August 2, 2021

Jennifer Eberlien, Regional Forester
USDA Forest Service, PSW Region 5
1323 Club Drive
Vallejo, CA 94592

sent via electronic mail to:

Dear Regional Forester Eberlien:

At our July 14 meeting with the Regional Forester and Region 5 (R5) Leadership, we had the opportunity to discuss recent developments in reforestation planning underway at state and federal levels. Specifically, we understand the California Forest Management Task Force (FMTF) has assembled a Reforestation Work Group to develop a joint CA-USFS Reforestation Strategy, and that the Sierra National Forest will be piloting novel reforestation practices as part of their 2021 Creek Fire Recovery actions. At our meeting, we presented recommendations for current best science on forest restoration that we strongly feel must be incorporated into on-going reforestation strategies and practices. This letter expands upon the information we provided at our meeting. The science publications and reports we reference have been developed by Forest Service ecologists, research scientists, and management practitioners with expertise in reforestation strategies and practices, who have contributed to recently published science and reports on forest restoration, and whom we urge you to include in future FMTF Reforestation Work Group meetings. We strongly encourage you to support collaborative integration of the talented staff and researchers guided by the Principles in PSW-GTR-270. As Region 5 and California work towards a joint Reforestation Strategy, we provide the following specific recommendations.

Summary Recommendations:

• Adopt GTR-270 and "*Reforestation for Resilience"* as the guidance for restoring post-disturbance landscapes in Region 5.

> Identify and prioritize areas for post-disturbance restoration following the framework outlined in GTR-270. Then PLANT LIKE FIRE MATTERS, by designing replanted

areas guided by the concepts and recommendations found in North et al (2019),[1] hereafter, *Reforestation for Resilience*, whereby future forests are established through processes that consider a variety of conditions—including micro-site and microclimatic conditions, as well as climate change—and by incorporating early and repeated application of fire to manage replanted areas. Avoid reforestation in ways that discourage or prevent use of prescribed or managed fire, i.e., in ways that would dictate full suppression of future fire in and around replanted areas (see attached slides from 2019 presentation by M. North to CA Fire MOU group summarizing these concepts).

• Use the framework in these documents as the collaborative model for post-disturbance restoration in all recent fires and those to come.

• Monitor novel reforestation approaches to ascertain and adaptively manage outcomes.

• Bring together both Region 5 Ecology Group scientists and forest silviculturists to continue dialogue about practical aspects of planting for reforestation. Along with GTR-270 and *Restoration for Resilience*, anecdotal post-fire information and stories can increase our understanding about where, why, and how to design and implement post-disturbance replanted stands.

• Utilize fire as the primary restoration tool on steep ground in post-disturbance areas (e.g., Creek Fire and elsewhere) in the Sierra Nevada. Do this collaboratively with CAL FIRE wherever possible.

• Expand the communication and outreach efforts to help policy makers and communities understand that NO FIRE is NOT AN OPTION in California and adopt a "Living with Fire" communication strategy.

Recalibrating Our Approach to Post-Fire Reforestation

In the past, post-disturbance reforestation has focused on reestablishing timber volume as quickly as possible, which has led to plantation structures that re-establish unsustainable hazardous fire and fuel profiles. Managers must focus on reestablishing ecological integrity of the post-fire environment. The framework for how to recalibrate reforestation strategies and practices in ways that take a more holistic approach to reforestation, including anticipating the incorporation of fire, are provided in two recent publications, *Reforestation for resilience in dry western U.S. forests* (North et al. 2019), and *Postfire Restoration Framework for National Forests in California* (PSW-GTR-270, 2021 (GTR-270)).[2]

[1] North et al. 2019. Tamm Review: Reforestation for resilience in dry western U.S. forests. *Forest Ecology and Management.* 432: 209-224.

[2] Meyer, M.D., Long, J.W., and Safford, H.D., eds. 2021. *Postfire Restoration Framework for National Forests in California*. Gen. Tech. Rep. PSW-GTR-270. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 204 p.

