

# **Accelerated Wood Recruitment and Timber Operations: Process Guidance from the California Timber Harvest Review Team Agencies and National Marine Fisheries Service (NMFS)<sup>1</sup>**

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## **Purpose**

To provide guidance to, and identify incentives for, Registered Professional Foresters (RPFs) and landowners seeking to conduct voluntary large wood restoration projects during timber operations as authorized under Title 14 California Code of Regulations 14 CCR § 916.9 [936.9, 956.9] (v)(2) (referred to below as (v)(2)).

## **Problem Statement**

The historic removal of large woody material (LWM), also known as large woody debris (LWD), from riparian areas, streams and rivers, greatly reduced the habitat structure and complexity necessary to help support sustainable populations of native salmon and trout species. Clearance of LWM from many streams followed post-WWII logging practices that introduced unnaturally large volumes of wood and soil into stream channels (Napolitano 1998). In addition, extensive timber harvest within riparian forests that focused on large conifers greatly reduced LWM recruitment potential to streams. Finally, construction of main haul roads, in some cases on both sides of low-gradient streams within riparian forests, caused long-term reduction of LWM recruitment potential to salmonid habitat in many watersheds.

In general, salmonids prefer complex habitat with large physical structures such as boulders, undercut banks, and large wood that provide feeding opportunities, segregation of territories, refuge from high water velocities, and cover from predators (Moyle *et al.* 2008). The reintroduction of LWM into watersheds is identified as one of the highest priority restoration actions in state and federal recovery plans for threatened and endangered anadromous salmonids (CDFG 2004, NMFS 2012, NMFS 2015).

This document is intended to guide and encourage RPFs to develop Timber Harvesting Plans (THPs), Nonindustrial Timber Management Plans (NTMPs), and other types of commercial timber harvest plans

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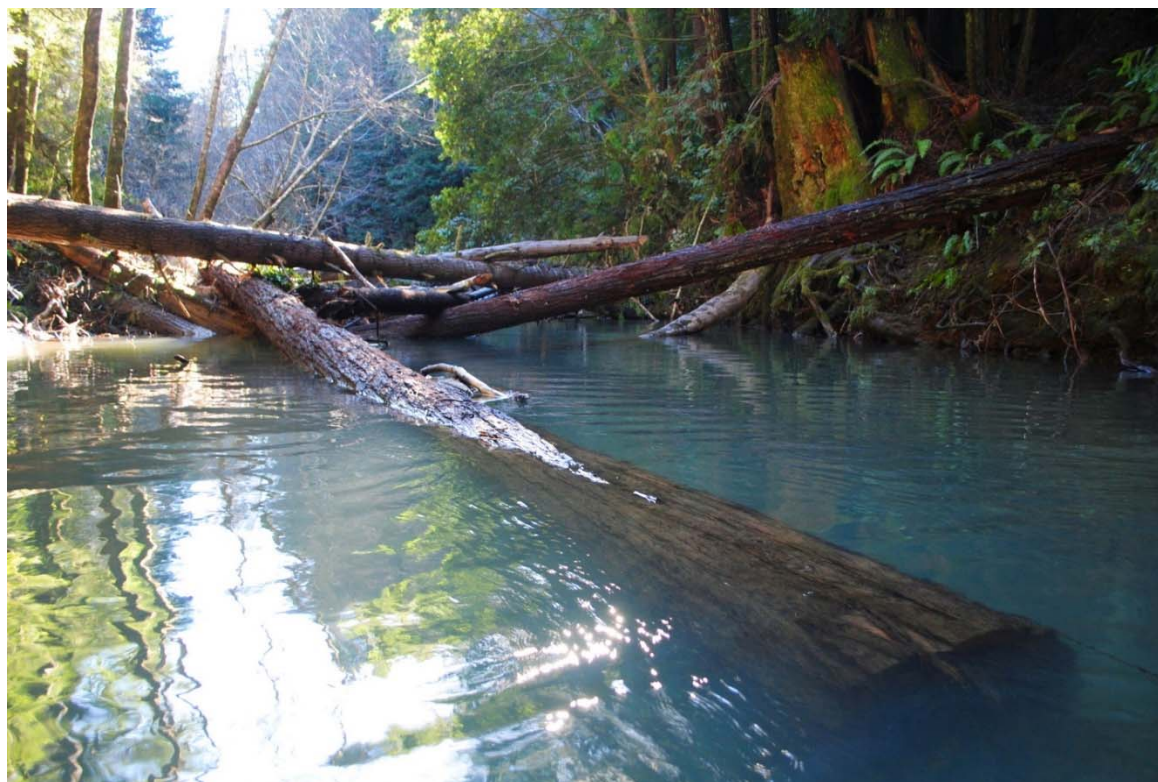
<sup>1</sup> Paper prepared for the Wood for Salmon Working Group, an informal group of California state, county, federal agency staff, representatives from environmental non-profits, and private landowners and consultants, that promotes actions in state and federal recovery plans for improved habitat for listed anadromous salmonids by accelerating the pace and scale of instream restoration projects, especially large wood enhancement.  
<https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/california/salmon/woodforsalmon/Pages/default.aspx>

