

MEMORANDUM

From: Paul Lynn

Re: ECA-Based "No Measurable Effect" Finding in Tiger-Mill EA Hydrology Analysis

Date: April 1, 2026

Purpose

This memo identifies internally inconsistent agency reasoning and demonstrable misapplication of the cited scientific sources, establishing that the flood risk of the proposed actions under the Tiger-Mill project was acknowledged but never analyzed.

The Core Finding Under Challenge

1. The Hydrology Analysis correctly identifies a key hazard: flood risk. This is primarily characterized by **peak flow**:

“The relationship between created openings in forested landscapes and changes in water yield and **peak flows** has been documented by numerous studies (Stednick 1996). Changes in forested stand and canopy density caused by **harvest**, fire, or insect and disease can change the distribution of the snowpack, increase the rate of melt of the snowpack, and cause the timing of the melt to be earlier. **These factors may lead to changes in peakflows**. In addition, reduction of stocking density reduces the overall vegetative use of water, increasing the amount of water available for runoff. Changes in water yield and in **peak flows** have the potential to destabilize channels, causing increased erosion and sedimentation in channels. Changes in these parameters would be of concern for aquatic habitat and biota, downstream water users, and for channel morphology” (Hydrology Analysis, p. 1, my emphasis).

Then, the "Potentially Affected Environment" (pp. 7-9) section acknowledges:

- All four 100-year floods on the Mill Creek gauge record were caused by rain-on-snow events
- 37% of the project area lies in the rain-on-snow zone
- 1,500 acres proposed for commercial thinning are in the ROS zone
- The region is trending toward more rain-on-snow due to climate change¹
- The 2020 flood event produced 57 mapped debris flows and hillslope slides in the Upper Mill Creek subwatershed alone
- 85% of the project area has slopes greater than 35%²

2. The hydrologist then applies the ECA model to categorically exclude any site-specific analysis of peak flow amplification:

¹ Another rain-on-snow flood event this March, which washed out bridges and caused significant property damage directly downstream of the project area, highlights this increase in climate-driven rain-on-snow flood frequency.

² An additional data point: FOIA records I received from Region 6 indicate that more than 62% of the project area has **slopes exceeding 50%**. The scientific literature is clear that slope steepness is a significant modifier of peak flow response to canopy removal, as steeper slopes deliver water to channels faster, have lower soil water storage buffering capacity, and are more susceptible to the shallow rapid landslides that drive extreme flood events.

“Because ECA would remain below [20%] threshold values, no adverse changes to channel condition from silvicultural treatments are predicted because water yield and **peak flow** will not be affected, and morphological stream channel changes which could affect stream temperature would not occur” (Hydrology Analysis, p. 21). As I enumerate in the following section, none of the sources cited by the hydrologist support this claim.

The Analysis then goes on to conclude that there will be “**no measurable increase** in streamflow, temperature, or sediment” provided the Equivalent Clearcut Area percentage across affected subwatersheds remains below 20% during and after project implementation. This conclusion underwrites the FONSI. *It is the analytical load-bearing wall for the entire no-significant-impact determination on hydrology.*

3. The Hydrology Analysis includes summary data of WEPP model runs as a supplemental analysis of water and sediment yield. However, of the three scenarios that were modeled, none directly examine the effects of the logging. The model input parameter files received via FOIA request confirm that the WEPP runs did not model the effects of the proposed logging operation *at all*. Every hillslope across all seven watersheds was parameterized as *undisturbed forest* throughout.

The practical consequence is that the WEPP modeling provides no independent analytical support for the hydrology conclusions. The technical findings from that FOIA request are offered below to establish that the agency's hydrology work product, taken as a whole, places the entire analytical burden on the ECA threshold, which is the appropriate focus of this challenge.

4. The Analysis applies a threshold derived from *annual water yield* studies across diverse national terrain to conclude there will be no measurable effects to *peak flows* in a steep, rain-on-snow-dominated watershed with a documented extreme flood history. The hazard context is acknowledged in one section of the document and structurally excluded from the analysis in the next. The literature cited to justify this exclusion actually underscores the relevance of this hazard.

The Ninth Circuit has consistently held that an agency cannot acknowledge a significant hazard in one portion of an EA and then issue a FONSI based on analysis that does not engage with that hazard.³ The internal record here — the agency's own characterization of the affected environment versus the threshold-based dismissal of peak flow concerns — is exactly the kind of contradiction those cases address.