Together, GTR-270 and *Reforestation for Resilience* provide foundational information for a reforestation strategy that can guide where and when to reforest (GTR-270) and provide alternative designs and rationale for how to replant disturbed areas (North et al. 2019). Both recognize that the current climate era and best available science related to fire regimes and fire frequency in much of California point to the need for a serious and detailed recalibration of plans and strategies to maintain forested landscapes that not only survive disturbances but accept fire as a positive intervention to build resilience and to stabilize forest carbon. As development of a joint CA/USFS Reforestation Strategy begins, it is imperative these sources of information, each based on interdisciplinary, science-based recommendations of leaders in their fields, are not dismissed or ignored but rather are taken as centerpieces of a reforestation framework.

As a practical example of how reforestation decision-making processes and planting designs found in GTR-270 and Reforestation for Resilience can be considered and implemented collaboratively, we point to the Dinkey Collaborative Forest Landscape Restoration Project's Restoration *Framework* (2017), as a starting point for discussion. The goals and objectives of Dinkey's framework are most relevant to its specific place and landscape history (the Sierra NF's 1994 Big Creek Fire area subsequently beset by extensive pine-beetle mortality), and while there is room to improve planting grid design and stocking densities as per *Reforestation for Resilience* recommendations, the Dinkey framework generally follows principles presented in GTR-270 by establishing short and long-term restoration objectives based on the goal of recovering ecological integrity, by acknowledging alternatives to traditional reforestation practices—especially reduced stocking densities and cluster planting techniques that favor ICO (individuals, clumps, openings) forest structure, strategically identifying areas of higher water holding capacity, by recognizing that new practices will require monitoring to assess outcomes and adaptive management to respond to findings, and by planning for early and repeated application of prescribed fire to prepare and maintain post-disturbance replanted areas. What is more, this framework was developed through a joint effort between the USFS (Sierra NF) and stakeholder groups participating in the Dinkey Collaborative and informed by both forest researchers and silvicultural lessons learned from post-fire restoration actions that followed the 1994 Big Creek Fire.

The Dinkey *Restoration Framework* is intended to guide future Dinkey CFLRP reforestation activities once a reforestation area is determined (e.g., following a reforestation area decision-making process much like that outlined in GTR-270). The Dinkey framework offers a starting point where alternative reforestation practices are at least acknowledged within a decision-support document whose objectives point to the ecological integrity of the landscape.

Both the Task Force Reforestation Strategy and the Sierra NF's 2021 pilot reforestation actions represent important and immediate opportunities to reinforce the implementation of concepts and recommendations we present below. The Dinkey *Restoration Framework*, while imperfect, can serve as proof of concept that new approaches can be collaboratively developed by integrating both best science and decades of management expertise. We expect even clearer direction from Region 5 leadership and the FMTF to ensure that our best science and the principle of recovering forest ecological integrity guide our reforestation strategy.

To underscore the value and wisdom of taking heed of best science to help inform forest management, we offer below a historical perspective on the development of use of best available science that has informed past management change, and highlight the benefits of fully engaging the ecological workforce in Region 5 and the PSW Research workforce who together have co-authored the majority of outstanding research on the need for change in management direction over the past thirty years on Forest Service managed landscapes in Region 5.

How Science has Changed Forest Management for the Better: A Historical Perspective

1990's Forest Service science and management

In the early 1990's Forest Service leadership and the PSW Research Branch engaged in extensive and deliberate discussion and formulation of efforts to protect and conserve existing habitat for the California spotted owl. This strategy (PSW-GTR-133, 1992)[3] was not a hands-off reserve effort but instead called out immediate protection for older trees >30" d.b.h, thinning from below, and the expanded use of fire for restoration on Sierra Nevada National Forests (GTR-133, Chapter 12 p. 247, Weatherspoon, Husari, van Wagtendonk) and the need "to align more closely with natural fire regimes and season on burns").

