

**DRAFT Natural Resource Impacts
Muir Woods National Monument GMP/EIS**

| IMPACT TOPIC | Current Conditions and Management | Alternative 1: Connecting People with the Parks | Alternative 2: Preserving and Enjoying Coastal Ecosystems | Alternative 3: Focusing on National Treasures – NPS Preferred |
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| Geologic Resources and Soils (including coastal resources and processes) | | <p align="center">Same summary conclusion as alt. 3</p> | <p>Range from negligible to moderate: Adverse impacts lessened (compared to alt. 3) due to lower amounts of new development and more controlled visitor use (compared to no-action); Beneficial impacts substantially greater due to more restoration</p> | <p>Add intro paragraph on effects based on management zoning</p> <p>The impacts to geologic resources and soils from the continued maintenance of existing facilities and structures under alternative 3 would be the less than the no-action alternative. The number of structures would be substantially reduced – resulting in long-term, minor, beneficial, localized impacts on geologic resources and soils. New recreational development (including a new welcome center at Highway 1; new recreational amenities near Bridge 4; new trails in the monument) would have long-term, minor, adverse, localized impacts on geologic resources and soils due to the permanent loss of soil function and integrity resulting from new development and increased erosion from facility construction and maintenance.</p> <p>Beneficial effects on geologic resources and soils would occur from the removal of facilities/structures and restoration of disturbed sites throughout the monument (such as the removal of the upper parking area; a number of structures in the Addition area; and targeted removal of rip rap along Redwood Creek) – a total of about 28 acres of built environment would be removed and restored to natural conditions. The impact of these activities would be long-term, moderate, beneficial, and localized. Short-term, minor, adverse impacts (such as increased erosion or compaction in adjacent areas) would occur during construction activities.</p> <p>Visitor access and use would continue to cause adverse impacts to geologic resources and soils due to the effects compaction and erosion. However, the impact would be less than under the no-action alternative because primary use areas and trails would be moved away from the creek (where soils may be more prone to compaction and erosion) and new boardwalks would be developed that reduce these impacts – a beneficial impact. The impacts to geologic resources and soils from visitor use under alternative 3 would be negligible.</p> <p>In general, expanded programming and enhanced opportunities for participatory science and stewardship in the monument would have a beneficial effect on geologic resources and soils due to increased public understanding and support for resource protection and management – the impact would be long-term, minor, beneficial, and monument-wide.</p> <p>Overall, the impact to geologic resources and soils from alternative 3 would be short- and long-term, range from negligible to moderate, be both adverse and beneficial, and be localized and monument-wide. Adverse impacts would occur from new recreational development and visitor use. Beneficial impacts would occur from the removal of facilities/structures and restoration of disturbed sites, creek restoration activities, and improved resource understanding and public support.</p> |
| | Upper and lower parking areas impact soil function and integrity | Restore soil resources from removal of upper parking area (about 1 acre) | Same as 1, plus majority of lower parking lot (about 1.75 acres total) | Same as 1 |
| | | Possible impacts from development of new welcome center at Hwy 101, minor due to urban built area | Same as 1 | Same as 1 |

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| | <p>Buildings are retained</p> <p>Rock revetment lines the creek hampering floodplain function.</p> | <p>Restoration of soil integrity and processes from removal of non-historic structures within main woods and relocation of trails</p> <p>In the Addition...maint. yard, nursery, and all other structures outside Camp Hillwood area would be removed and area restored</p> | <p>Built environment [all buildings except Muir Woods Inn (about 33 acres total including the Addition), parking lots, trails (about 2.75 miles), unneeded management roads] is removed, restoring soil integrity and function; long-term beneficial, but short-term adverse impacts</p> | <p>Same as 1</p> |
| | <p>Trails in floodplain that impact floodplain processes, hydrologic flow, barriers to wildlife crossing; displacement from humans, etc.</p> | <p>Permanent localized impacts on soil loss due to new facilities at Bridge 4</p> | <p>Visitor access and impacts throughout the park would be highly controlled and limited, benefiting protection of soil resources and limiting erosion</p> | <p>New trails developed with long-term soil impacts</p> |
| <p>Water-related Resources (including stream character, water quality, watershed processes, wetlands, and floodplains)</p> | | <p>Range from negligible to moderate: Adverse impacts lessened due to new development; Beneficial impacts greater than no-action and less than alt. 2 due to only targeted creek restoration and facility removal</p> | <p>Overall, the impact to water-related resources from alternative 3 would be short- and long-term, range from negligible to major, be both adverse and beneficial, and be localized and monument-wide. Adverse impacts would occur from new recreational development and visitor use. Beneficial impacts would occur from the removal of facilities/structures and restoration of disturbed sites, substantial creek restoration activities, and improved resource understanding and public support.</p> | <p>Same summary conclusion as alt. 1</p> |
| | <p>Upper and lower parking areas impact floodplain and hydrologic function and integrity; contribute pollutants to water quality, limit expansion of wetland</p> | <p>Removal of upper parking area and trails away from creek; restoring natural floodplain and sinuosity</p> <p>Improved water quality/temperature due to veg shading of stream</p> <p>Actions contribute to improved watershed processes</p> | <p>Same as 1, plus removal of majority of lower parking lot</p> | <p>Same as 1, plus changing of asphalt surface to something more pervious would improve water quality and groundwater retention</p> |
| | <p>Trails in floodplain that impact floodplain processes, hydrologic flow, barriers to wildlife crossing; displacement from humans, etc.</p> <p>Buildings are retained</p> <p>Rock revetment lines the creek hampering floodplain function.</p> | <p>Rock revetment lines the creek hampering floodplain function.</p> | <p>Rock revetment removal and full creek restoration (about 6,700 linear feet)</p> <p>Visitor access and impacts throughout the park would be highly controlled and limited, benefiting protection of habitat and limiting impacts to veg and wildlife</p> | <p>Targeted removal of rip rap to restore floodplain function and integrity</p> |
| | | <p>Possible contamination of water quality due to new restroom facility at Bridge 4; short-term siltation, erosion from construction; could reduce presence of human waste within woods, beneficial</p> <p>In the Addition, landscape and streams (about 0.5 mile) would be restored, improving function and integrity</p> | <p>Built environment (all buildings except Muir Woods Inn, parking lots, trails, unneeded management roads) is removed, restoring hydrologic integrity and floodplain function; long-term beneficial to stream character, water quality, floodplains, watershed processes, but short-term adverse impacts on water quality from erosion</p> <p>Flow and floodplain function would be restored by removing or re-designing bridges that constrain floodplain function</p> | <p>New trails developed with short and long-term impacts from erosion and loss of hydrologic connectivity</p> <p>Flow and floodplain function would be restored by relocation of bridges that constrain floodplain function</p> |
| <p>Air Quality / Carbon Footprint</p> | | | | |
| | <p>Retention of upper and lower parking areas maintains emission levels from driving and idling from personal autos</p> | <p>Shuttle reduces emissions from personal autos by reducing miles traveled by visitors, improving air quality at peak periods</p> | <p>Large reduction in emissions due to reliance on shuttle, bike, and drastic reduction in personal auto use</p> | <p>Shuttle reduces emissions from personal autos by reducing miles traveled by visitors, improving air quality at peak periods</p> |

