetail, hedge-nettle, cattail, bulrush, sedge, willows)
High plant and animal diversity
High plant productivity
Large tree age diversity due to flooding (e.g., red alders, big-leaf maples, willows)
Islands of conifers within stands of deciduous forests
Log jams and beaver dams

Step 3. Conduct an Appropriate Analysis

Conduct an appropriate analysis to protect and maintain the disclosed flood prone area functions and to evaluate them in light of possible significant adverse impacts from management on the flood prone surface. In general, it is important to note that:

-Disclosure and analysis requirements increase with increased risk associated with the proposed level of activity in the flood prone area. For example, if no activities are proposed within the 20-year recurrence interval flood prone area, the analysis required will be vastly different than if intensive management is proposed within this zone.

-The detail of disclosure and analysis increases with the frequency of inundation of the floodplain surface. For example, the outer extent of a 100- year flood prone area is likely to be less sensitive to timber operations compared to the portion of floodplain that is overtopped every 2 to 5 years.

-Concern and risk tolerance may vary geographically due to the increased potential for species range constriction in areas near known range limits.For example, impacts to coho salmon near their southern range limit may illicit greater concern than similar impacts to northern populations

As stated above, 14 CCR § 916.4(a)(1) already requires the RPF to evaluate areas near and areas with the potential to directly impact watercourses and lakes for sensitive conditions, including changeable channels, overflow channels, flood prone areas, and riparian zones. In the past, this Forest Practice Rule has been misunderstood and inconsistently applied, which is partially responsible for agency disagreements regarding the adequacy of proposed flood prone area protection measures.

If management is proposed within the approximate 20-year return interval floodplain in a watershed with anadromous fish habitat (particularly coho salmon habitat or habitat restorable for coho salmon), we outline below possible approaches that may be used for analyzing potential impacts for the various floodplain functions previously discussed in Section III.

Preparation.

Where a more detailed approach is needed, Arcement and Schneider (undated) provide excellent guidance on selecting roughness coefficients for floodplains. This USGS document includes numerous photographs illustrating roughness values for floodplains with differing levels of vegetation. The range is from 0.10 to 0.20, depending on tree size and density. In addition, they state that where trees are the major factor affecting floodplain roughness, the roughness coefficient can be calculated following the completion of a field survey by measuring the number of trees and trunk sizes in a representative sample area.

Was this assessment completed? -Author

Geomorphic Functions and Processes

Geomorphic analysis may include, depending on the practices proposed, documentation of existing natural levees in place, the degree of vegetative roughness change anticipated, the degree of soil disturbance anticipated on the floodplain surface, the anticipated changes in bank stabilization, and the potential for channel avulsion. Vegetative roughness considerations are discussed above. The degree of soil disturbance anticipated can be analyzed by the percent of the flood prone surface to be exposed by skid trails, and how they will be treated following the completion of logging (Figure 15). Factors to be considered include whether skid trails will cause new overflow channels to be formed and whether the water table will be exposed. Tractor slash packing of skid trails and/or tractor layouts is an effective mitigation measure to reduce surface soil exposure and potential for sediment remobilization following harvesting.

Anticipated changes in bank stabilization can be addressed based on the amount of harvesting proposed in the most critical zone near the channel bank (Figure 16).

The 14 CCR § 916.4(a)(1) write-up should clearly document how much harvesting is proposed within one-half of the diameter of a tree crown distance from the edge of the stream bank.

Channel migration by avulsion occurs in response to reductions in channel capacity (typically due to sediment deposition and/or large wood) that forces the streamflow out of the existing channel. The potential for avulsion is higher in relatively unconfined channels with good floodplain connectivity where the elevation of the active stream channel is similar to that of the adjacent flood prone area. The difference in elevation of the floodplain surface and the stream channel can be determined, if necessary, with a cross sectional survey using an engineer level, tape, and Philadelphia rod. Additionally, the roughness effects of existing and post-harvest vegetation must be considered in a channel avulsion assessment (Spittler 2004). Weiland and Schwab (1996) provide an example of channel avulsion in British Columbia

Was the above assessment included?-author

Overflow channels

As discussed in Section III, floodplains are commonly the site of overflow channels and provide winter refuge habitat for juvenile anadromous salmonids during high flows (Ligon and others 1999). Water velocities are much slower in overflow channels on floodplains, providing highly valuable refugia during strong winter storms.

