Board of Forestry and Fire Protection

“Cumulative Impacts Assessment Checklist and Technical Rule Addendum #2, 2017”

Title 14 of the California Code of Regulations (14 CCR),

Division 1.5, Chapter 4,

Subchapter 4, 5 & 6, Article 2

Amend:

Appendix

Technical Rule Addendum #2

Cumulative Impacts Assessment

(Guidance Document)

In evaluating cumulative impacts, the RPF ~~shall~~ may consider the factors set forth herein.

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A. Watershed Resources

Cumulative Watershed Effects (CWEs) occur within and near bodies of water or ~~significant wet areas~~ wet meadows or other wet areas, where individual impacts are combined to produce an effect that is greater than any of the individual impacts acting alone. Factors to consider in the evaluation of cumulative watershed impacts are listed below.

1. Impacts to watershed resources within the Watershed Assessment Area (WAA) shall be evaluated based on significant on-site and off-site cumulative effects on beneficial uses of water, as defined and listed in applicable Water Quality Control Plans.

2. Watershed effects produced by timber harvest and other activities may include one or more of the following:

- Sediment
- Water temperature
- Organic debris
- Chemical contamination
- Peak flow

The following general guidelines shall be ~~used~~ considered when evaluating watershed impacts. The factors described are general and may not be appropriate for all situations. Actual measurements may be required if needed to evaluate significant environmental effects. The plan must comply with the quantitative or narrative water-quality objectives set forth in an applicable Water Quality Control Plan.

a. Sediment Effects. Sediment-induced CWEs occur when earth materials transported by surface or mass wasting erosion enter a stream or stream system at separate locations and are then combined at a downstream location to produce a change in water quality or channel condition. The eroded materials can originate from the same or different projects. Sediment is composed of both suspended and bedload material. Suspended sediment is usually the primary source of turbidity in forested watersheds, although suspended organic material also accounts for a proportion of the suspended load. Chronic turbidity can be an indicator of a cumulative watershed sediment effect when sources can be identified and linked to one or more projects. Both turbidity and suspended sediment concentrations are subject to extreme

<u>inherent variability from region to region, storm to storm, and from year to year, dependent upon underlying geology and precipitation.</u>

Potentially adverse <u>sediment </u>changes are most likely to occur in the following locations and situations:

- Downstream areas of ~~reduced~~ <u>low</u> stream gradient where sediment from a new source may be deposited in addition to sediment derived from existing or other new sources.

- Immediately downstream from where sediment from a new source is combined with sediment from other new or existing sources and the combined amount of sediment exceeds the transport capacity of the stream.

- Any location where sediment from new sources in combination with suspended sediment from existing or other new sources significantly <u>increases turbidity,</u> reduces the survival of fish or other aquatic organisms<u>,</u> or <u>otherwise</u> reduces the quality of waters used for domestic, agricultural, or other beneficial uses.

- Channels with relatively steep gradients which contain accumulated sediment and debris that can be mobilized by sudden new sediment inputs, such as debris flows, resulting in debris torrents and severe channel scouring.

Potentially significant adverse impacts of cumulative sediment inputs may include:

- Increased treatment needs or reduced suitability for domestic, municipal, industrial, or agricultural water use.

- Direct mortality of fish and other aquatic species.

- <u>Impaired spawning and rearing habitat for salmonids or otherwise </u>~~. R~~<u>r</u>educed viability of aquatic organisms or disruption of aquatic habitats and loss of stream productivity caused by filling of pools and plugging or burying streambed gravel.

- Accelerated channel filling (aggradation) resulting in loss of streamside vegetation and stream migration that can cause accelerated bank erosion.

- Accelerated channel filling (aggradation) resulting in increased frequency and magnitude of overbank flooding.

- Accelerated filling of downstream reservoirs, navigable channels, water diversion and transport facilities, estuaries, and harbors.

- Channel scouring by debris flows and torrents.

- Nuisance to or reduction in water related recreational activities.

