The VTAC Committee: Developing Guidance for an Alternative Regulatory Pathway to the Anadromous Salmonid Protection Rules[1]

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Abstract

In recent decades, riparian protection standards have been guided by generalized prescriptive rules. With the passage of the Anadromous Salmonid Protection rules in 2009, the Board of Forestry and Fire Protection (Board) established a regulatory pathway that provides an alternative approach for riparian protection based on site-specific criteria (14 CCR § 916.9 [936.9, 956.9](v)). This new pathway seeks to promote more immediate (short-term) responses to active riparian management practices that might not otherwise occur under the more prescriptive rule protocols. This approach requires consideration of both watershed-scale limiting factors (in other words, context assessment) and site-based factors to lead to a modified riparian management design that provides benefits to the aquatic environment. It is the Board's intent that allowing site-specific plans will create an economic incentive for landowners to engage in active management and restoration activities in riparian areas. The implementation of this new approach is being overseen by the Anadromous Salmonid Protection Rule Section V Technical Advisory Committee (VTAC), composed of members from academia, the timber industry, professional consulting firms, and the public. The California Department of Forestry and Fire Protection (CAL FIRE) appointed this committee in October 2010. The VTAC is seeking to establish principles, guidelines, and procedures to guide landowners in the use of this new rule section. The VTAC is focusing on: (a) broadening incentives, and (b) developing permitting efficiencies that properly balance the risks of negative impacts with the potential benefits to listed salmonid species. In short, one goal of the VTAC is to reduce the regulatory barriers that might otherwise prevent landowners from engaging in active management and restorative actions in riparian areas.

The VTAC will use multiple pilot projects identified by landowners in both the Coast Ranges of California and the interior part of the state to demonstrate active riparian management, with potential implementation in 2011. These pilot projects include a range of desired objectives, including increasing large wood loading, promoting increased biotic diversity, reducing catastrophic wildfire risk, and accelerating conifer tree growth.

Key words: anadromous, buffer, riparian, restoration, salmonid

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Introduction

Over the past 4 decades, there have been several refinements and additions to riparian protection rules originally established by the Z'Berg-Nejedly Forest Practice Act of 1973. Similar processes have occurred in Oregon, Washington, Alaska, and on federal timberlands (Everest and Reeves 2007). Common to most of these riparian protection standards is the use of prescriptive rules for longitudinally continuous buffer strips. These buffer strips require mandated widths and restricted harvesting practices, such as a minimum basal area or canopy cover, to remain following harvest for specific classes of stream. Such standards typically result in relatively passive, continuous, uniform, one-size-fits-all streamside buffers.

Recently in California, the California State Board of Forestry and Fire Protection (Board) developed Anadromous Salmonid Protection (ASP) rules that seek to protect, maintain, and improve riparian habitats for state and federally listed anadromous salmonids. The Board adopted an option (14 CCR § 916.9 [936.9, 956.9] Section (v)), referenced here as the Section V Rule, that would support more site-specific decision making in the design of riparian prescriptions that could be applied during the time of adjacent timber harvest. This approach offers an alternative to prescriptive uniform buffers and may be more protective of ecological functions (Liquori and others 2008) (*fig. 1*). The intention of this new rule is to promote a more explicit riparian design process that addresses specific ecological and geomorphic functions and processes specific to the project site. In theory, more site-based riparian treatments could better maintain, improve, restore and/or expedite those ecological