(Plans) that facilitate rapid LWM placement in Class I watercourses—particularly in watersheds located in the California Coast Ranges (Coastal Anadromy Zone, or CAZ) (Figure 1).

### **Background Information**

Resource agencies and restoration practitioners support the implementation of priority recovery actions, including large wood augmentation projects, to improve survival and lead to self-sustaining populations of anadromous salmonids. This support is reflected in changes in state and federal guidelines and regulatory processes for reintroducing LWM into anadromous salmonid habitat.

Specifically in 2009, the California State Board of Forestry and Fire Protection approved a regulatory pathway that provides an alternative approach for enhancing riparian functions based on site-specific criteria (14 CCR § 916.9 [936.9, 956.9](v)) (referred to as “Section V”). This pathway seeks to promote more immediate (short-term) improvements to the riparian zone and aquatic habitat conditions by allowing active riparian management practices that would not otherwise be allowed under the standard Anadromous Salmonid Protection (ASP) watercourse and lake protection zone (WLPZ) rules. Since the ASP rules were incorporated into the Forest Practice Rules in 2010, proposed Plans included timber operations adjacent to 778 miles of Class I watercourses, or an average of 111 miles per year, in Humboldt, Mendocino, Sonoma, and Trinity counties.<sup>2</sup> The extent of Plan-related timber operations occurring adjacent to salmonid-bearing watercourses provides an important potential opportunity to enhance habitat and help achieve recovery of listed salmonid stocks.



*Figure 1. Accelerated wood recruitment trees in the Ten Mile River. Photo credit: David Wright, TNC.*

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<sup>2</sup> Data through 2016.

To guide landowners and RPFs in the use of Section V, a multi-stakeholder technical advisory committee previously developed the Section V Guidance report (VTAC 2012). Two specific permitting pathways are included in Section V. The first pathway, (v)(2), specifies that only written concurrence before plan submittal from CDFW is required in lieu of (v)(3) requirements for proposed site- and plan-specific timber operations intended to improve riparian and/or aquatic habitat conditions. The second pathway, pursuant to 14 CCR § 916.9 [936.9, 956.9] (v)(3) (referred to as (v)(3)), is used for larger scale or more complex proposals evaluated at scales equal to or larger than the watershed assessment area evaluated for cumulative impacts. The VTAC (2012) guidance document is most helpful for Plan proponents who wish to pursue (v)(3), but provides relatively little guidance for (v)(2) proposals.

The purpose of this document is to provide more specific guidance to Plan proponents in developing a (v)(2) proposal that includes LWM recruitment using the popular method of Accelerated Wood Recruitment (AWR), sometimes referred to as “chop and drop,” to introduce unanchored trees from the Class I Core Zone into fish-bearing streams. The recommendations and guidance set forth in this document are best used when applied to Plans that include the AWR method, and are in conformance with the other applicable standard California Forest Practice Rules in 14 CCR § 916.9 [936.9, 956.9]<sup>3</sup> and other State and federal laws and regulations.