Additionally, in some circumstances, the channel zone may be required to extend to the outside edge of the overflow channel. If ground-based harvesting is proposed within flood prone areas and the inventory of floodplain functions (Step 1) indicates that these features are present, the plan proponent must consider the need for mitigation measures to protect these features. In particular, it is critical to show that harvesting operations are designed to avoid overflow channels and there will not be skid trail crossings. If this is not possible, then there must be assurance provided in the plan that these channels will be properly restored following timber operations. Adequate protection of channel bed and banks is crucial.

END

Some Notes on the Anadromous Salmonid Protection Rules (ASP)

There is language in the ASP rules as cited in page 10 of the OR that says alternate harvesting methods should be used if they are possible. 916.9(f)(3)(E) This code section was used in the OR to make the argument that the ASP rules do allow equipment operations in the WLPZ Inner zones A and B. However it ends with " Cable yarding corridors should be located at wide intervals consistent with practices the use lateral yarding. Full suspension should be used when possible." The area that this THP is in is very conducive to full suspension cable yarding.

FPR 916 (b),(c) also support this and say that the "restoration" of the riparian zones is a goal. How logging in the Class I WLPZs advances restoration is a reach.

Included here are excerpts and highlights previously submitted by FOGR member and coastal plant biologist Dr. Peter Baye. [yellow highlight: Dogwood disputed CEQA adequacy issues]

Flood Prone Area Considerations in the Coast Redwood Zone -

California Dept. of Forestry & Fire Protection November 2005

Prepared by Riparian Protection Committee (CDFG, CDF, RWQCB)

Executive Summary

The basic procedures suggested by the RPC for flood prone area protection and restoration include:

(1) inventorying flood prone areas for all of the hydrologic, geomorphic, and biological functions present that may be affected by proposed timber operations;

(2) determining the category of inundation of the flood prone area proposed for management (i.e., very frequent, frequent, moderately frequent, or infrequent), and

(3) conducting an appropriate analysis for the functions present in light of possible significant adverse impacts from management. Disclosure and analysis requirements will increase with increased risk associated with the proposed level of activity, and with increased frequency of inundation of the flood prone area.

In particular, **management proposed within the 20-year recurrence interval floodplain in a watershed with anadromous fish habitat** (particularly coho salmon habitat or restorable habitat) requires **detailed analysis.**

- approach is to show resource professionals how to adequately document existing flood prone area functions

RPC and document are response to a recommendation by the California Department of Fish and Game(DFG) following issues raised for recent THPs in the Gualala River and Big River watersheds, which were reviewed.

RWQCB N coast Basin Plan: Key **beneficial uses** identified in the Basin Plan for the North Coast region related to **flood prone areas** include (p. 5):

- ground water recharge;
- freshwater replenishment;
- commercial and sport fishing;
- cold freshwater habitat;
- wildlife habitat;
- biologically significant areas;
- rare, threatened or endangered species;
- migration of aquatic organisms;
- spawning, reproduction, and/or early development;

- water quality enhancement;
- flood peak attenuation/flood water storage; and
- wetland habitat.

In the North and Central Coast regions, the most biologically critical area is generally considered by riparian ecologists to be that area inundated at less than or equal to every 20 years, based on coho salmon life cycle requirements. (p. 7)

Flood Prone Area Functions

A summary of these functions is provided in Table 1.

Due to high roughness associated with a forested stand condition, flood flow velocities are reduced considerably. …The **function of vegetative roughness will need to be identified and protected in the planning of timber harvesting operations on flood prone areas**.

Table 1. List of flood prone area functions.