Situations where sediment production potential is greatest include:

- Sites with high or extreme erosion hazard ratings.

- Sites which are tractor logged on steep slopes.

- Unstable areas.

b. Water Temperature Effects. Water temperature related CWEs are changes in water chemistry or biological properties caused by the combination of solar warmed water from two or more locations (in contrast to an individual effect that results from impacts along a single stream segment) where natural cover has been removed. Cumulative changes in water temperature are most likely to occur in the following situations:

- Where stream bottom materials are dark in color.

- Where water is shallow and has little underflow.

- Where removal of streamside canopy results in substantial, additional solar exposure or increased contact with warm air at two or more locations along a stream.

- Where removal of streamside canopy results in substantial, additional solar exposure or increased contact with warm air at two or more streams that are tributary to a larger stream.

- Where water temperature is near a biological threshold for specific species.

Significant adverse impacts of cumulative temperature increases include:

- Increases in the metabolic rate of aquatic species.

- Direct increases in metabolic rate and/or reduction of dissolved oxygen levels, either of which can cause reduced vigor and death of sensitive fish and other sensitive aquatic organisms.

- Increased growth rates of microorganisms that deplete dissolved oxygen levels or increased disease potential for organisms.

- Stream biology shifts toward warmer water ecosystems.

c. Organic Debris Effects. CWEs produced by organic debris can occur when logs, limbs, and other organic material are introduced into a stream or lake at two or more locations. Decomposition of this debris, particularly the smaller sized and less woody material, removes dissolved oxygen from the water and can cause impacts similar to those resulting from increased water temperatures. Introduction of excessive small organic debris can also increase water acidity.

Large organic debris is an important stabilizing agent that should be maintained in small to medium size, steep gradient channels, but the sudden introduction of large, unstable volumes of bigger debris (such as logs, chunks, and larger limbs produced during a logging operation) can obstruct and divert streamflow against erodible banks, block fish migration, and may cause debris torrents during periods of high flow.

Removing streamside vegetation can reduce the natural, annual inputs of litter to the stream (after decomposition of logging-related litter). This can cause both a drop in food supply, and resultant productivity, and a change in types of food available for organisms that normally dominate the lower food chain of streams with an overhanging or adjacent forest canopy.

d. Chemical Contamination Effects. Potential sources of chemical CWEs include run-off from roads treated with oil or other dust-retarding materials, direct application or run-off from pesticide treatments, contamination by equipment fuels and oils, and the introduction of nutrients released during slash burning or wildfire from two or more locations.

e. Peak Flow Effects. CWEs can be caused by management induced peak flow increases in streams during storm events. ~~are difficult to anticipate.~~ Peak flow increases may result from management activities that reduce rainfall interception (i.e., evaporation) and vegetative water use (i.e., transpiration), or produce openings where snow can accumulate, ~~(~~such as ~~clear-cutting~~ in-clearcuts and ~~site preparation~~ on roads and landings). ~~or that change the timing of flows by producing more efficient runoff runoff (such as insloped roads). These~~ While increases, if any,~~,~~ ~~however,~~ are likely to be small relative to pre-harvest ~~natural~~ peak flows, extensive canopy removal over a short period of time on a watershed scale can increase peak flow effect on streambank erosion, channel incision, and headward channel extension in erodible landscapes. ~~from medium and large storms. Research to date on the effects of management activities on channel conditions indicates that channel changes during~~

~~storm events are primarily the result of large sediment inputs.~~ The timing and concentration of flows affecting lower order stream channel morphology can also be affected by the routing of runoff from roads, landings, and skid trails. Peak flow effects diminish with decreasing intensity of canopy removal, increasing time since harvest, and during larger flow recurrence intervals.

3. Watercourse Condition. The watershed impacts of past upstream and on-site projects are often reflected in the condition of stream channels on the project area. Following is a list of channel characteristics and factors that may be used to describe current watershed conditions and to assist in the evaluation of potential project impacts:

◊ Gravel Embedded - Spaces between stream gravel filled with sand or finer sediments. Gravel are often in a tightly packed arrangement.