In 1996 the UC Center for Water and Wildland Resources published The Sierra Nevada Ecosystem Project Report (SNEP, 1996)[4] which was, and remains, a scientific benchmark effort for its rigor in assessing historical and (then) current Sierra Nevada ecosystem conditions and providing recommendations. The sections on fire regime, fire suppression, fire trends, and climate change impacting the Sierra Nevada were the first extensive and comprehensive ecological accounting of the 20,663,930-core area.[5]

The SNEP Report was very much a catalyst in terms of the capturing the science, but it was also a catalyst in bringing people together in a 3-year process of topic area meetings and extensive discussion in each topic area of the report. Permanent relationships were built, management change increased (the 2001 Sierra Nevada Forest Plan Amendment affecting 12 million acres of national forest lands) and the understanding of fire's ecological role in shaping the landscapes of the Sierra Nevada among the public, policy maker and land manager increased by orders of

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[3] Verner, Jared; McKelvey, Kevin S.; Noon, Barry R.; Gutierrez, R. J.; Gould, Gordon I. Jr.; Beck, Thomas W., Technical Coordinators. 1992. *The California Spotted Owl: A Technical Assessment of its Current Status.* Gen. Tech. Rep. PSW-GTR-133. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 285 p.

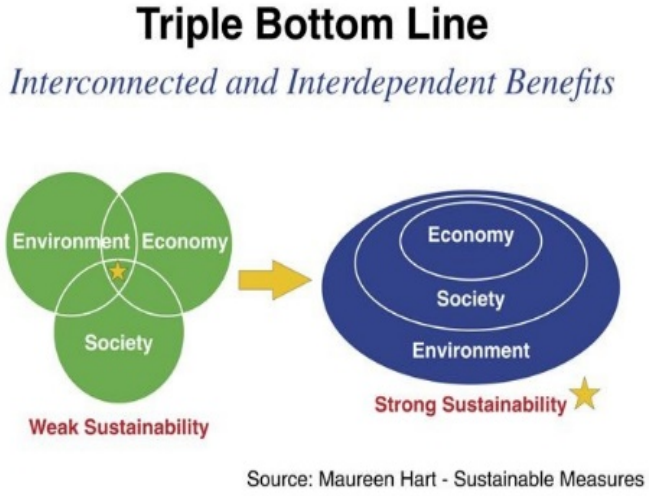
[4] Sierra Nevada Ecosystem Project. 1996. *Sierra Nevada Ecosystem Project, Final Report to Congress*. Centers for Water and Wildland Resources, Report No. 36, University of California, Davis, California. Cooperative report of the PSW Research Station, PSW Region, USDA, for the Sierra Nevada Framework Project, Sacramento, CA.

[5] See especially SNEP Volume II, Section IV, Chapters (37-44) and references, where; Chapter 37-An overview of Fire in the Sierra Nevada. Chapter 38--Fire Regimes Past and Present. Chapter 39—Ecosystem Responses to Fire and Variations in Fire Regime. Chapter 40—Fire Management Policies and Programs. Chapter 41-Twentieth-Century Fire Patterns on Forest Service Lands. Chapter 42—Fire Frequency Analysis of Sierra Forests. Chapter 43—Use of a Deterministic Fire Growth Model to Test Fuel Treatments. Chapter 44—Fire-Silviculture Relationships in Sierra Forests.

magnitude. While the Bush Administration undermined that decision, the science supporting expanded fire use and ecological thinning will never be undermined.

2010 National Report on Sustainable Forests: Strong Sustainability and the new scientific realignment of the Forest Service policy position in support of ecological integrity.

Forest Service Chief Tom Tidwell, in 2010, established the current Forest Service position regarding the concept of "Strong Sustainability"— "the entire economy is reliant on society which is reliant in the environment."



The 2012 Forest Planning Rule: Current requirements and how science should inform management.

The 2012 Forest Planning Rule[6] states:

> *The final rule requires that the best available scientific information be used to inform all phases of the planning process* (77 Fed. Reg. 68 (April 9, 2012), p. 21201).

Further, the rule defines sustainably and relates it to the restoration of fire:

> § 219.8 Sustainability.
>
> *A plan developed or revised under this part must provide for social, economic, and ecological sustainability within Forest Service authority and consistent with the inherent capability of the plan area, as follows:*
>
> *(a) Ecological sustainability.*

[6] 2012 Forest Planning Rule. U.S. Department of Agriculture, Forest Service. 2012. National Forest System Land Management Planning. 36 CFR Part 219. Federal Register 77(68):21162-21276.