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| | | Short-term impacts due to construction of new facilities (Bridge 4, parking, etc.) and restoration of the Addition | Short-term adverse impacts due to construction emissions associated with restoration and re-design of park entrance; long-term air quality improvement due to carbon footprint reduction | New trails developed with short-term impacts from construction |
| Vegetation and Wildlife (including plant communities, wildlife and wildlife habitat, and ecologically sensitive areas) | | | | |
| | Upper and lower parking areas result in perm loss of habitat, affect condition and quality of riparian areas | Removal of upper parking area from redwood footprint and restoration of native veg. Benefits to aquatic and terrestrial habitat from improved veg and shading of creek | Same as 1, plus removal of majority of lower parking lot | Same as 1 |
| | Food and snacks available inside monument, human-wildlife conflict and habituation behavior | Provision of food and snacks at welcome center reduces food-wildlife conflict; eliminates food concession within the monument, and reduces food brought into the park | Same as 1 | Same as 1 |
| | Trails in floodplain that impacts floodplain processes, hydrologic flow, barriers to wildlife crossing; displacement from humans, etc. Rock revetment lines the creek hampering floodplain function. Fire is used to manage and benefit redwood forest and exotic species, but on a small-scale without landscape level benefits Buildings are retained | Permanent localized impacts on veg. removal due to new facilities at Bridge 4, could reduce presence of human waste within woods Restoration of native habitat from removal of non-historic structures and potential removal of Muir Woods Inn In the Addition...maint. yard, nursery, and all other structures outside Camp Hillwood area would be removed and area restored, improving habitat on about 27 acres | Built environment (all buildings except Muir Woods Inn, parking lots, trails, unneeded management roads) is removed, restoring wildlife and riparian habitat; long-term beneficial, but short-term adverse impacts due to noise, displacement, etc. Vegetation condition would be improved by canopy openings and sunlight that would promote redwood regeneration | Same as 1 |
| | High levels of visitor use with focus in creek corridor | Same as No-action | Visitor access and impacts throughout the park would be highly controlled and limited, benefiting protection of habitat and limiting impacts to veg and wildlife | Visitor use is more distributed; New trails, and expanded visitor use, developed in areas that would impact veg and wildlife; loss of habitat, flushing and displacement, human conflict, etc. |
| Federal and State-listed Species (including Northern spotted owl, coho salmon, steelhead) | Possible ESA determination: <i>no effect; may affect, not likely to adversely affect; may affect, likely to adversely affect</i> | | | |

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| | Upper and lower parking areas impact floodplain and hydrologic function and integrity needed to support fish habitat; contribute pollutants to water quality | Removal of upper parking area and relocation of trails should provide benefits to fish and aquatic species; better spawning and rearing habitat, improved water quality, and shading of stream due to improved vegetation | Same as 1, plus removal of majority of lower parking lot | Same as 1 |
| | <p>Trails in floodplain that impacts floodplain processes, hydrologic flow, barriers to wildlife crossing; displacement from humans, etc.</p> <p>Buildings are retained</p> <p>Rock revetment lines the creek hampering floodplain function.</p> | <p>Possible short-term impacts (siltation, etc) from construction of new facilities at Bridge 4; could reduce human waste contact with Creek within the woods</p> <p>Long-term habitat improvements would result from restoration of Addition; short-term adverse impacts from construction/siltation, disturbance</p> | <p>Built environment (all buildings except Muir Woods Inn, parking lots, trails, unneeded management roads) is removed, restoring habitat integrity and function; long-term beneficial, but short-term adverse impacts due to erosion and displacement</p> <p>Woody debris is increased and provides better habitat structure/nutrients to coho and steelhead</p> <p>Visitor access and impacts throughout the park would be highly controlled and limited, benefiting protection of habitat and limiting impacts to veg and wildlife</p> | <p>Visitor use is more distributed and affects more acreage of potential owl nesting habitat; New trails, and expanded visitor use, developed in areas that would impact veg and wildlife; loss of habitat, flushing and displacement, human conflict, etc.</p> <p>Realignment of Old Muir Woods road reclaims some of the owl's mapped foraging habitat</p> |