

## **Northern Spotted Owl and Fuels Reduction Treatment Marin Wildfire Prevention Authority**

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May 2023

The Marin Wildfire Prevention Authority (MWPA) is funding vegetation treatment projects to prevent wildfires in Marin County. These projects include evacuation route enhancement, shaded and nonshaded fuel breaks, and other vegetation reduction projects. The projects are typically aligned with the perimeters of communities and are intended to both reduce wildfire intensity and provide firefighters an increased chance of stopping a wildfire. Treatment methods may include the use of hand and power tools, heavy equipment, prescribed burning, and livestock grazing. Project descriptions and descriptions of treatment activities are available in detail at MWPA's website. Northern spotted owls (*Strix occidentalis caurina*; NSO) are a federal and California State-listed threatened owl subspecies of spotted owl known to occur in Marin County that have potential to be affected by fuels reduction activities within their preferred habitat. NSO nest in forests, which may be targeted for fuels reduction treatments or adjacent to areas so targeted. Fuels reduction activities, such as vegetation removal, have the potential to disturb NSO during the breeding season when they are most sensitive. Because NSO often nest within or near residential areas of Marin County, a proactive approach utilizing protective measures where NSO are known to occur will be implemented by project managers to prevent impacts to individuals within and adjacent to fuels treatment areas. It should also be noted that NSO that continually utilize nest sites within or near residential areas implies that at a minimum those individual NSO tolerate some level of regular noise and human activity. Large-diameter tree removal is not generally prescribed as a fuels reduction method unless the tree is considered a hazard or if it is part of an invasive species removal effort. However, removal of smaller-diameter trees and undergrowth could still impact NSO through disturbance and foraging habitat modification if measures are not taken to avoid impacts during work activities.

This paper details the risks posed to NSO by fuels reduction treatments and MWPA's approach to reduce and avoid significant impacts to NSO during design and implementation of fuels reduction activities.

### **GENERAL APPROACH TO NORTHERN SPOTTED OWL PROTECTION**

MWPA staff continue to work with Consultants (Sequoia Ecological Consulting, Inc. and Panorama Environmental, Inc. [Consultants]) to review all proposed fuels reduction treatments for their potential to impact NSO. For each proposed project, Sequoia's raptor ecologists and biologists conduct analyses to determine NSO habitat and nesting activities using a desktop review of habitat suitability. This



analysis includes mapping historical nesting data using the California Natural Diversity Database (CNDDDB), which provides reliable information related to NSO nesting activities dating back to the 1960s (California Department of Fish and Wildlife [CDFW] 2021). NSO tend to be philopatric; that is, mating pairs nest in the same general locations year after year. Therefore, CNDDDB data is useful for determining habitat suitability and predicting nest locations from year to year. MWPA and Sequoia staff are also in conversation with staff at OneTam and Point Blue Conservation Science (Point Blue) who conduct annual surveys for the NSO populations across Marin County. This collaboration ensures that project biologists have up-to-date nesting activity mapped to inform project implementation going forward so project managers and contractors can avoid those areas during nesting season.

In addition, to ensure that the MWPA is adequately addressing NSO and other biological resource concerns, Sequoia reviewed local agency environmental documents and chose to model MWPA's approach after the best guidance applied in Marin County on this topic, encompassing measures developed by local water districts, Marin County Parks and Open Space District, and California State Parks. The design and implementation features incorporated into these and future MWPA projects include protective measures to ensure that all MWPA projects minimize impacts to NSO. This includes implementation of protection measures that aim to limit impacts to dusky-footed woodrats (*Neotoma fuscipes*; DFW), the primary prey source for NSO within Marin County. Additional protection measures suggested by MWPA's Environmentally Sound Practices (ESP) committee are also being considered, although the measures are still in review as of publication of this document. The discussion below explains some background on NSO ecology and threats, an overview of protective features MWPA has incorporated into project design and implementation, and some of the ways these features protect NSO.

## **NORTHERN SPOTTED OWL PHYLOGENY**

The NSO is one of three subspecies of the spotted owl (*Strix occidentalis*), and ranges from southwest British Columbia down through Marin County, California. The other two subspecies are the California spotted owl (*S. occidentalis occidentalis*) and the Mexican spotted owl (*S. occidentalis lucida*), which occupy ranges from the southern Cascade Range through the Sierra Nevada and from Colorado to Michoacán, Mexico, respectively (CDFW 2016). Of the three subspecies, both the northern spotted owl and the Mexican spotted owl are federally protected under the Endangered Species Act (ESA) of 1973. The northern spotted owl was listed as federally threatened in 1990, granting it protection under the ESA (U.S. Fish and Wildlife Service [USFWS] 1990). The northern spotted owl also receives federal protection under the Migratory Bird Treaty Act (MBTA) of 1918 and state protection under the California Fish and Game Code (CFG) §3503 and §3503.5, as do the other two subspecies. In 2016, following a 2012 petition to the CDFW, NSO was listed as state threatened in California under the California Endangered Species Act (CESA) (CDFW 2016).