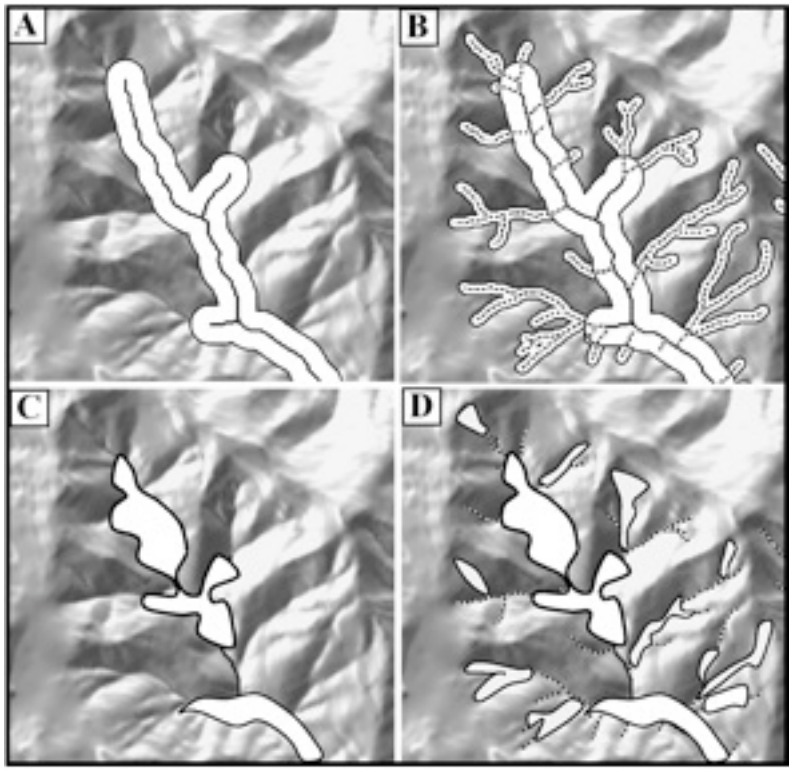

Figure 1—Uniform stream buffer protection measures (A and B) v. spatially variable prescriptions (C and D) (image from Liquori et al. (2008) (used with permission).

processes most important to sustaining resilient salmonid habitat conditions throughout forested landscapes (Benda et al. in press, Liquori et al. 2008, Ryan and Calhoun 2010).

The Section V Rule allows alternative treatments to the riparian zone with the caveat that the effects of the proposed practices on riparian functions must be at least equal to those expected from the revised prescriptive standards that were adopted. This rule seeks to promote both immediate (short-term) responses to active riparian management practices that might not otherwise occur under the more prescriptive rule protocols, as well as longer-term habitat improvements (Liquori et al. 2008). This approach requires consideration of both watershed-scale limiting factors (in other words, context assessment) and site-based factors to lead to a modified riparian management design that provides benefits to the aquatic environment. It was also the Board's intent that allowing site-specific plans will create an economic incentive for landowners to engage in active management and restoration activities in riparian areas. Thus, it will allow for economic incentives to encourage restoration.

The Section V Technical Advisory Committee (VTAC) was established by the Board to develop a guidance document that will allow broad application of the site-specific approach for riparian management and implementation of at least two pilot projects. The VTAC is composed of members from academia, the timber industry, professional consulting firms, the public, and includes state and federal agency representatives. The VTAC is seeking to establish principles, guidelines, and procedures to guide landowners in the use of this new rule section. It is focusing on: (a) broadening incentives, and (b) developing permitting efficiencies for measures that are necessary for recovery of listed salmonid species. One important goal of the VTAC is to reduce the regulatory uncertainty that might otherwise prevent landowners from engaging in active management and restorative actions in riparian areas.

VTAC outreach survey genesis and summary

The VTAC developed an online survey to improve acceptance of the adaptive rule described by the ASP Rule 916.9 Section V and to gain a better perspective on regulatory requirements that the landowner may face when trying to implement a Section V plan. The survey was distributed to landowners, Registered Professional Foresters (RPFs), agency personnel, and the public in spring 2011 (see: http://calfirevtac.weebly.com). A brief introductory video, as well as background information on the rule section, was provided on this website. Information from the survey responses is helping the VTAC develop approaches that will be used for the guidance document being produced for this new approach to riparian forest management.

The VTAC received 123 responses to the survey. Landowners and land managers supplied 39 percent of the sample, while 32 percent were agency staff, 19 percent were consultants, 6 percent were from the general public, and 4 percent represented advocacy groups. Approximately half of the respondents are California RPFs. Roughly 70 percent of respondents had either detailed or moderate knowledge of the ASP Section V rule prior to taking the survey and 87 percent of the respondents were either very or somewhat knowledgeable of the California Forest Practice Rules.

Eighty percent of respondents said they favor more flexible site-based riparian protection zone treatments that are professionally designed over a broadly prescriptive rule. Seventy-three percent agreed that treatments should be well-grounded in science. Nearly 80 percent responded that they are likely to support a landowner's ability to apply site-based riparian treatment through Section V rules if it is technically justified.