Hydrologic Processes/Functions/Properties and Role of Vegetation

Accommodation of floods above bankfull or channel-full flow

Modification of the flood hydrograph

Storage of runoff to allow for infiltration and recharge alluvial groundwater

Roughness to a floodplain that expends the energy of flood waters (e.g., slowing flood water velocity)

Temporary storage of water to moderate downstream flood flows

Hyporheic zone function

Geomorphic and Geologic Processes/Functions/Properties and Role of Vegetation

Area of deposition for suspended sediment in flood waters

Source of sediment through erosion of stored material by flood flows

Storage and metering of sediment transported from hill slope and upstream portions of the watershed (sediment filtration)

Roughness of floodplain vegetation slows flood waters and permits the deposition of fine-grained sediment adjacent to high-energy channels

Vegetation provides both surface and subsurface resistance to soil erosion

Vegetation provides cohesion that aids in bank stabilization

Biological Processes/Functions/Properties and Role of Vegetation

Potential site of overflow channels that serve as refugia for fish during floods

Large wood for recruitment to watercourses, enhancing aquatic habitat structure and complexity

Direct shading of watercourses and reduced heating from solar radiation

Wetland area that provides habitat such as ponds and vernal pools for a variety of mesic-(moisture) zone associated and dependent plants and animals

Riparian woodland that provides habitat for terrestrial organisms

Acceptable riparian microclimate conditions (air temperature, relative humidity, soil temperature, soil moisture, etc.)

Migratory corridors for wildlife species

Overhanging bank cover

Meters naturally occurring nutrients transported from hill slopes

Input of fine organic matter, leaf litter, and insects directly into watercourses that may be used for food for aquatic organisms

Moderation of air temperature above and immediately adjacent to stream channels

Alluvial aquifers that moderate surface water temperatures

Possible support of species of concern

Deposition and storage of large wood (both in and on the floodplain for potential delivery downstream), while providing habitat (e.g., nests, dens, food caches, and water/moisture sources) for wildlife species. Also, colonization sites for some coniferous species

Filtration of agricultural nutrients (nitrogen and phosphorus) and pesticides

Hyporheic zone function

As water velocities decrease on wide, rough, low gradient flood prone areas, the amount of sediment the river can carry declines. …As stated above, the function of vegetative roughness will need to be identified and protected in the planning of timber harvesting operations on flood prone areas. [p. 13]

Since floodplain surfaces are nearly flat, they provide sediment filtration and act as natural collection features for hill slope erosion moving colluvially downslope from anthropogenic and naturally-caused rills, gullies, and mass wasting features. [p. 13]

In addition, activities within the riparian zone need to be designed and implemented to minimize the potential for disturbing or compacting soils, destroying organic litter, removing large downed wood, or otherwise reducing the effectiveness of riparian buffers as sediment filters. Floodplain vegetation provides resistance to surface erosion on the flood prone area surface, and greatly aids in bank stabilization.

In this section of the report, we **outline three steps that should be utilized** when completing a field examination per 14 CCR § 916.4(a)(1) **to analyze potential impacts** associated with the biological, physical and hydrological functions found **on flood prone areas proposed for management**. [p. 21]

next page

Step 1. Inventory of Flood Prone Area Functions

Inventory/evaluate the flood prone area within the proposed plan and consider the hydrologic, geomorphic, and biologic functions listed in Table 1 that might be affected by the proposed timber operations (i.e., possibly producing significant adverse impacts).

Conduct a detailed field examination based on the proposed level of activity, using suitable protocols and involving personnel with appropriate education and experience.

Document (possibly including photographs) the floodplain functions present.