Figure 1. Range of spotted owl subspecies (Chutter et al. 2004)

## REGULATORY BACKGROUND

### Endangered Species Act

The Federal ESA provides protection for federally listed endangered and threatened species and their habitats. “Take” of protected species is prohibited or limited, requiring a permit, issued by both state and federal resource agencies (CDFW and USFWS, respectively). As defined in the law, “take” of a species involves any action to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct,” including incidental or accidental take. A project may obtain permission to take federally listed species in one of two ways: a Section 10 Habitat Conservation Plan (HCP) issued to a non-federal entity, or a Section 7 Biological Opinion from the USFWS and/or the National Oceanic and Atmospheric Administration (NOAA) issued to another federal agency (e.g., U.S. Army Corps of Engineers [USACE]) that funds or permits an action. Under either Section of the ESA, adverse impacts to protected species are avoided, minimized, and mitigated and require consultation with the USFWS and/or the NOAA Fisheries. The USFWS ultimately issues a Biological Opinion

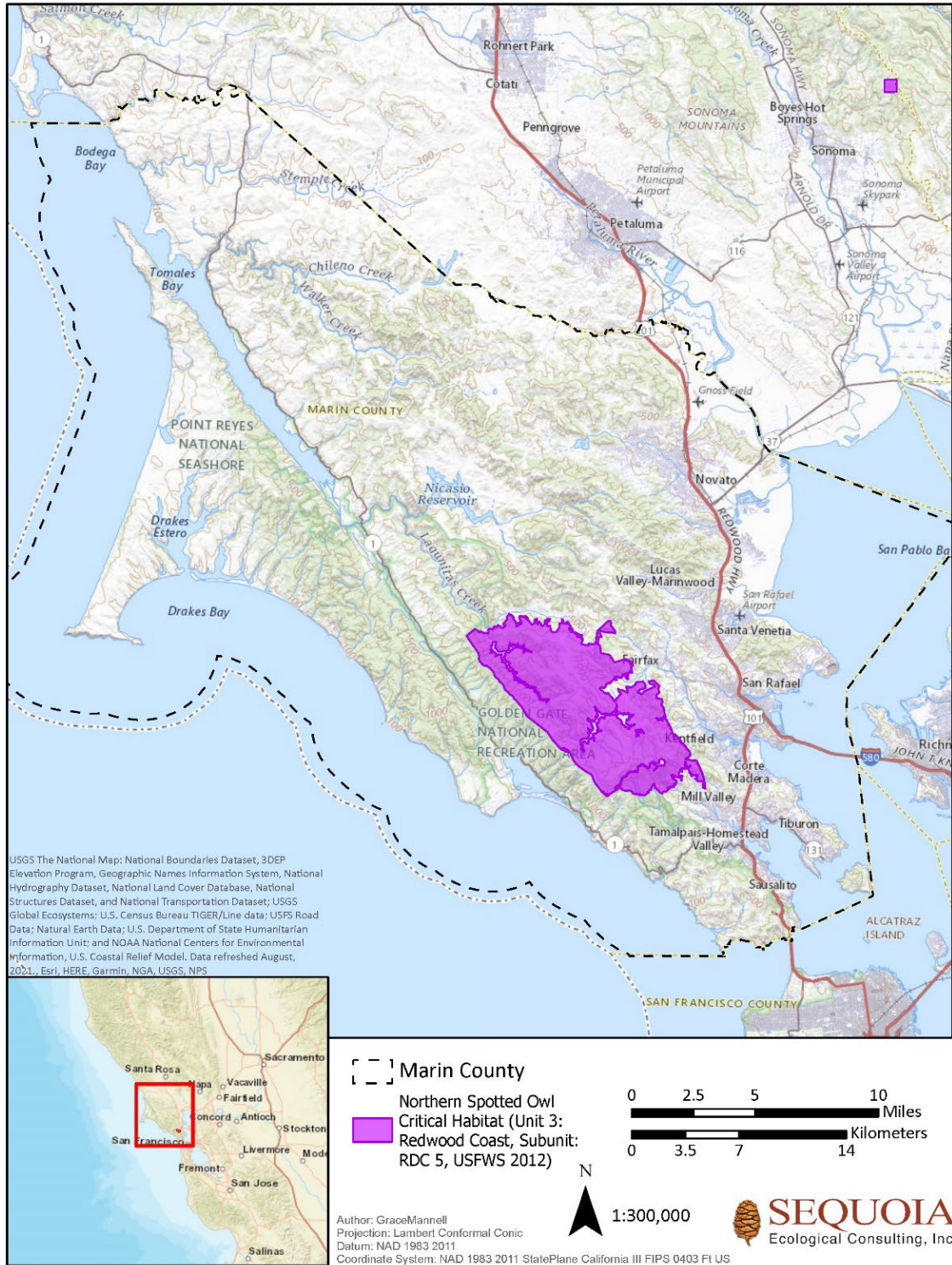


determining whether the federally listed species may be incidentally taken pursuant to the proposed action and authorizing incidental take.

Section 7 of the ESA requires that federal agencies develop a conservation program for listed species (ESA 7(a)(a)) and that they avoid actions that will jeopardize the continued existence of the species or result in the destruction or adverse modification of the species' designated critical habitat (ESA 7(a)(2)). ESA Section 9 prohibits all persons and agencies from take of threatened and endangered species (though the prohibition on taking listed plants only applies to plants taken from "areas under federal jurisdiction" or plants taken "in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law"). Those who violate this mandate face civil and criminal penalties, including civil fines of up to \$25,000 per violation, as well as criminal penalties of up to \$50,000 and imprisonment for one year. Section 10 of the ESA regulates a wide range of activities affecting fish and wildlife designated as endangered or threatened, and the habitats on which they rely. Section 10 prohibits activities affecting these protected fish and wildlife species and their habitats unless authorized by a permit from the USFWS or NMFS. These permits may include incidental take permits, enhancement of survival permits, or recovery and interstate commerce permits. HCPs under Section 10(a)(1)(B) provide for partnerships with non-federal parties to conserve the ecosystems upon which listed species depend.