### **The Accelerated Wood Recruitment Method**

The AWR method has been commonly used on the east coast of the United States to enhance habitat for brook trout (MDIFW 2013, Bonney 2008) and Atlantic salmon (MDACF-MFS 2013), and it is an emerging stream restoration technique in California (Carah *et al.* 2014). To date, the application of the AWR method in California has been limited to a few locations in the northern and central part of the Coast Ranges, including the Ten Mile River, Noyo River, Pudding Creek, Garcia River, Big River, Big Salmon Creek, Navarro River, Usal Creek, Gualala River, and Soquel Creek watersheds.

The method involves selecting and directionally felling whole trees (for the purpose of this document whole trees may or may not include the rootwad, but always includes the tree crown) into the stream channel to create LWM structures. The AWR approach typically avoids permanently anchored structures. Instead, wood is either unanchored or non-traditional anchoring methods are used such as wedging between two standing trees. Depending on local stream characteristics, LWM is effective in trapping and sorting mobile sediment, creating winter-period refugia during high flows, and increasing instream habitat complexity such as pools (Figure 2). They also trap fallen leaves and other detritus that enrich the stream with organic matter and contribute to the aquatic food chain.

Including the AWR method in Plans can result in significant contributions toward the recovery of listed salmonids (Carah *et al.* 2014, Benda *et al.* 2015, Reeves *et al.* 2016). For example, between 2007 and 2008, Campbell Timberland Management<sup>4</sup> and Trout Unlimited implemented an AWR project in the South Fork Ten Mile River to introduce 309 trees along 10 miles of river. In the years following the treatment, the fallen trees have captured additional pieces of LWM, increased habitat complexity, and

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<sup>3</sup> Except 14 CCR § 916.9 [936.9, 956.9] (f)(2)(a), f)(3)(b), and (f)(4)(a), the standard rules that prohibit the felling of trees into watercourses, which are why such activities under Plans must go through Section V.

<sup>4</sup> This forestland is now owned by Lyme Redwood Forest Company.

initiated streambank erosion recruiting whole trees. Existing pools in the Ten Mile River became deeper and new pools were formed. Complex cover and shelter within pools increased significantly. Fisheries biologists who monitor smolt production from the Ten Mile River have seen production progressively increase (up to six times) since the treatment (D. Wright, TNC, unpublished data). Although there are many factors contributing synergistically that may explain the increased smolt production, there is general agreement among biologists that the AWR treatment is likely a major contributor to this increase.



*Figure 2. Pool formed by large wood restoration on the Ten Mile River. Photo credit: David Wright, TNC.*

In coastal Oregon, Benda *et al.* (2015) reported that “tree tipping”, which is the practice of introducing whole trees into a watercourse with mechanized equipment, was effective in offsetting short- and long-term impacts to LWD recruitment from thinning. Reeves *et al.* (2016) found a riparian thinning strategy to be restorative on stands less than 80 years old when tree tipping is used throughout the riparian zone to ensure harvest does not negatively affect potential wood recruitment to the stream from any one location in the riparian zone.

Practitioners have determined that AWR is a cost-effective approach for projects with limited funding or in remote streams that are in need of instream wood. Carah *et al.* (2014) reported that the cost to implement AWR projects was approximately 22% of that associated with traditional engineered wood structures.

## Tree Selection Considerations for Accelerated Recruitment Projects

Based on the experience gained from AWR projects previously implemented in California, we suggest selecting trees, as an initial screen for LWM in salmonid streams, based on the following criteria:

