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GMP 'Coastal Ecosystem Corridor' Working Group

(Possible alternate working title for this alternative – *Preserving Biodiversity in the Face of Climate Change*)

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'Coastal Ecosystem' concept development for Muir Woods NM

The vision is that MUWO is restored to its messy, feral, untidy/un-manicured, primeval forest condition, where the fog-shrouded old growth forest is nurtured by unimpeded natural processes including natural flooding, fallen trees, canopy gaps and multi-layered canopy, fire, etc. Floodplain function and stream processes are restored and sustain improved conditions for coho salmon, steelhead and other aquatic life in Redwood Creek. Natural quiet and natural light and darkness predominate and sustain spotted owls, rare bats and other old growth forest inhabitants.

This alternative concept is grounded in the 1908 proclamation that established Muir Woods National Monument that called out "...the extraordinary scientific interest and importance because of the primeval character of the forest in which it is located, and the character, age and size of the trees." Restoration of natural processes will aid in preserving and re-establishing the primeval character of the forest. Muir Woods will also serve as a living laboratory for research into the long-range impacts of climate change on the watershed and the old growth forest, providing urgently needed direction for adaptive management and response to future changes.

Visitor Experience and Capacity

Muir Woods NM, one of America's most treasured places, serves as a source of inspiration for visitors. The experience is tailored to immerse visitors in the watershed, from the ocean at Muir Beach to the redwood canyons upstream, where the lives of salmon connect the ocean to the redwood forest. The visitor comes in intimate contact with all the qualities of the forest – the filtered light, the damp shroud of fog, the gurgling stream, the trill of the winter wren, the silver flash of salmon, and solitude – not just the majestic trees.

The message of Conservation is paramount. It links the past – the history of the conservation movement, the establishment and preservation of Muir Woods as a National Monument, the Civilian Conservation Corps era – with the present, highlighting the changes in thinking about conservation including recognition of the impacts of past practices and the need to restore ecological function. It explores the anticipated, yet unpredictable, future changes that will result from human-induced changes in the earth's climate, challenging the forest's, and our own, abilities to adapt. Interpretation is focused

on this evolution of conservation ethics through time. The Muir Woods experience (which begins when one decides to visit there) serves as an active agent of change, inspiring visitors to take action to preserve the places they cherish, to become more civically engaged.

A visit to Muir Woods begins with a commitment to change, to treading lightly on our planet. Visitation is reduced significantly from today's levels to reduce the potential for human impacts on fragile resources, and all visitors arrive on foot, bicycle or via quiet park shuttle buses that use alternative fuels and clean air technology. No tour buses are accommodated, in order to enhance the intimate feeling and solitude evoked by a quiet walk in the woods. Only basic amenities are provided – restrooms, shelter and water, and those are outside of the redwood forest. The experience is about minimizing the human footprint on the planet – reducing carbon emissions to reduce global warming, conserving water to sustain other forms of life, preserving quiet for the human psyche and lives of wildlife... Programs are developed to actively engage the public in the stewardship of Muir Woods including ecological restoration, monitoring of resource conditions, and research into the impacts of climate change on the redwood forest ecosystem and what potential actions might mitigate those impacts.

Visitor use levels are dictated by a reduction in carbon emissions of 80% below 1990 levels by 2050, beginning with a 20% reduction below 1990 levels by 2012. Slowing and stopping global warming is imperative if we hope to preserve Muir Woods for the future.