Why the Scientific Foundation Is Problematic

The 20% threshold derives primarily from Stednick (1996), with supporting citations to Ager and Clifton (2005), Grant et al. (2008), and Helvey and Fowler (1995). Each citation has a significant problem when examined against what the source actually says.

Stednick (1996) addresses annual water yield, not peak flows.

The study compiled 95 paired catchment studies evaluating effects of timber harvest on annual water yield — a bulk seasonal and annual accounting measure. It does not address peak flow magnitude, flood recurrence intervals, or rain-on-snow runoff dynamics. A watershed could show no detectable change in annual water yield while still experiencing significant amplification of peak flows during ROS events, because the additional water associated with canopy removal in a ROS zone is delivered rapidly during specific storm events rather than distributed across the annual

³ *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146 (9th Cir. 1998); *Klamath-Siskiyou Wildlands Center v. Boody*, 468 F.3d 549 (9th Cir. 2006).

water balance. Stednick's methodology, by design, would not capture this effect, and his study makes no claim to do so.

Annual water yield and peak flow response to rain-on-snow events are categorically different hydrologic phenomena requiring different analytical frameworks. The EA applies one to answer questions that can only be addressed by the other.

The finding that changes below 20% harvest could not be detected was a statement about measurement detectability, not physical absence of effect. The distinction is critical: Stednick was reporting the resolution limits of hydrometric methods applied to annual water balance studies, not establishing that hydrologic changes do not occur below 20% disturbance. The hydrology analysis converts a detection threshold into a physical threshold, which the source does not support.

The threshold of harvested area below which changes were not detectable ranged from 15% in the Rocky Mountain area to 50% in the Central Plains, reflecting that hydrologic responsiveness is highly region- and climate-specific. The 15% Rocky Mountain threshold, which Stednick found sufficient to produce detectable annual water yield changes, is arguably more appropriate than the 20% figure the analysis applies to a steep, rain-on-snow-dominated watershed with documented extreme flood behavior, but even that choice does not resolve the peak flow applicability problem. The analysis does not acknowledge this regional uncertainty at all.

The ECA model (Ager and Clifton 2005) is explicitly not a peak flow model.

The cited paper states that the ECA model “is not directly predictive of increased peak flows or impacts to streams” and that a “consistent relationship between the ECA statistic and hydrologic variables (peak flows and water yields) has not been established” (Ager and Clifton 2005, p. 6).

It goes on to specifically address that “the original ECA method was developed in north Idaho and Montana where spring snowmelt runoff is the dominant mechanism generating streamflow. In areas like the Blue Mountains of eastern Oregon, streamflow is generated from multiple hydrologic processes including spring snowmelt and winter **rain on snow**. ... Using one ECA threshold (15 percent) ... ignores the variability among subwatersheds” (Ager and Clifton 2005, p. 6, my emphasis).

Ager and Clifton describe their model as providing “an index of vegetative disturbance” for comparing management alternatives and triggering further review. They explicitly acknowledge “many limitations.” The EA uses this disturbance index — a comparative screening tool — as the basis for a definitive no-effects determination at the FONSI level. This inverts the tool's intended function. An index designed to flag when more analysis may be needed cannot logically be used to conclude that no further analysis is needed, especially when it explicitly declares that it does not address the subject of said analysis.

Grant et al. (2008) does not support the conclusion drawn from it.

Grant et al. 2008 is specifically a state-of-science report on peak flows in western Oregon and Washington, precisely the Pacific Northwest rain-on-snow context relevant here. The report synthesized data across rain-, transient-, and snow-dominated hydrologic zones. It found that increases in peak flows generally diminish with decreasing intensity of percent watershed harvested and lengthening recurrence intervals of flow.

The EA characterizes Grant et al. (2008) as supporting the proposition that peak flow increases occur only above 20% ECA, stating that “increased peakflows could occur at >20% ECA.” However, the literature cannot be interpreted as establishing a threshold below which effects are zero. More

critically, the report explicitly demonstrates that peak flow responses to harvest are detectable at lower disturbance levels in rain-dominated and transient zones—such as the rain-on-snow zone that generated all four of the documented Mill Creek 100-year floods. The hydrologist's one-sentence summary of Grant et al. 2008 omits its treatment of the transient zone entirely.

