

Summary of Changes Proposed Since the November 20 Meeting

Regional Water Board staff proposes the following changes to the Policy to Implement the Water Quality Objectives for Temperature (Attachment 1 to Resolution No. R1-2014-0006):

In Action 1, delete “site-potential effective shade conditions” and replace with the following text: “...riparian shade³, control sediment loading, and address hydrologic conditions resulting in exceedence of temperature objectives...”

In addition, add the following footnote:

“³The removal of vegetation that provides shade to a waterbody is a controllable water quality factor. Riparian shade-related temperature TMDL load allocations are based on the concept of “site-specific potential effective shade,” which means the shade equivalent to that provided by topography and potential vegetation conditions at a site. Shade controls that are effective at correcting temperature impairments also operate to prevent impairments, and provide other water quality protections such as bank stability and filtering sediment and other waste discharges. The Regional Water Board has discretion on how to implement load allocations on a case-by-case basis. This policy is not intended to predetermine precise parameters for achieving potential effective shade for a specific location or land use, and does not necessarily preclude management in riparian areas.”

Regional Water Board staff proposes the following changes to the Staff Report:

Change all instances of “site potential effective shade” to “site-specific potential effective shade.”

Add the following text following the second sentence of the existing text of section 4.2, and delete the remainder of section 4.2:

North Coast Temperature TMDL load allocations associated with effective shade conditions are based on the concept of natural vegetation conditions, and have been described using various terminology. The Navarro, Mattole, Salmon, Scott, and Shasta River Temperature TMDLs, developed by the Regional Water Board, express shade-related load allocations as “adjusted potential effective shade.” In those analyses, the potential effective shade conditions at a site are estimated as potential effective shade (based on fully mature trees growing along the bankfull channel of the streams) reduced by 10 percent to account for natural effects such as fire, windthrow, and earth movements that would reduce the actual riparian area vegetation below the site potential. The Eel River Temperature TMDLs, developed by the USEPA, defines shade-related temperature allocations in terms of Langleys, a unit of heat loading. The shade-related allocations for these TMDLs are set at the heat load that corresponds to effective shade levels corresponding to natural vegetation conditions. Though the allocations are expressed using different terms, the conditions that the allocations define are the same: the level of effective shade provided by vegetation when the vegetation is growing at potential. For any given location, this term is called “site-specific potential effective shade.”

4.2.1 Definition of Terms:

The term “site-specific potential effective shade” is defined as:

The shade equivalent to that provided by topography and potential vegetation conditions at a site.

This term combines two concepts: “effective shade” and “site-specific potential.” These two concepts are described herein.

The term “effective shade” is widely used in the solar power industry as a measure of solar radiation available at a site. Effective shade is also used to compare solar power potential between sites. The term has been adopted by hydrologists to quantify the solar radiation amount received by bodies of water.

The term “effective shade” is defined in the Basin Plan as:

The percentage of direct beam solar radiation attenuated and scattered before reaching the ground or stream surface from topographic and vegetation conditions.

Webster’s dictionary defines “effective” as “producing the intended or desired effect”, and “shade” as “comparative darkness caused by the screening of rays of light.” In this context, the terms are combined to denote the degree to which objects creating shade effectively reduce solar radiation.

Effective shade is a measurement unit that describes the amount of solar energy received in relation to the possible solar energy associated with an unobstructed sky. Effective shade is different from other units of measure related to the density of trees, branches and leaves overhead. It explicitly takes into account the path of the sun through the sky. It also accounts for the fact that the intensity of solar radiation is greatest at noon and least in the morning and evening. Other vegetation density measurements - for example, the percentage of overhead vegetation and basal area - do not distinguish between vegetation that reduces solar radiation and vegetation that only blocks the view to the sky.

The term “site-specific potential” is a modifier that describes a particular effective shade condition. The term “site-specific potential” is defined as: the vegetation conditions possible at a location, considering the vegetation species present, and any natural factors that limit vegetation size and density.

Site-specific is defined as “relating to a particular place.” The North Coast Region encompasses a variety of vegetation communities and ecological settings. The Policy recognizes this variability and requires that potential effective shade be evaluated relative to the vegetation, soil, hydrology, and other factors affecting growing conditions at any given site.

The term “site” is also used in forestry, and has been defined in that context as follows:

The area in which a plant or stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can carry. (Society of American Foresters 1998)

This definition is consistent with its use in the term “site-specific”, however in forestry the term is often combined with other terms (e.g., site class, site index, site quality, and site productivity class) to refer to the growth rate and production capacity of a location. Site-specific potential effective shade refers to the site-specific potential for effective shade at a site, and does not pertain to growth rate and productive capacity.

Webster’s dictionary defines “potential” as “capable of being or becoming.” In this case, the term refers to the shade that occurs when the riparian vegetation naturally occurring at a site is at a level that the site is capable of supporting. Many riparian areas in the North Coast Region reflect the effects of past management activities that have removed or prevented the ongoing presence of vegetation. The application and assessment of site-specific potential shade is discussed in section 4.2.3. Site-specific potential effective shade describes an effective shade level that existed prior to reductions associated with management activities. Riparian areas that haven’t experienced vegetation removal or suppression, or that have regained characteristics reflecting those that existed prior to management-related reductions, are considered to be at a potential level of vegetation, and therefore provide potential effective shade.