## **Northern Spotted Owl Critical Habitat**

Critical Habitat is designated by the USFWS for some species which are listed under the ESA. Critical habitat is a specific geographic area which contains features essential to the conservation of the threatened or endangered species. Special rules and regulations related to protection of the species may be federally required within critical habitat areas. Critical habitat was designated for NSO in 2012, and can be found throughout northeastern California, and parts of Oregon and Washington where key habitat occurs. An update in January 2021 proposed removing 3.4 million acres of the originally designated NSO critical habitat, which was to go into effect in December 2021 (USFWS 2021a). On November 10, 2021, the USFWS reversed the January 2021 ruling and revised the critical habitat to reduce the total amount of acreage that would lose protection from 3.4 million to 204,294 acres (USFWS 2021b). Most of the critical habitat that was removed occurs in Oregon throughout the species' range. The revised rule went into effect on December 10, 2021 (USFWS 2021b). Much of the Marin population of NSO falls within critical habitat unit 3, redwood coast subunit 5, and represents the southernmost extent of the species' designated critical habitat and distribution (USFWS 2021; Figure 2). Critical habitat unit 3, redwood coast subunit 5 encompasses approximately 20,684.5 acres from just south of Lagunitas to just northwest of Mill Valley, and from the area just east of Golden Gate National Recreation area to the hills just west of San Anselmo/Larkspur (Figure 2), although many occurrences of NSO are known outside this designated area.



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Figure 2. USFWS-Designated northern spotted owl critical habitat within Marin County.



### **California Environmental Quality Act**

The California Environmental Quality Act (CEQA) was adopted in state law in 1970 and is intended to inform government decision-makers and the public about the potential environmental effects of a discretionary action (project), identify avenues of reducing or preventing significant impacts to the environment, and to disclose project approval processes to the public. Any significant impact must be mitigated to the extent feasible, below the threshold of significance, to prevent significant, avoidable environmental impacts.

MWPA is funding and supporting implementation of various projects, some of which are required to undergo CEQA review. Projects may be determined to be exempt from CEQA or require preparation of environmental documents. Environmental documents may include Negative Declarations, Mitigation Negative Declarations, or Environmental Impact Reports (EIR). MWPA projects may alternatively be determined to be within the scope of the California Vegetation Treatment Program EIR, or the CalVTP, for which the CEQA review is completed, but a Project Specific Analysis must be prepared in order to show the project falls within the scope of the CalVTP EIR.

Many MWPA projects, due to the scale, scope, and type of activities, have been determined to not have a significant environmental effect on the environment and are categorically exempt from CEQA.