Helvey and Fowler (1995) is cited in an inverted manner.

The Helvey and Fowler 1995 barometer watershed study was conducted on the Umatilla National Forest, apparently giving it direct site-specific relevance. The analysis states that "in a local study, effects were not seen below 50% ECA (Helvey and Fowler 1995)." This is offered as if it is reassuring — implying that the local threshold is even higher than the general 20% threshold. But the local study found effects only above 50% ECA because the measurement methods had limited statistical power to detect changes at lower thresholds — not because changes below 50% don't occur.

A study finding that detectable effects required 50% ECA does not mean there are no hydrologic effects below 50%; it means effects below that level couldn't be distinguished from background variability in small catchments using that study's methods. The analysis treats detection limits as physical limits, which is not scientifically valid, especially in the context of the sensitivity of unfiltered drinking water to minute changes in water quality.

Conclusion

In sum, the Tiger-Mill Hydrology Analysis explicitly acknowledges that the proposed actions may increase the risk and severity of floods and flood-driven debris flows, especially those caused by rain-on-snow events in the transient zone, in a watershed with documented frequent extreme flood history, and that these risks are likely to be compounded with climate change, yet none of the scientific rationale cited or modeling used ever actually quantified or analyzed these risks at all. This is a glaring oversight that undermines the validity of the Finding of No Significant Impact and obviates a significance determination that statutorily compels a full Environmental Impact Statement.

Appendix 1: Additional Related Internal Contradictions in the Hydrology Analysis

The following quotations examine each of the key instances in the Hydrology Analysis that supposedly address peak flow hazards. These are included here to help frame the context of the Hydrology Analysis overall, and demonstrate that the failure to analyze peak flow effects was systematic, not limited to a single instance or subset of instances.

Claim: "There would be no measurable increase in water temperature, streamflow, or sediment from this project which could degrade downstream beneficial uses when the prescribed water quality Project Design Criteria (PDCs) [in addition to PDCs prescribed by the soil scientist and fisheries biologist] are implemented, monitored, and adjusted (if needed)." (Hydrology Analysis, p. 6)

- This is the operative claim that flows directly into the FONSI, and it has a structural problem that is independent of the modeling disputes above: the no-effects determination is conditionally contingent on PDC implementation, monitoring, and adjustment — and that contingency undermines its legal function.
- The relevant PDCs specify a one-time post-harvest visual inspection of surface soil erosion by the sale administrator, who may then recommend placing additional slash below timber

units to slow runoff. Beyond that, there is no water quality monitoring of logging activities included anywhere in the Tiger-Mill Project.

- The claim precludes any consideration of sedimentation and peak flow amplification due to mass movement caused by rain-on-snow flood-driven debris flows, despite the Analysis' own documentation of this specific, localized risk.
- The claim that effects can be "adjusted (if needed)" not only presupposes that monitoring will occur, but that it will also detect the effects with the relevant drinking-water quality thresholds and in time to allow adaptive management before downstream beneficial uses are degraded. This is especially problematic in the context of unfiltered municipal drinking water. A >5 NTU turbidity event caused by a storm-triggered debris flow does not wait for a monitoring response.

Claim: "Based on the assumptions of the ECA model and the literature cited, the proposed thinning and fuels treatments would not have a measurable effect to hydrologic functions (capture, storage, and release of water) in the any of the subwatersheds when combined with past actions, based on modelling and implementation assumptions." (Hydrology Analysis, p. 20)

- This claim is self-defeating: by qualifying the no-effects finding with "based on modelling and implementation assumptions," the analysis acknowledges the conclusion is contingent on assumptions holding true — not a finding that effects will not occur, but that the model does not predict them under its own premises.
- The ECA model (Ager & Clifton 2005) does not simulate runoff routing, subsurface lateral flow, rain-on-snow dynamics, or flood frequency. Using it to make a no-effects determination about hydrologic capture, storage, and release on a watershed with a documented 100-year flood history is a misapplication of the tool's stated purpose.
- "Hydrologic functions" encompass peak flow generation and mass movement — the dominant processes driving measurable hydrologic change in this watershed — neither of which the ECA model or the accompanying WEPP runs are capable of assessing. The analysis cannot conclude there will be no measurable effect on hydrologic function when it has not modeled the functions most likely to be affected.
- The claim refers to "subwatersheds" as the unit of analysis, but the relevant scale for peak flow amplification and debris flow initiation is the individual treatment unit on steep slopes in the ROS zone — not the HUC12 subwatershed average. Averaging disturbance across large subwatersheds mathematically dilutes localized intensity, allowing a 70% basal area reduction on 1,500 ROS-zone acres to appear negligible when expressed as a subwatershed-scale ECA percentage. The analysis does not acknowledge this scale mismatch.