◊ Pools Filled - Former pools or apparent pool areas filled with sediments leaving few areas of deep or "quiet" water relative to stream flow or size.

◊ Aggrading - Stream channels filled or filling with sediment that raises the channel bottom elevation. Pools will be absent or greatly diminished and gravel may be embedded or covered by finer sediments. Streamside vegetation may be partially or completely buried, and the stream may be meandering or cutting into its banks above the level of the former streambed. Depositional areas in aggrading channels are often increasing in size and number.

◊ Bank Cutting - Can either be minor or severe and is indicated by areas of fresh, unvegetated soil or alluvium exposed along the stream banks, usually above the low-flow channel and often with a vertical or undercut face. Severe bank cutting is often associated with channels that are downcutting, which can lead to oversteepened banks, or aggrading, which can cause the channel to migrate against slopes that were previously above the high flow level of the stream.

◊ Bank Mass Wasting - Channels with landslides directly entering the stream system. Slide movement may be infrequent (single events) or frequent (continuing creep or periodic events).

◊ Downcutting - Incised stream channels with relatively clean, uncluttered beds cut below the level of former streamside vegetation and with eroded, often undercut or vertical, banks.

◊ Scoured - Stream channels that have been stripped of gravel and finer bed materials by large flow events or debris torrents. Streamside vegetation has often been swept away, and the channel has a raw, eroded appearance.

◊ Organic Debris - Debris in the watercourse can have either a positive or negative impact depending on the amount and stability of the material. Some stable organic debris present in the watercourse helps to form pools and retard sediment transport and downcutting in small to medium sized streams with relatively steep gradients. Large accumulations of organic debris can block fish passage, block or divert streamflow, or could be released as a debris flow.

◊ Stream-Side Vegetation - Stream-side vegetation and near-stream vegetation provide shade or cover to the stream, which may have an impact on water temperature, and provides root systems that stabilize streambanks and floodplains and filter sediment from flood flows.

◊ Recent Floods - A recent high flow event that would be considered unusual in the project area may have an impact on the current watercourse condition.

B. Soil Productivity

Cumulative soil productivity impacts occur when the effects of two or more activities, from the same or different projects, combine to produce a significant decrease in soil biomass production potential. These impacts most often occur on-site within the project boundary, and the relative severity of productivity losses for a given level of impact generally increases as site quality declines. The primary factors influencing soil productivity that can be affected by timber operations include:

◊ Organic matter loss. ◊ Soil compaction.

◊ Surface soil loss. ◊ Growing space loss.

The following general guidelines may be used when evaluating soil productivity impacts.

1. Organic Matter Loss. Displacement or loss of organic matter can result in a long term loss of soil productivity. Soil surface litter and downed woody debris are the store-house of long term soil fertility, provide for soil moisture conservation, and support soil microorganisms that are critical in the nutrient cycling and uptake process. Much of the chemical and microbial activity of the forest nutrient cycle is concentrated in the narrow zone at the soil and litter interface.

Displacement of surface organic matter occurs as a result of skidding, mechanical site preparation, and other land disturbing timber operations. Actual loss of organic matter occurs as a result of burning or erosion. The effects of organic matter loss on soil productivity may be expressed in terms of the percentage displacement or loss as a result of all project activities.

2. Surface Soil Loss. The soil is the storehouse of current and future site fertility, and the majority of nutrients are held in the upper few inches of the soil profile. Topsoil displacement or loss can have an immediate effect on site productivity, although effects may not be obvious because of reduced brush competition and lack of side-by-side comparisons or until the new stand begins to fully occupy the available growing space.

Surface soil is primarily lost by erosion or by displacement into windrows, piles, or fills. Mass wasting is a special case of erosion with obvious extreme effects on site productivity. The impacts of surface soil loss may be evaluated by estimating the proportion of the project area affected and the depth of loss or displacement.