4.2.2 Measurement and Approximation of Effective Shade

Effective shade can be measured using simple devices. Solar Pathfinders and angular canopy densimeters are examples of such devices. Such devices identify several factors: the objects obstructing direct sunlight, the time of day that the object will obstruct sunlight, and the corresponding intensity of solar radiation. These devices are based on geometric relationships between earth and sun at a given latitude, and the daily distribution of solar radiation.

Effective shade can be approximated using models that take into account the same geometric relationships and solar radiation distributions as the devices used for measuring it. These models use spatial data describing the elevation, vegetation, and stream location for a site to calculate the timing and effect of solar obstructions.

4.2.3 Application and Assessment

Evaluating the effects of a proposed action relative to site-specific potential effective shade requires evaluation of whether the action will result in riparian shade conditions equivalent to that provided by potential riparian vegetation conditions in the near or long term. The factors that must be assessed generally relate to the height, depth, and density of vegetation as it relates to effective shade.

The assessment of management effects on effective shade related to vegetation removal occurs in two contexts: (1) the effective shade at a site is equivalent to the site-specific potential, and (2) the effective shade at a site is less than the site-specific potential.

In the first case, the evaluation of the proposed management actions on effective shade involves judging whether the proposed practices will reduce the effective shade (i.e., increase solar radiation) on the waterbody. To do this, the vegetation proposed for removal is considered in terms of its position relative to the path of the sun and the waterbody. Maintaining site-specific potential effective shade involves retaining the vegetation that provide the effective shade.

In the second case, the evaluation of the proposed management actions on effective shade involves judging whether the proposed practices will prevent the re-growth of vegetation to site-specific potential effective shade conditions. In this situation, the assessment of practices is very similar to that of the first situation, where the vegetation proposed for removal is considered in terms of its position relative to the path of the sun and the waterbody. However, in this case management consistent with site-specific potential effective shade involves retaining the vegetation that will provide, or will continue to provide, effective shade as it reaches site-specific potential.

The assessment of management effects on effective shade doesn't always involve active removal of vegetation. Some situations, such as evaluation of a grazing management plan, involve evaluating the effects of proposed management practices on the natural processes that establish and maintain riparian vegetation. In these cases the activity is evaluated for impacts that will limit germination, growth, and persistence of riparian vegetation in a manner that reduced the amount of riparian vegetation providing effective shade over the timeframe the management activity is proposed.

The Regional Water Board develops and administers permits and programs for various activities that include restrictions and requirements for the protection of water quality. In some cases these restrictions and requirements include effective shade considerations, as appropriate. Evaluation of the effectiveness of permit or program restrictions and requirements is similar to the evaluation of project-specific management actions described above. These permits and programs often rely on the development of riparian management plans that describe practices that will be employed to achieve or maintain site-specific potential effective shade.

4.2.4 Restoration and Maintenance of Site-Specific Potential Effective Shade

Action 1 of the Policy directs the Regional Water Board to "Restore and maintain riparian shade." The use of the term "restore" in Action 1 applies to situations in which the effective shade at a site is less than the site-specific potential. In such a case, the Policy directs the Regional Water Board to use its authorities in a manner that ensures that the management occurring at the site allows the vegetation present to achieve conditions equivalent to site-specific potential effective shade.

The use of the term "maintain" in Action 1 applies to situations in which the effective shade at a site is equivalent to the site-specific potential. In this situation, the Policy directs the Regional Water Board to use its authorities to ensure management occurring at the site is consistent with the maintenance of effective shade equivalent to the site-specific potential.

This Policy is not intended to preclude management of riparian areas. Use of the terms "restore" and "maintain" does not mean that the Regional Water Board should require active restoration such as tree planting projects, nor does it mean that management actions in the riparian zone are prohibited, either in areas where site-specific potential effective shade already exists or in areas where site-specific potential effective shade conditions do not exist. This policy is not intended to predetermine precise parameters for achieving potential effective shade for a specific location or land use, and does not necessarily preclude management in riparian areas. There are circumstances in which management actions within riparian areas that reduce effective shade conditions in the near- and short-term are necessary and appropriate in order to achieve potential effective shade in the long-term.

Delete the last paragraph of section 4.3 and replace with the following:

Other situations in which reductions of shade may be consistent with the goal of restoring and maintaining site-specific potential effective shade include actions that require short-term reductions of effective shade to enhance the size, density, or resiliency of riparian vegetation over time.

Short-term reduction of effective shade associated with fuels reduction projects in riparian areas may be appropriate when the long-term benefits are considered. In such cases, the impacts of vegetation thinning are weighed against the long-term benefits of a riparian ecosystem that is resilient against fire impacts. Similarly, the short-term reduction of shade associated with thinning projects designed to increase the growth rate of dominant trees or replace stunted trees with vigorous saplings may represent an acceptable tradeoff if the project results in increased shade levels in a shorter timeframe. Likewise, a short-term reduction of effective shade associated with efforts to increase hardwood species in a riparian zone may be appropriate where it can be demonstrated that natural primary productivity levels are suppressed due to a lack of nutrients, leading to a reduced capacity to support beneficial uses.

In each of the situations described above, the Regional Water Board considers the short term impacts of the proposed action in light of the site-specific conditions in the affected area. Factors taken into consideration include existing water temperatures relative to biological thresholds, the level of solar radiation increase associated with the project, likely temperature impacts associated with the project, the current capacity for support of beneficial uses, condition of riparian vegetation in adjacent reaches, and the expected amount of time for necessary for riparian recovery.