Respondents informed the VTAC that their primary concern regarding the Section V rules is "too much uncertainty/inconsistency in interpretation." Approximately 50 percent felt that well-documented examples of success with regard to navigating the various regulatory agencies' requirements would improve their comfort level in the use of Section V projects. Thirty-seven percent of respondents said they are highly or moderately likely to submit a Section V project (15 percent did not reply to this question). Respondents stated that the primary reason why a landowner would be unwilling to submit a Section V project is "too much uncertainty in the process." Approximately 30 percent plan to submit or may submit a Timber Harvesting Plan (THP) in the near future with a Section V project.

The primary take-home messages from the survey are the following: (1) there is widespread agreement that site-based riparian management can be used where it is justified; (2) an increased level of certainty is required for extensive use of the Section V process; and (3) successful pilot projects are needed to demonstrate to landowners that this approach can work.

Potential types of section V site-specific projects

Site-specific riparian management projects that are justified will vary depending on current watershed and riparian conditions, geographic location, and geomorphic characteristics of the site. Desired objectives for riparian management include increasing large wood loading, promoting increased biotic diversity, increasing nutrient cycling and biotic qualities of the salmonid food-base, and reducing catastrophic wildfire risk. The following sections provide brief descriptions of selected references related to these topics, but is not meant to be a comprehensive review of the riparian science literature.

Large wood

Most of the anadromous fish-bearing watersheds located in the Coast Ranges of California are currently deficient in large wood loading due to removal of wood from the 1960s through the 1980s (NMFS 2010, Wooster and Hilton 2004) and removal of much of the riparian forest in harvests prior to 1973. In smaller coastal streams, large wood is usually the dominant structural agent, important in pool formation and a critical component for habitat complexity. Generating adequate volumes of large wood following removal is a slow process in second-growth coastal stands due to lack of adequate material and low levels of mortality in these long-lived species, typically requiring 75 to 150 years to reach acceptable levels (Wooster and Hilton 2004), and was exacerbated by excessive removal of large conifer trees in riparian zones in past decades.

Felling and/or excavating selected large conifer trees from the riparian zone near the fish-bearing streams may be appropriate to rapidly create deep pools in channels

with the appropriate gradient and bankfull width that are currently lacking wood. Past monitoring work has shown that large wood placement projects can lead to higher densities of juvenile coho and other salmonids (Roni and Quinn 2001, Whiteway et al. 2010). Unanchored large wood has the highest likelihood of relative stability in smaller streams (for example, third order) when the bole length is at least two times bankfull channel width and the rootwad remains attached (Collins 2000, WFPB 2001).

Spence et al. (1996) state that for second-growth stands, thinning may be appropriate in order to facilitate recovery and protection of key functions, particularly in coastal forests. Thinning can accelerate riparian conifer tree growth in areas where uniformly young stands exist. In these stands, there are limited large conifers for future recruitment to the channel. Additionally, the stream ecosystem is likely to be temperature limited and lack large tree habitat characteristics. Very high tree densities can preclude the development of large trees for decades in coast redwood stands (Thornburgh et al. 2000). Ligon et al. (1999) concluded that to grow and maintain larger diameter conifer trees in riparian areas similar to the stand structure for those elements found in late-successional stands, "it may be necessary to manage these zones through thinnings and selection harvests to promote the growth of the larger trees present that have the best opportunity to maximize diameter and height growth."

In general, thinning has been found to be an effective means of enhancing old forest development in coast redwood forests by accelerating tree growth, modifying species composition, and increasing stand-level variability (O'Hara et al. 2010). Silvicultural approaches to improve tree growth include low thinning (in other words, thinning from below), commercial thinning (crown thinning), and variable density thinning (VDT) (Teraoka and Keyes 2011). Cafferata et al. (2005) reported that thinning from below produced more large trees in a coastal riparian flood prone area over a 60-year modeling period than standard single tree selection.[7] Low thinning in a coast redwood/Douglas fir stand has recently been reported as accelerating conifer growth but not promoting redwood dominance. This treatment allowed Douglas-fir to remain competitive in the upper canopy (Teraoka 2010, Teraoka and Keyes 2011).