3. Soil Compaction. Compaction affects site productivity through loss of large soil pores that transmit air and water in the soil and by restricting root penetration. The risk of compaction is associated with:

- Depth of surface litter.
- Soil structure.
- Soil organic matter content.
- Presence and amount of coarse fragments in the soil.
- Soil texture.
- Soil moisture status.

Compaction effects may be evaluated by considering the soil conditions, as listed above, at the time of harvesting activities and the proportion of the project area subjected to compacting forces.

4. Growing Space Loss. Forest growing space is lost to roads, landings, permanent skid trails, and other permanent or non-restored areas subjected to severe disturbance and compaction.

The effects of growing space loss may be evaluated by considering the overall pattern of roads, etc., relative to feasible silvicultural systems and yarding methods.

C. Biological Resources

Biological assessment areas will vary with the species being evaluated and its habitat. Factors to consider in the evaluation of cumulative biological impacts include:

1. Any known rare, threatened, or endangered species or sensitive species (as described in the Forest Practice Rules) that may be directly or indirectly affected by project activities. Significant cumulative effects on listed species may be expected from the results of activities over ~~time which combine~~ time which combines to have a substantial effect on the species or on the habitat of the species.

2. Any significant, known wildlife or fisheries resource concerns within the immediate project area and the biological assessment area (e.g. loss of oaks creating forage problems for a local deer herd, species requiring special elements, sensitive species, and significant natural areas). Significant cumulative effects may be expected where there is a substantial reduction in required habitat or the project will result in substantial interference with the movement of resident or migratory species.

The significance of cumulative impacts on non-listed species viability should be determined relative to the benefits to other non-listed species. For example, the manipulation of habitat results in conditions which discourage the presence of some species while encouraging the presence of others.

3. The aquatic and near-water habitat conditions on the ~~THP~~ Plan and immediate surrounding area. Habitat conditions of major concern are: Pools and riffles, Large woody material in the stream, Near-water vegetation. Much of the information needed to evaluate these factors is described in the preceding Watershed Resources section. A general discussion of their importance is given below:

a. Pools and Riffles. Pools and riffles affect overall habitat quality and fish community structure. Streams with little structural complexity offer poor habitat for fish communities as a whole, even though the channel may be stable. Structural complexity is often lower in streams with low gradients, and filling of pools can reduce stream productivity.

b. Large Woody Material. Large woody debris in the stream plays an important role in creating and maintaining habitat through the formation of pools. These pools comprise important feeding locations that provide maximum exposure to drifting food organisms in relatively quiet water. Removal of woody debris can reduce frequency and quality of pools.

c. Near-Water Vegetation. Near-water vegetation provides many habitat benefits, including: shade, nutrients, vertical diversity, migration corridors, nesting, roosting, and escape. Recruitment of large woody material is also an important element in maintaining habitat quality.

4. The biological habitat condition of the ~~THP~~ Plan and immediate surrounding area. Significant factors to consider are:

◊ Snags/den trees ◊ Hardwood cover

◊ Downed, large woody debris ◊ Late seral (mature) forest characteristics.

◊ Multistory canopy ◊ Late seral habitat continuity

◊ Road density

The following general guidelines may be used when evaluating biological habitat. The factors described are general and may not be appropriate for all situations. The ~~THP~~ Plan preparer must also be alert to the need to consider factors which are not listed below. Each set of ground conditions are unique and the analysis conducted must reflect those conditions.

a. Snags/Den/Nest Trees: Snags, den trees, nest trees and their recruitment are required elements in the overall habitat needs of more than 160 wildlife species. Many of these species play a vital role in maintaining the overall health of timberlands. Snags of greatest value are >16" DBH and 20 ft. in height. The degree of snag recruitment over time should be considered. Den trees are partially live trees with elements of decay which provide wildlife habitat. Nest trees have importance to birds classified as a sensitive species.

b. Downed large, woody debris: Large downed logs (particularly conifers) in the upland and near-water environment in all stages of decomposition provide an important habitat for many wildlife species. Large woody debris of greatest value consists of downed logs >16" diameter at the large end and >20 feet in length.

c. Multistory canopy: Upland multistoried canopies have a marked influence on the diversity and density of wildlife species utilizing the area. More productive timberland is generally of greater value and timber site capability should be considered as a factor in an assessment. The amount of upland multistoried canopy may be evaluated by estimating the percent of the stand composed of two or more tree layers on an average per acre basis.