- a) Trees that are safe to fall.
- b) Trees that are second-growth coast redwood for instream longevity.<sup>5</sup>
- c) Trees that are larger than 30 inches in diameter at breast height (dbh) for larger channels (i.e., >50 foot active channel width). For smaller channels (active channel width 10 feet to 50 feet), trees should be at least 24 inches dbh.
- d) Trees should be selected from amongst the median size class distribution found within the riparian forest stand. The number of trees that are selected for AWR projects that are part of the 13 largest conifer trees per acre should be limited where possible. If trees proposed for inclusion in an AWR project are selected from amongst the 13 largest trees per acre, then the RPF must identify, describe, and sufficiently justify the use of the trees prior to concurrence by the Review Team agencies.
- e) Trees that are unlikely to fall naturally into the channel in the near future, such as bankside, leaning trees.
- f) Trees that are not located within or adjacent to an unstable area, such as a streamside landside, streambank failure, inner gorge, etc., unless explained and justified by the project proponent.
- g) Trees that are part of a group or clonal group to minimize effects on streambank stability and promote stump sprouting.
- h) Trees that do not contribute significantly to stream shade where it is currently at or below WLPZ canopy retention standards.<sup>6</sup>
- i) Trees that do not provide significant habitat for terrestrial species (e.g., nest and den trees).
- j) Trees that can fall with minimum breakage.
- k) Trees that are minimum 1.5 to 2 times the bankfull width in height (WFPB 2013); or could be felled in a way that they can be wedged between existing trees or stumps and be more likely to remain in place and continue to function. LWM less than 1.5 times channel width is suitable if placed upstream of appropriately sized logs to form a log cluster.
- l) When selecting trees, consider the risks to known downstream infrastructure if felled trees move out of the project reach.

In general, trees selected for AWR should come from Class I watercourse riparian zones next to channels with gradients less than 3 percent, and bankfull channel widths less than 100 feet (VTAC 2012). In some situations where roads in riparian zones closely parallel and/or cross streams, downed logs may also be placed into the channel to augment wood loading using ground skidding equipment (Collins 2000, Figure 3). However, project proponents should carefully consider tradeoffs involved in removing downed logs from upland areas, as coarse woody debris is an important habitat feature for terrestrial species. The risk to downstream infrastructure (e.g., bridges, highways, homes, etc.) from trees felled into

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<sup>5</sup> Coast redwood and Douglas-fir are the primary species utilized for accelerated wood recruitment, with coast redwood being the most desirable due to its high resistance to decay (Carah *et al.* 2014).

<sup>6</sup> Importing non-riparian trees may be considered when riparian stocking is low; however, best management practices are to be implemented to protect wildlife and wildlife trees (Carah *et al.* 2014).

streams or logs placed in streams dislodging and floating downstream must be considered when proposing unanchored wood projects as part of Plans. In some cases, large wood structures may need to be engineered to keep the structure in place during high flows and not adversely impact downstream infrastructure.



*Figure 3. Ken Smith weaving large wood into a fish-bearing watercourse. Photo credit: David Wright, TNC.*

Once trees have been identified in the field and marked, an experienced tree faller should inspect them to ensure that they can be fallen while meeting the criteria listed above. Following this inspection, the proposed trees should be mapped relative to the Plan area. Once these steps have been completed, there is sufficient information to initiate preconsultation with CDFW as a (v)(2) project.

If trees near larger streams (e.g.,  $\geq$  4th order), are selected and felled that are not large enough in length, diameter, and weight to resist downstream movement, are not effectively anchored, or are not wedged by nearby trees or large stumps, the method may not meet the goals and objectives of the (v)(2) project (at least within the project area). The first known application of the AWR method in California was conducted in Parlin Creek, a tributary of the South Fork Noyo River, in 1996 (Collins 1999). Based on the Parlin Creek project, Collins (2011) suggested using unanchored wood with a minimum length of two times bankfull channel width. Similarly, Carah *et al.* (2014) reported that all placed logs with lengths greater than 1.5 times the bankfull width were retained within the project reaches during the sampling period, whereas logs that moved outside of the project reaches all had lengths less than 1.5 times the bankfull width. The authors suggest the treatment is best applied in smaller streams, particularly if retaining LWM in the project reach is a desirable outcome.<sup>7</sup>

Under certain site-specific conditions, it is possible to use trees with lengths less than 1.5 times the bankfull width. In an experimental AWR project associated with timber operations, Gualala Redwoods,

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<sup>7</sup> Smaller channels can be generally considered to have bankfull channel widths less than approximately 70 feet.