Biotic diversity and nutrients

Increased biotic diversity and nutrient input into anadromous salmonid watersheds is increasingly being recognized as a key function produced from the riparian forests. Past studies have shown that a 30 m buffer with no tree removal reduces impacts to a stream that are similar to a no-harvest level (Newbold et al. 1980). However, completely excluding vegetation management in the buffer strip can limit opportunities to increase fish growth rate and biomass (CSBOF 2008). Several studies suggest selective thinning of the riparian canopy can result in an increase in aquatic macroinvertebrate production, thus raising the food availability for salmonids (e.g., Wilzbach et al. 2005). Conifer verses hardwood-dominated riparian stand types can produce differing stream temperatures and channel morphology due to differences in canopy conditions and root density (Liquori and Jackson 2001 (*fig. 2*). Past research suggests that at appropriate locations, active riparian management that promotes an appropriate mixture of conifers and hardwoods can enhance primary

[7] Thinning from below was defined as harvesting intermediates and co-dominants only and specifying that the quadratic mean diameter (QMD) of the stand must increase after harvest.

productivity and produce temperature regimes that promote fish production. The riparian stand characteristics most likely to achieve these functions include: (1) a sufficient number of nitrogen-fixing deciduous trees distributed at key locations within the stream network, and (2) a sufficient number of riparian canopy gaps that allow for sunlight to support macroinvertebrate production while balancing effects on other riparian functions (CSBOF 2008).

Figure 2—Diagram of a unevenaged conifer-dominated riparian stand (above) v. a hardwood-shrub riparian stand (below) from the east slope of the Cascade Mountains in Washington (image from Liquori and Jackson 2001). Note differences in stream shading and channel morphology for each stand type.

Fuel hazard reduction

Research has shown that fuel hazard reduction projects can reduce the risk of catastrophic crown wildfire (Martinson and Omi 2003, Omi and Martinson 2004). This concept directly applies to riparian zones, where active management can prevent dense stands of trees from contributing to rapid fire spread upslope, particularly in the interior parts of California with hotter and drier climates. Balancing the potential benefits of fuel hazard reduction with the possible risks to habitat recovery, however, will be complex and require careful consideration by both the project proponent and the reviewing agencies.

Fire behavior models have been used to show that some parts of the landscape

are highly prone to catastrophic wildfire (in other words, a rapidly moving crown fire). This information can be used to justify prescriptions to reduce surface fuels, intermediate fuels, and co-dominate fuels (in other words, "ladder fuels") in the riparian zone that differ from the standards in the ASP rules. Treatment could occur both in the Class I (fish-bearing) watercourse and lake protection zone (WLPZ) core, inner, and outer zones, as well on the hillslopes beyond the WLPZ, creating a landscape level fire hazard reduction project. Recent modeling work by Van de Water and North (in press) shows that Sierra Nevada riparian forests are significantly more fire prone under current management regimes with excluded harvest that allow for a build-up of fuels when compared to riparian areas that have been exposed to an active-fire regime. Additionally, under current conditions, riparian forests were found to be significantly more fire prone than upland forests. The 2007 Angora Fire at South Lake Tahoe provides an example of this situation. Murphy et al. (2007) reported that dense stands of trees in the Angora SEZ (Stream Environment Zone) likely contributed to the rapid fire spread to Angora Ridge by supporting crown fire runs upslope.

Framework for riparian design

Site-based riparian design should: (1) identify the relative importance of riparian function inputs (wood, heat, sediment, litter/invertebrates) for forming aquatic habitat and to affect water quality in the adjacent stream reach, and (2) assess the potential connectivity (in other words, transport) of riparian inputs to downstream channels. The sensitivity or response of aquatic resource condition to riparian inputs and the potential downstream connectivity are indicators of riparian function importance.