Near-water multistoried canopies in riparian zones that include conifer and hardwood tree species provide an important element of structural diversity to the habitat requirements of wildlife. Near-water multistoried canopy may be evaluated by estimating the percentage of ground covered by one or more vegetative canopy strata, with more emphasis placed on shrub species along Class III and IV streams (14 CCR §§ 916.5, 936.5, or 956.5).

d. Road Density: Frequently traveled permanent and secondary roads have a significant influence on wildlife use of otherwise suitable habitat. Large declines in deer and bear use of areas adjacent to open roads are frequently noted. Road density influence on large mammal habitat may be evaluated by estimating the miles of open permanent and temporary roads, on a per-section basis, that receive some level of maintenance and are open to the public. This assessment should also account for the effects of vegetation screening and the relative importance of an area to wildlife on a seasonal basis (e.g. winter range).

e. Hardwood Cover: Hardwoods provide an important element of habitat diversity in the coniferous forest and are utilized as a source of food and/or cover by a large proportion of the state's bird and mammal species. Productivity of deer and other species has been directly related to mast crops. Hardwood cover can be estimated using the basal area per acre provided by hardwoods of all species.

[Northern and Southern only]: Post-harvest deciduous oak retention for the maintenance of habitats for mule deer and other hardwood-associated wildlife shall be guided by the Joint Policy on Hardwoods between the California Board of Forestry and Fire Protection and California Fish and Game Commission (5/9/94). To sustain wildlife, a diversity of stand structural and seral conditions, and tree size and age classes of deciduous oaks should be retained in proportions that are ecologically sustainable. Regeneration and recruitment of young deciduous oaks should be sufficient over time to replace mortality of older trees. Deciduous oaks should be present in sufficient quality and quantity, and in appropriate locations to provide functional habitat elements for hardwood-associated wildlife.

Commented [DM2]: Decision Point: Should the reference the Joint Policy still be contained in TRA #2 guidance. If the FPC determines that this should be a regulatory standard, this text could be relocated to 912.9, or this SHALL could become a MAY in the appendix to reflect that this is "guidance".

f. Late Seral (Mature) Forest Characteristics:

Determination of the presence or absence of mature and over-mature forest stands and their structural ~~characteristics provides~~ characteristics provide a basis from which to begin an assessment of the influence of management on associated wildlife. These characteristics include large trees as part of a multilayered canopy, large decadent trees and the presence of a large numbers of snags and downed logs, all of which ~~that~~ contribute to an increased level of stand decadence and complexity. Late seral stage forest amount may be evaluated by estimating the percentage of the land base within the project and the biological assessment area occupied by areas conforming to the following definitions:

Forests not previously harvested should be at least 80 acres in size to maintain the effects of edge. This acreage is variable based on the degree of similarity in surrounding areas. The area should include a multi-layered canopy, two or more tree species with several large coniferous trees per acre (smaller subdominant trees may be either conifers or hardwoods), large conifer snags, and an abundance of large woody debris.

Previously harvested forests are in many possible stages of succession and may include remnant patches of late seral stage which generally conform to the definition of unharvested forests but do not meet the acreage criteria.

g. Late Seral Habitat Continuity: Projects containing areas meeting the definitions for late seral stage characteristics must be evaluated for late seral habitat continuity. The fragmentation and resultant isolation of late seral habitat types is one of the most significant factors influencing the sustainability of wildlife populations not adapted to edge environments.