(1) Ecosystem Integrity. The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore structure, function, composition, and connectivity, taking into account:

(i) Interdependence of terrestrial and aquatic ecosystems in the plan area.

(ii) Contributions of the plan area to ecological conditions within the broader landscape influenced by the plan area.

(iii) Conditions in the broader landscape that may influence the sustainability of resources and ecosystems within the plan area.

*(iv) System drivers, **including dominant ecological processes, disturbance regimes**, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.*

*(v) **Wildland fire and opportunities to restore fire adapted ecosystems**.*

(vi) Opportunities for landscape scale restoration.
(36 CFR 219.8)

Absent an expanded fire restoration program and the professional workforce to conduct ecologically relevant scales of fire restoration, ecological integrity objectives cannot be met in California or the West in general.

When the Forest Service creates objectives in something as profound as the 2012 Planning Rule and then fails to build out a program that meets those objectives it not only violates the intent of the Rule but erodes the trust and collaborative support for the work on the ground. As shown above in the Forest Service's own model for Strong Sustainability, the environmental realm is the foundation of strong sustainability. Relying on outdated ideas of landscape level vegetation uniformity (plantation forestry) in our naturally fire-associated landscapes of California flies in the face of the best available science and fosters increased efforts of fire suppression—nothing could be more counter-productive to landscape resilience, ecological integrity, biodiversity enhancement or carbon stability—in other words, Strong Sustainability.

<u>The 2021 Biden Administration's support for use of the Best Available Science as the foundation for actions by federal agencies.</u>

On January 27, 2021, President Biden issued a Presidential Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking (2021 Memorandum).[7] The Memorandum asserts the Administration's goal to develop sound policy to make evidence-based decisions guided by the **best available science and data, recognizing that**

[7] 2021 Presidential Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking. Federal Register 86 (26): 8845-8851.

scientific and technological information, data, and evidence are central to the development and iterative improvement of sound policies and to the delivery of equitable programs across every area of government. It emphasizes that political interference in the work of Federal scientists and other scientists who support the work of the Federal government and in the communication of scientific facts undermines the welfare of the Nation, contributes to systemic inequities and injustices, and violates the trust that the public places in government to best serve its collective interests.

Through the lens of science-informed shifts in forest management, the Postfire Restoration Framework for National Forests in California PSW-GTR-270 and *Reforestation for Resilience* are the best available scientific information today on the topic of reforestation in situations that are departed from reference or desired conditions based on natural range of variation (NRV) and projected changes in climate.

Recalibrating Forest Service Reforestation Culture

It is clear to us that the struggle to implement needed changes to increase fire restoration and ecological reforestation strategies are not due to a lack of sound science. It has much more to do with the role of science in informing Forest Service culture. Science tells us what to do or change, the land managers role is to implement the changes in the best manner possible. While this concept is not new, it is one that bears repeating. For example, as recommended in An Ecological Basis for Ecosystem Management (1994)[8]:

> *"Ecosystem management involves a shift in focus from sustaining production of goods and services to sustaining the viability of ecological, social, and economic systems now and into the future…by bringing ecosystem capabilities and social and economic needs into closer alignment"*

The strategies discussed in *Reforestation for Resilience* and PSW-GTR-270 take fire and climate change seriously but also assert the ecological and cultural need for active reforestation, especially where natural regeneration is unlikely. So, applying the new framework does not mean we abandon the Forest Service's role in timber production, but it does mean that we stop forcing uncharacteristic, unsustainable, and misguided ideas such as treating the Forest Service public lands like crop lands and creating large-scale plantations which attempt to force nature to conform to market-based, demand-driven decisions that override science and common sense.

A cautionary example of what we risk by maintaining the current, dominant reforestation practices can be found within the Cleveland Fire footprint. In September 1992, the Cleveland Fire consumed roughly 22,000 acres of Forest Service (Eldorado NF) and industrial timberland

[8] Kaufmann, M. R.; Graham, R. T.; Boyce, D. A., Jr.; Moir, W. H.; Perry, L.; Reynolds, R. T.; Bassett, R. L.; Mehlhop, P.; Edminster, C. B.; Block, W. M.; Corn, P. S. 1994. *An Ecological Basis for Ecosystem Management*. Gen. Tech. Rep. RM-GTR-246. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 22 p.

plantations. Areas within the Cleveland Fire footprint were replanted as before, and subsequently burned as before.