Inc. (GRI)<sup>8</sup> successfully retained LWM within the South Fork Gualala River (Figure 4). In this project, GRI directionally felled a large redwood tree between two standing trees. The fallen redwood tree remained despite being shorter than 1.5 times bankfull width and having weathered through several storm discharge events up to 28,500 cubic feet per second (cfs). However, there were two other trees further downstream which were directionally felled as part of this project that were mobilized during moderate-size storm events. Using the AWR method in larger stream channels or rivers should be carefully planned and implemented depending on the identified goals and objectives of the (v)(2) project. Unanchored wood projects in the Gualala River watershed have shown that (1) concentration of wood pieces appears to be more important for pool formation than individual pieces dispersed throughout a reach, and (2) the size of wood relative to channel cross-sectional area appears to be key for effective creation of wood-formed pools (Church 2012).



Figure 4. LWM recruitment project in the Gualala River watershed. Photo credit: Henry Alden (GRI-retired).

#### **Preconsultation with CDFW and Other Agencies**

According to 14 CCR § 916.9 [936.9, 956.9](v)(2), if a Plan submitter intends to carry out a (v)(2) project that includes measures that are limited in applicability to specific sites (i.e., site-specific, under a specific

<sup>8</sup> The current forestland owner is Gualala Redwood Timber, LLC.

intended Plan), the submitter may do so without completing an evaluation described under 14 CCR § 916.9 [936.9, 956.9](v)(3) by obtaining written concurrence from CDFW before submitting the Plan. Consultation with CDFW and possibly the other Review Team agencies<sup>9</sup> during preparation of a Plan and before Plan submittal (“preconsultation”) that is to include a (v)(2) project is strongly encouraged. Requests for preconsultation should be directed to CAL FIRE.<sup>10</sup> Preconsultation can identify potential issues of concern that may require revision in project design and allow CDFW to determine in advance whether it can provide written concurrence. The intent is to quickly identify potential barriers to project implementation to allow for a more efficient application of resources during the Plan review period.

Preconsultation with the responsible agencies will inform RPFs and landowners of additional considerations that should be addressed as part of the (v)(2) proposal and provide CDFW the opportunity to determine whether the (v)(2) proposal will adversely impact terrestrial wildlife habitat or riparian function prior to providing written concurrence. Reviews of (v)(2) proposals may be conducted by CDFW's Timberland Conservation Program staff, and when necessary, other CDFW staff with specific expertise deemed to be warranted.

An optional preconsultation form is included in the VTAC (2012) guidance document as Appendix B that can be used by RPFs if desired (both for (v)(2) and (v)(3) proposals). Preconsultation with any of the Review Team agencies will not produce formal agency plan approval, but this information will provide feedback to the RPF during the planning process and may produce written concurrence for a (v)(2) proposal. CAL FIRE will confirm Forest Practice Rule (FPR) conformance through evaluation of documentation included in the Plan and through the Review Team process.

A preconsultation begins with a request from the RPF to CAL FIRE to initiate the preconsultation. The information that the RPF provides can range from an informal, verbal discussion to a more formal written project description. In either case, information on the project description should:

- provide clear goals and objectives consistent with those set forth in 14 CCR § 916.9 [936.9, 956.9],
- identify the project “foot print”,
- discuss the beneficial functions of the riparian zone and stream at the project site,
- include a description of the current and after-project condition of the riparian zone related to the beneficial functions,
- include an account of potential project effects to the beneficial functions,
- provide a description of the site-specific measures to be employed,
- describe environmental impact avoidance and minimization measures, and
- discuss project timing.

The final product of the preconsultation is written documentation of the project as agreed to by the RPF, CAL FIRE, CDFW and any other responsible agencies.

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<sup>9</sup> Review Team agencies include California Department of Forestry and Fire Protection (CAL FIRE), California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Boards (RWQCBs), and California Geological Survey (CGS). Other agencies may also participate in plan review (e.g., California Department of Parks and Recreation).