Channel response potential and downstream connectivity are strongly influenced by channel geomorphology (gradient, confinement, bed composition), stream size/flow, and position in the stream network. Although channel morphology and flow vary along the stream network, a stream may be subdivided into reaches with distinct channel forms that are reflective of watershed topography and channel forming processes (Montgomery and Buffington 1997, Paustian et al. 1992). Such geomorphic stream classification provides a qualitative tool for assessing response potential to changes in riparian function inputs (WFPB 1997). We adopt this approach by apply a typing system that combines stream size (based on channel width or regionally calibrated basin areas) with the Montgomery-Buffington classification (*table 1*). More rigorous evaluation of response potential can be facilitated by quantitative modeling of channel conditions and watershed processes (Benda et al. 2007).

VTAC guideline document and pilot projects

The VTAC is developing guidance documents that will: (1) identify qualifying criteria for suitability of sites for various treatment options, (2) help identify site-based objectives, (3) outline treatment option alternatives that are consistent with those objectives, (4) establish guidance for the data necessary to justify proposed actions, and (5) clarify administrative procedures for obtaining agency approvals. In preliminary "interim" guidance, the VTAC has established a simplified procedure for prioritizing among four objectives: wood loading, thermal regulation, nutrient

cycling, and sediment.

VTAC pilot projects guidelines documents will allow RPFs to determine if site-specific riparian management is appropriate for a given location. Both a "default design process" using a structured classification system, and a more flexible

Table 1—*Preliminary channel sensitivity/response potential to changes in exchange function inputs in relation to stream size and channel type.*

		Function input (channel response metric)			
Channel type	**Stream size**	**Large wood (pool formation)**	**Shade (temperature)**	**Sediment (grain size)**	**Litter (retention)**
colluvial	small	M	H	M	H
bedrock	all	L	H	L	L
cascade	all	L	M	M	L
step pool	all	M	H	M	M
plane bed	all	H	H	H	L
pool riffle	small	H	H	H	H
pool riffle	medium	H	M	H	H
pool riffle	large	H	L	H	M
dune ripple	small	M	H	L	M
dune ripple	medium	M	M	L	L
dune ripple	large	L	L	L	L
alluvial fan	all	H	M	H	H

"customized design process" requiring more data and expertise are available in the draft document. Major steps using the default design process include: (1) evaluating existing site conditions, (2) identifying functional objectives, and (3) developing site prescriptions.

While still under development, key concepts to be included in this guidance document are: (1) methods for assessing watershed-scale limiting/constraining factors, (2) information on how to conduct the assessment at the appropriate spatial scale, and (3) riparian stand modeling methodologies for watershed-scale projects (for example, the RAIS model for LWD and shade; Welty et al. 2002).

The initial version of the guidelines will be used for implementing Section V pilot projects that are undertaken in the summers of 2011 and 2012. Potential pilot project locations range from Santa Cruz County to Humboldt County in the Coast Ranges, as well as in the Klamath Mountains and the Sierra Nevada. The list of potential pilot projects include the full range of desired objectives, including increasing large wood loading, promoting increased biotic diversity, reducing catastrophic wildfire risk, and accelerating conifer tree growth.

The vision for the final document is broad and includes sections on project pre-consultation guidance with the state and federal agencies, context assessment at the watershed scale, project/site evaluation tools using a refined version of the modified Washington watershed analysis approach discussed above, and monitoring guidance. The final document will use feedback from the preliminary documents produced by the group.

Conclusions

The VTAC is optimistic that the pilot projects will be successful and demonstrate to landowners in California that site-specific riparian management is both economically viable and ecologically valuable. It is clear that rapidly accelerated habitat improvement for listed anadromous fish species such as coho salmon is needed if these species are to recover in this state (NMFS 2010). Hope remains high since all surveyed stakeholder groups agree that site-based riparian management is appropriate where it is justified and necessary for recovery. Most types of projects seem likely to be accepted by the state and federal reviewing agencies in appropriate situations. It does appear, however, that riparian management that results in impacts only on hillslopes will be initially easier to permit as part of a THP in California than those that cause impacts in the stream channel (for example, large wood placement projects). These projects may require a federal permit before they can be completed and difficulties currently exist with addressing compliance with the Federal Endangered Species Act (ESA).

The status of the pilot projects and guidance document that will allow for broad application of the site-specific approach for riparian management will be presented to the Board in the second half of 2011. The final VTAC report is expected to be completed by the summer or early fall of 2012.

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