Claim: "Because ECA would remain below threshold values, no adverse changes to channel condition from silvicultural treatments are predicted because water yield and peak flow will not be affected, and morphological stream channel changes which could affect stream temperature would not occur." (Hydrology Analysis, p. 21)

- This claim contains a chain of three linked propositions: (a) ECA remains below threshold; therefore (b) water yield and peak flow are unaffected; therefore (c) channel morphology will not change; therefore (d) stream temperature will not be affected. Each link in that chain has problems, and the problems compound.
- (a) The assumption that ECA will remain below threshold relies on mathematical dilution of individual treatments across multiple HUC12 watersheds, a form of statistical gerrymandering.
- As established in the previous analysis, the ECA model does not assess peak flow, and Stednick's detectability threshold applies to annual water yield, not peak flow in rain-on-snow terrain.

Claim: "Harvest, thinning and prescribed burning would produce lower short- and long-term

sedimentation rates than a higher severity wildfire based on WEPP model runs and assumed background levels.” (Hydrology Analysis, p. 18)

- Claiming that harvest would produce *lower* sedimentation rates than fire acknowledges that it would, in fact, affect sedimentation.
- The sedimentation effects of harvest, thinning and prescribed burning were not modeled. None of the WEPP modeling scenarios examine the effects of these activities.
- Claiming that the effects of the proposed activities would be less severe than a hypothetical disaster does not preclude the need to examine those effects under the “hard look” NEPA statutory standard.

Appendix 2: Technical Findings from WEPP Model Input File Review

The following verified technical findings were derived from direct examination of the WEPP model input files produced in response to FOIA Case No. 2026-FS-R6-02897-F. While these results may or may not be especially relevant, they provide important context and verification that WEPP modeling has no bearing on the Hydrology Analysis claims of no measurable effect.

Finding 1: No post-logging, pre-fire scenario was modeled.

This merely confirms what is apparent in the results summary included in the Hydrology Analysis. The three scenarios present are: Undisturbed (existing condition), PostTrtFire (logged watershed subjected to fire), and CurrentFire (unlogged watershed subjected to fire). There is no scenario representing the watershed condition after logging but before any fire event. The hydrological effects of the logging operation itself — soil compaction, canopy removal, skid trail erosion, reduced infiltration, increased peak flows — are entirely absent from the model’s scope.

Finding 2: No logging-disturbance land use was applied to any hillslope in any scenario.

The five logging-specific *luse* categories recognized by the model’s own lookup table — *skid, high use skid, low or treated skid, thinning*, and *young forest* — appear nowhere in the actual model inputs. Every hillslope across all seven watersheds and all three scenario types was assigned exclusively to management files from the *UnDisturbed/* library. The lookup table entries for the logging categories were never invoked.

Finding 3: The PostTrtFire scenario encodes logging solely as fire-severity reduction, not as physical disturbance.

For Tiger Creek, for example, 177 of 203 hillslopes in the PostTrtFire (post-treatment fire) scenario are assigned *UnDisturbed/Old_Forest.man* (pristine closed-canopy mature forest: 90% interrill cover, 100% ground cover), and only 2 of 203 hillslopes receive any fire-severity class at all. The scenario is thus functionally equivalent to the Undisturbed baseline on 99% of the watershed. For all modeled watersheds, PostTrtFire uses the same *UnDisturbed/* fire-severity management files as the CurrentFire scenario, just with a different fire-severity distribution — no logging parameters in any case.

In summary, this is not a methodological gap at the margins; it is a gap at the center of the analysis. An agency cannot satisfy NEPA’s hard-look requirement by modeling fire effects on a treated versus untreated landscape while omitting the effects of the treatment itself.