<sup>10</sup> While the rules require written concurrence from CDFW for a (v)(2) proposal prior to plan submission, the preconsultation request should be made to CAL FIRE, who will then request staff from the responsible agencies.



### **What to Include in the Submitted Plan**

For a (v)(2) proposal including an Accelerated Wood Recruitment proposal that is part of a Plan in conformance with the other applicable standard California Forest Practice Rules in 14 CCR § 916.9 [936.9, 956.9], the following minimum elements are required:

- RPF preconsultation record with CDFW.
- Any environmental impact avoidance and/or minimization measures developed during the preconsultation with CDFW.
- Written concurrence by CDFW obtained prior to plan submittal.
- Map of the stream reach where the AWR project is proposed.
- An account of all trees proposed for AWR that have been marked in the AWR project site.

Additional information that can be included as part of a preconsultation and/or into the proposed Plan may include, but is not limited to:

- Fish species present during various times of the year.
- The Federal Clean Water Act Section 303(d) impairment(s).
- Any stream temperature data available for the stream reach proposed for treatment.
- Pool: Riffle: Flatwater ratios (see California Salmonid Stream Habitat Restoration Manual (DFG 2010) for level II and higher stream assessment levels, and more ideas for assessing existing stream conditions prior to submitting AWRs).
- Riparian conifer diameter distributions and stand age.
- Current instream wood volume amounts.

If a (v)(3) proposal is submitted for a larger scale or more complex large wood enhancement project, see Section VI in the VTAC (2012) guidance document for the requirements listed in 14 CCR § 916.9 [936.9, 956.9] (v)(3) that must be included in a Plan submitted to CAL FIRE.

### **Incentives for Conducting Voluntary Large Wood Restoration Projects**

Voluntary large wood restoration projects are typically conducted with funding assistance provided from various state and federal grants (e.g., CDFW's Fisheries Restoration Grant Program, NOAA-NMFS' Restoration Center, State Water Board 319(h) or Timber Regulation and Forest Restoration grants; Figure 5). These state and federal grants have not yet been utilized to support large wood restoration through the timber harvest planning process.

Additional funding assistance is now available through CAL FIRE's grant program known as the California Forest Improvement Program (CFIP). Cost-share assistance is provided to private and public ownerships containing 20 to 5,000 acres of forestland. Eligible landowners can apply for CFIP funds to conduct voluntary large wood restoration as part of a THP. However, the restoration activities cannot be mitigation that is required to reduce an impact of the timber operations proposed in a Plan to a level of less than significance. The landowner should work with CDFW during the preconsultation for the restoration activity and with CAL FIRE during the Plan review process to ensure that the restoration activity is accurately identified in the Plan as a voluntary restoration activity that is not being conducted to mitigate impacts of the timber operations proposed in the Plan.

Information about CFIP can be found on the internet at the following addresses:

[http://calfire.ca.gov/resource\\_mgt/resource\\_mgt\\_forestryassistance\\_cfip](http://calfire.ca.gov/resource_mgt/resource_mgt_forestryassistance_cfip)

[http://calfire.ca.gov/resource\\_mgt/downloads/CFIP/CFIP%20User's%20Guide%202017.pdf](http://calfire.ca.gov/resource_mgt/downloads/CFIP/CFIP%20User's%20Guide%202017.pdf).

In some circumstances, landowners may also be eligible for tax-based incentives for conducting large wood restoration projects. Landowners who are working with a 501(c)(3) non-profit environmental organization have the option of making a charitable donation in the form of woody materials (trees).



*Figure 5. Trout Unlimited staff reviewing an accelerated recruitment project in South Fork Ten Mile River. Photo Credit: Trout Unlimited.*

Landowners contributing trees towards a large woody material restoration project have claimed a charitable donation of \$400-\$500 per tree, based on conservative valuation of the trees at current market rate (Sungnome Madrone, Mattole Salmon Group, pers. comm.). Landowners interested in conducting large wood restoration projects should consult with a tax professional to determine whether the materials used can qualify as a charitable donation.