Examples of wildfire burns within 1992 Cleveland Fire's post-fire plantations. Left: St. Pauli Fire (2002), Right: Fred's Fire (2004), Eldorado NF

The Cleveland Fire plantations shown above demonstrate the myth of reliability associated with continuing reforestation at current planting designs and densities, and relying on a hope that there will be resources available to manage competing vegetation, implement precommercial thins, and that the plantations themselves do not burn up prior to commercial harvest. This scenario is repeated over and over again, with every fire and with increasing scale, as seen in all of the mega fires occuring in the last decade.

Recent research (North et al. 2019, Koontz et al 2020,[9] Kane et al. 2019,[10] North et al. 2021,[11] York et al. 2021,[12] and others) all point to the fact that in our frequent fire systems, a millenia of burning (Native American burning and lightning ignitions) generated a structural heterogeneity (variability in vertical and horizontal structure) that promotes forest resilence to disturbance, while uniformity (high planting densities, untreated or fire-excluded stands) decreases resilience to disturbance by promoting increased fire connectivity, drought risk, and bark beetle attack. We must acknowledge and incorporate these findings into our post-disturbance restoration

[9] Koontz et al. 2020. Local forest structure variability increases resilience to wildfire in dry western U.S. coniferous forests. *Ecology Letters* 23 (3): 483-494.

[10] Kane, V. et al. 2019. First-entry wildfires can create opening and tree clump patterns characteristic of resilient forests. *Forest Ecol. and Mgmt*. 454: 117659.

[11] North, M. et al. 2021. Pyrosilviculture needed for resilience of dry western United States forests. *J. of Forestry*. 2021, 1-11. doi:10.1093/jofore/fvab026.

[12] York, R.A., H. Noble, L. Quinn-Davidson, and J.J. Battles. 2021. Pyrosilviculture: Combining prescribed fire with gap-based silviculture in mixed-conifer forests of the Sierra Nevada. *Can. J. For. Res.* 51: 1-11. dx.doi.org/10.1139/cjfr-2020-0337

interventions. In GTR-270, forest scientists and management practitioners provide us with a framework for how to identify and prioritize post-disturbance areas for reforestation using recovery of ecological integrity as a driving principle.

Key elements from PSW-GTR-270:

- A management framework focused on restoring post-fire landscapes where wildfires have resulted in conditions outside the NRV has been lacking for national forest lands in the United States.
- Such a framework is critical, especially in the Western United States, as climate warming accelerates, human populations grow, and the area of ecosystems burned by uncharacteristically severe wildfires increases (Westerling et al. 2006).
- The framework is rooted in ecological restoration principles designed to enhance or recover ecological integrity and is guided by legislation and agency policy and direction.
- This framework is focused on medium-and-long term post-fire management and is complementary to the BAER emergency recovery objectives.
- Post-disturbance interventions are justified as a means for addressing past or ongoing human impacts such as the lack of large trees due to logging, excessive fuels, and high tree densities due to long-term fire exclusion, and other factors.
- Adaptation to climate change.

Region 5 leadership can catalyze reforestation changes by helping to socialize a recalibration of reforestation strategies and practices. This can happen both by supporting the work of forest collaboratives driving changes in post-disturbance practices from the ground up, as well as by fostering a culture of integrating best science with management expertise within the Forest Service. We envision a change of perspective regarding reforestation, where we move away from an approach preoccupied with "planting trees in the ground" to one more circumspect that begins by asking, "how do we reestablish trees across the landscape?" These are similar ideas but are framed for consideration differently.

Thank you for fully considering these recommendations, and please let us know how we can help from here.

Sincerely,

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Attachments:

• Dr. Malcolm North's presentation to CA Fire MOU summarizing *Reforestation for Resilience*, 2019.
• Dinkey Reforestation Framework, 2017.

Cc: Liz Berger, Al Olson, Diana Craig, Jerry Bird