Step 2. Determine Frequency of Inundation Category

Identify the category for frequency of inundation of the flood prone surface proposed for management (i.e., very frequent, frequent, moderately frequent, or infrequent) [see Section II]. This can be established by a combination of short-term and long-term field observations, local contacts, published and unpublished reports, and possibly a flood frequency analysis using existing USGS gaging station information. **The frequency of overtopping flows is very important in determining floodplain sensitivity to timber operations.** One approach for determining the "activity" of a floodplain is to compare the environmental characteristics of the site to the numerous physical and biological characteristics of floodplains described in the literature (Benda 2004). These characteristics include:

- Evidence of periodic flooding/disturbance by flooding
- Recent sediment deposition
- Natural river levees
- Diverse fluvial landforms and substrates
- Wetlands and bogs
- Close proximity to the groundwater table
- Evidence of channel migration
- Oxbow lakes (Figure 13)
- Multiple channels, side channels, and backwater alcoves
- Hydric vegetation (e.g., scouring rush, horsetail, hedge-nettle, cattail, bulrush, sedge, willows)
- High plant and animal diversity
- High plant productivity
- Large tree age diversity due to flooding (e.g., red alders, big-leaf maples, willows)
- Islands of conifers within stands of deciduous forests
- Log jams and beaver dams

Step 3. Conduct an Appropriate Analysis

Conduct an appropriate analysis to protect and maintain the disclosed flood prone area functions and to evaluate them in light of possible significant adverse impacts from management on the flood prone surface. In general, it is important to note that:

- **Disclosure and analysis requirements increase with increased risk associated with the proposed level of activity in the flood prone area. For example, if no activities are proposed within the 20-year recurrence**

interval flood prone area, the analysis required will be vastly different than if intensive management is proposed within this zone.

- **The detail of disclosure and analysis increases with the frequency of inundation of the floodplain surface. For example, the outer extent of a 100-year flood prone area is likely to be less sensitive to timber operations compared to the portion of floodplain that is overtopped every 2 to 5 years.**
- **Concern and risk tolerance may vary geographically due to the increased potential for species range constriction in areas near known range limits.For example, impacts to coho salmon near their southern range limit may elicit greater concern than similar impacts to northern populations.**

An important factor to **analyze** for hydrologic functions on floodplains is the **degree of roughness that will remain following harvesting operations** (Figure 14). In detailed studies, engineers and hydrologists use Manning's coefficient of roughness (n) to determine how water will flow in channels and over floodplains. A reasoned professional judgment on the degree of vegetative roughness reduction that will be present following timber operations, and how that will change over the next five years will often be sufficient for plan preparation. **Where a more detailed approach is needed**, Arcement and Schneider (undated) provide excellent guidance on selecting roughness coefficients for floodplains. [p. 23] This USGS document includes numerous photographs illustrating roughness values for floodplains with differing levels of vegetation. [p. 24]

Geomorphic Functions and Processes

Geomorphic analysis may include, depending on the practices proposed, documentation of existing natural levees in place, the degree of vegetative roughness change anticipated, the degree of soil disturbance anticipated on the floodplain surface, the anticipated changes in bank stabilization, and the potential for channel avulsion. [p. 24]

The degree of soil disturbance anticipated can be analyzed by the percent of the flood prone surface to be exposed by skid trails, and how they will be treated following the completion of logging (Figure 15). Factors to be considered include whether skid trails will cause new overflow channels to be formed and whether the water table will be exposed. Tractor slash packing of skid trails and/or tractor layouts is an effective mitigation measure to reduce surface soil exposure and potential for sediment remobilization following harvesting.

Biological Functions and Processes

Overflow channels

As discussed in Section III, floodplains are commonly the site of overflow channels and provide winter refuge habitat for juvenile anadromous salmonids during high flows (Ligon and others 1999). …**If ground-based harvesting is proposed within flood prone areas and the inventory of floodplain functions (Step 1) indicates that these features are present, the plan proponent must consider the need for mitigation measures to protect these features.** In particular, it is critical to show that harvesting operations are designed to avoid overflow channels and there will not be skid trail crossings. If this is not possible, then there must be assurance provided in the plan that these channels will be properly restored following timber operations. Adequate protection of channel bed and banks is crucial. [p. 27]

If significant harvesting is proposed in a flood prone area, as stated above, the level of required analysis will significantly increase. [p. 28] END