### **Frequently Asked Questions**

**1) *Is an Accelerated Wood Recruitment proposal conducted as part of timber operations considered mitigation or as a voluntary enhancement measure?***

It would typically be considered a voluntary enhancement measure.

**2) *If the opportunity arises to add more LWM to a watercourse under an AWR project than what was disclosed in the Plan, may I do so under the existing Plan or do I have to go through a separate process (amending the THP or NTMP)?***

If the riparian zone area to be used as a source of LWM is substantially enlarged or the number of trees from the area substantially increased, the Plan would have to be amended. Any change of operations within a WLPZ is presumptively a substantial deviation from the Plan and requires a major amendment to the Plan. However, the plan submitter of a THP or NTMP may propose to CAL FIRE that the presumptively substantial deviation be treated as a minor deviation. Effective preconsultation with the Review Team agencies will assist CAL FIRE in making this determination.

**3) What if over the course of the Plan, unforeseen circumstances arise that render the AWR proposal, or portions of it, infeasible?**

If the proposed area for using the AWR becomes infeasible, the proposed work can be dropped from the Plan with a minor amendment.

**4) What types of public funding assistance are available to landowners seeking to conduct voluntary AWR projects through the timber harvest planning process?**

Public funding assistance for AWR projects is currently limited, but under development. Funds from the Timber Regulation and Forest Restoration Fund (TRFRF) Program are being used to conduct AWR in watersheds of the Mendocino Coast through a grant with Trout Unlimited. Funds from CAL FIRE's California Forest Improvement Program (CFIP) for habitat improvement are available to support landowners who own at least 20 acres but less than 5,000 acres of nonindustrial private forestland in the state (see the section above for more detailed information on incentives).

**5) Can funds from AB 1492 (Timber Regulation and Forest Restoration Program) be used to pay for the value of timber that will be committed to the AWR proposal?**

Typically, grant funding covers the cost of planning and implementation of an AWR project, while the trees are used as match for cost sharing purposes.

**6) Will including an AWR proposal expedite the review of my Plan? Alternatively, will including it cause additional review/substantially lengthen the review process?**

Where the RPF has already received written concurrence from CDFW, the review period for Plans that include (v)(2) proposals should not be substantially affected by the inclusion of AWR. For (v)(3) proposals, the required evaluation specified in 14 CCR § 916.9 [936.9, 956.9](v)(3) can be completed before Plan submittal and incorporated into the Plan by reference, with the evaluation components appropriately scaled. The hope is that with more agency experience with these types of proposals, the review process will not be substantially lengthened.

**7) What if the LWM I introduce causes bank erosion or produces a temporary barrier to fish-migration? Will I be held responsible by the permitting agencies for unintended consequences associated with this type of restoration technique?**

Where the project has been implemented according to the approved permits/authorizations, the landowner will not be held responsible by the permitting agencies for unintended consequences to natural resources associated with a restoration project. However, the landowner may be subject to civil liability for property or other damage to third parties. Downstream properties and vulnerable infrastructure must be evaluated and necessary protection measures incorporated as part of any LWM restoration project to avoid private property damages and liabilities.

**8) Aside from the need to obtain CAL FIRE "approval" of the Plan under which the AWR activities would be conducted, would permits from other agencies be necessary?**

The effects of felling trees into a watercourse would likely be deemed "substantial" and subject to the notification requirements of Section 1600 *et seq.* of the Fish and Game Code. Notification

usually leads to CDFW development of a Lake or Streambed Alteration Agreement (LSAA). Incidental take permits or statements under the authorities of the California Endangered Species Act and/or the federal Endangered Species Act could be warranted depending on site-specific circumstances. Talking with local representatives of CDFW, NMFS and US Fish and Wildlife Service while preparing a Section V project would help determine whether incidental take authorization would be warranted. The US Army Corp of Engineers may authorize a project under Section 404 of the Clean Water Act through a nationwide permit. Finally, the appropriate (North Coast, Central Coast, San Francisco Bay) Regional Water Quality Control Board will authorize an AWR project through Waste Discharge Requirements (WDRs), Waiver of Waste Discharge Requirements, or a water quality certification.

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