A significant reduction in visitor use (to moderate along the main trail and low everywhere else) affords opportunities to restore ecological function to the redwood forest ecosystem. All major infrastructure would be removed (except water and sewer systems, and essential small office or shop space preserved at the Muir Woods Inn location) within the monument boundaries, including Camino del Canyon, Conlon Avenue and the native plant nursery. The trail system would be redesigned to accommodate fewer visitors in a more intimate and appropriate setting. Redwood Creek Trail would be realigned and extend from the ocean to the redwood forest (and beyond?), highlighting watershed restoration and the connections between the ocean and the uplands. The primary trail within Muir Woods is relocated out of the floodplain, other trails and bridges may be removed, more sensitively located, or designed to be modular/flexible/adaptable to changing conditions as more natural processes are restored. Some trails may only be available seasonally. Paved surfaces would be removed, though the main trail would provide universal access to the heart of the woods. The design of any new infrastructure (trails, bridges, shuttle bus shelter) would be a reflection of the CCC era but would minimize impacts on the redwood forest ecosystem. Historic trails and CCC era structures would be utilized or preserved where appropriate. Seasonal viewing areas for salmon would be established while minimizing impacts to the stream and forest environment. Fallen trees would be left intact and trails relocated over or around the fallen giants. Visitor use and access would accommodate restoration of a naturally functioning ecosystem. Off trail travel would be prohibited in all areas of the Monument except for approved stewardship and research activities. Park leadership in

restoration, resource stewardship and climate change research would be key messages visitors take home with them.

Resource Stewardship

Natural processes, including floodplain function and stream processes would be restored along Redwood Creek. Woody debris would be actively added back into the system, rather than waiting for recruitment. Impediments to natural processes would be removed such as riprap revetments, grade control structures, bridges that confine stream-flow, major trails and stream crossing in the floodplain and tributaries. Prescribed fire would be used to mimic natural fire processes. Fallen trees would be left to decay in place and serve as nursery trees for recruitment of old growth forest species and as wildlife habitat. Salmonid fisheries and possibly amphibians (foothill yellow-legged frogs) would be restored and/or reintroduced. Invasive terrestrial and aquatic plants and animals would be aggressively controlled.

All parking lots would be removed (with the exception of a shuttle bus turnaround and handicap parking above the floodplain near the Muir Woods Inn) and floodplain function restored. Redwood forest and riparian habitat would be expanded onto the re-established floodplain.

A major program to control sediment sources in the watershed would be undertaken, including removal of the structures and the roads within Camino del Canyon, rehabilitation and restoration of the landscape, and an aggressive removal of associated invasive and escaped ornamental vegetation including the eucalyptus groves. Natural drainage patterns and tributary channels would be restored or reconstructed in Camino del Canyon and Conlon Avenue, as well as along upper Muir Woods Road. All of these actions would reduce the vulnerability of the watershed to climate change impacts by increasing its resiliency and ability to recover from extreme events including storms, landslides and flooding, or prolonged drought and wildfires.

Active stewardship programs would engage the public in hands-on ecological restoration of aquatic, riparian and upland habitats, as well as monitoring of T&E species (coho salmon, steelhead, spotted owls), stream-flow, water quality, and other resource conditions (e.g. natural sounds, land birds, amphibians, barred owls, bats, changes in stream channel morphology). A stewardship center, including native plant nursery, might be located in the lower Redwood Creek watershed at the Golden Gate Dairy, the Banducci site, or possibly on state park land (or at Green Gulch Farm?).

Climate Change Research

The park will collaborate with academic institutions and federal agencies engaged in climate change research to identify the greatest threats to the redwood ecosystem arising from climate change, develop a research strategy, and conduct climate change research that will provide direction for future management in these uncertain times. The park encourages establishment of a consortium like CIRMOUNT (The Consortium for

Integrated Climate Research in Western Mountains) to collaborate on climate change research needs in the region of California influenced by the Mediterranean climate (CIRMED?).

The park will promote the sensitive use of Muir Woods as a living laboratory. It is imperative that these research efforts be conducted throughout the range of the California redwood to better understand future climate change impacts. Research conducted in the near-term south of Muir Woods would be particularly valuable.

An inventory of the redwood canopy environment at Muir Woods is urgently needed as no canopy investigations have ever been conducted there. A whole canopy ecosystem could be lost before it is even described. Visitors would be able to experience and learn more about the redwood canopy and impacts of climate change on the canopy through a virtual tour created in concert with canopy research. A very preliminary list of research needs includes climate change impacts on seasonal changes in fog and fog drip and their moisture contributions to the redwood ecosystem, the impact of increasing temperatures on stream temperature, forest health and disease dynamics including tanbark oak and SOD, redwood recruitment and stand longevity.