This fragmentation may be evaluated by estimating the ~~amount of the on-site~~ number of acres within both the project area, ~~and~~ as well as the biological assessment area occupied by portions of or entire late seral stands ~~greater than~~ at least 80 acres in size (considering the mitigating influence of adjacent and similar habitat, if applicable) and less than one mile apart or connected by a corridor of similar habitat.

h. Special Habitat Elements: The loss of a key habitat element may have a profound effect on a species even though the habitat is otherwise suitable. Each species may have several key limiting factors to consider. For example, a special need for some large raptors is large decadent trees/snags with broken tops or other features.

Deer may have habitat with adequate food and cover to support a healthy population size and composition but dependent on a few critical meadows suitable for fawning success. These and other key elements may need special protection.

D. Recreational Resources

The recreational assessment area is generally the area that includes the logging area plus 300 feet.

To assess recreational cumulative impacts:

1. Identify the recreational activities involving significant numbers of people in and within 300 ft. of logging area (e.g., fishing, hunting, hiking, picnicking, camping).

2. Identify any recreational Special Treatment Areas described in the Board rules on the plan area or contiguous to the area.

E. Visual Resources

The visual assessment area is generally the logging area that is readily visible to significant numbers of people who are no further than three miles from the timber operation. To assess visual cumulative effects:

1. Identify any Special Treatment Areas designated as such by the Board because of their visual values.

2. Determine how far the proposed timber operation is from the nearest point that significant numbers of people can view the timber operation. At distances of greater than 3 miles from viewing points activities are not easily discernible and will be less significant.

3. Identify the manner in which the public identified in 1 and 2 above will view the proposed timber operation (from a vehicle on a public road, from a stationary public viewing point or from a pedestrian pathway).

F. Vehicular Traffic Impacts

The traffic assessment area involves the first roads not part of the logging area on which logging traffic must travel. To assess traffic cumulative effects:

1. Identify whether any publicly owned roads will be used for the transport of wood products.

2. Identify any public roads that have not been used recently for the transport of wood products and will be used to transport wood products from the proposed timber harvest.

3. Identify any public roads that have existing traffic or maintenance problems.

4. Identify how the logging vehicles used in the timber operation will change the amount of traffic on public roads, especially during heavy traffic conditions.

G. Greenhouse Gas (GHG) Impacts

Forest management affects GHG sequestration and emission rates of forests to the extent management activities affect forest inventory, growth, yield, and mortality. Timber operations and subsequent production of wood products, and in some instances energy, can result in the emission, storage, and offset of GHGs. Any one or a combination of the following options can be used to assess the potential for significant 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 greenhouse gas emissions resulting from the project. The model or methodology should at 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 analysis 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 analysis should disclose if a known ‘threshold of significance’ (PRC § 15064.7) for the project type has been identified by the Board, CAL FIRE or State Agency, and if so, if the project’s emissions in combination with other forestry projects are anticipated to exceed this threshold.

H. Wildfire Risk and Hazard

Cumulative increase in wildfire risk and hazard can occur when the effects of two or more activities from the same or different projects combine to produce a significant increase in forest fuel loading in the vicinity of residential dwellings and communities. Risk to life and property increases with increasing proximity to dwellings and communities while hazard increases as a result of elevated forest fuel loads.

The following elements should be considered in the assessment of potential cumulative effects:

- Regional fire hazard severity zoning
- Existing and future fuel conditions including vertical and horizontal continuity
- Location of existing fuel breaks and fuel hazard reduction activities
- Road access for fire suppression

Note: Authority cited: Sections 4551, 4551.5, 4553, 4562, 4562.5, 4562.7, and 21080.5, Public Resources Code. Reference: Sections 4512, 4513, 4526, 4551.5, 4562, 4562.5, 4582.5, 5093.50**,** 21000(g), 21001(f), 21002, 21080.4, 21080.5 Public Resources Code. Sections 100 Water Code; Section 5650c fish and game code.