Categorically or statutorily exempt projects are those which fulfill the definitions of specific exemptions already approved by the state government. The majority of MWPA projects qualify for one or more of the following CEQA exemptions:

- CEQA Guidelines Section 15304, Class 4, for Minor Alterations to Land. A Class 4 exempt project consists of minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees.
- CEQA Guidelines Section 15301, Class 1, for Existing Facilities. A Class 1 exempt project consists of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use.
- California Code of Regulations Section 15333, Class 33, Small Habitat Restoration Projects. A Class 33 exempt project would not exceed five acres in size to assume the maintenance, restoration, enhancement or protection of habitat for fish, plants, or wildlife. An example includes projects to restore or enhance habitat that are carried out principally with hand labor and not mechanized equipment.

The CalVTP Program EIR was certified in 2019 to facilitate streamlining of CEQA review for critical wildfire risk reduction projects in California. The CalVTP provides a structure for conducting project specific analyses (PSA Checklist) to determine whether a vegetation management or treatment project is within the scope of the CalVTP and incorporating relevant mitigation measures from the Program EIR for wildfire risk reduction vegetation management projects throughout the state. Projects are disqualified



from using the CalVTP PSA Checklist without modification if they fall under certain jurisdictions, such as privately held companies and corporations, HOAs or individually landowners who are not certified as non-profit. Projects are also disqualified if they pose substantially more severe significant impacts than those covered in the Program EIR. The CalVTP allows wildfire prevention vegetation management projects to be streamlined through CEQA in order to increase the pace and scale of projects that reduce the risk of wildfire to life, property, and natural resources, while also maintaining environmental protections.

### ***California Endangered Species Act***

The CDFW is responsible for administering CESA of 1984. CESA was enacted to “conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat” (CESA 1984, section 2052). It was originally enacted in 1970 but was repealed and replaced in 1984 and amended in 1997. This law states that “no person or public agency shall import into this state, export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species” without permit (CESA 1984). Section 2080 of the California Fish and Wildlife Code prohibits take of any species that the Fish and Wildlife Commission determines to be an endangered or threatened species. Similar to the federal ESA, under CESA, the term “take” is defined as “to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” the protected species, including incidental take. Unlike the federal law, the definition of “take” under CESA does not include the terms “harm” or “harass.” However, CESA does allow for take that is incidental to otherwise lawful development projects. Sections 2081(b) and (c) of CESA allow the CDFW to issue an incidental take permit for a State-listed threatened and endangered species only if specific criteria are met (i.e., the effects of the authorized take are minimized and fully mitigated). The measures required to meet this obligation shall be roughly proportional in extent to the impact of the authorized take of the species. Where various measures are available to meet this obligation, the measures required shall maintain the applicant’s objectives to the greatest extent possible. All required measures should be capable of successful implementation.

### ***Migratory Bird Treaty Act (MBTA)***

The MBTA makes it unlawful to take any migratory bird listed in Title 50 of the Code of Federal Regulations, Section 10.13, including active nests, eggs, or young. Migratory birds include songbirds, ducks, wading birds, shorebirds, seabirds, and raptors. The MBTA does not discriminate between live or dead birds and grants full protection to any bird parts including feathers, eggs, and nests. There are over 800 species currently covered under the MBTA.

### ***California Fish and Game Code (CFG) sections 3503 and 3503.5***

CFG section 3503 states that “It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird.” Section 3503.5 states “it is unlawful to take, possess, or destroy any birds in the orders



Falconiformes (falcons) or Strigiformes (owls).” Both codes state that exceptions may apply if the exceptions are included elsewhere in the CFGC, or by adopted regulation.

### **Northwest Forest Plan**

The Northwest Forest Plan (NWFP) is the federal government’s contribution to the conservation of NSO, implementing management guidelines to protect NSO and their habitat across federal lands and federal agencies in the Pacific Northwest (USFWS 2011; Spies et al. 2019). Due to its broad, overarching nature and comprehensive scientific information, the 1994 NWFP was widely viewed as the federal government’s contribution to the recovery of the spotted owl since it contained the information used to develop the draft 1992 Northern Spotted Owl Recovery Plan. The NWFP was directly incorporated into four National Forest land and resource management plans (LRMPs). The NWFP amended the LRMPs or resource management plans (RMPs) that guide the management of each of the 15 National Forests and six Bureau of Land Management (BLM) districts across the range of the spotted owl. These plans adopted a series of reserves and management guidelines that were intended to protect spotted owls and their habitat as well as other species (USFWS 2011).

Though the NWFP does not apply from a regulatory standpoint as no work will be conducted in National Forests or Bureau of Land Management lands, it does provide a framework for assessing, avoiding, and minimizing impacts to NSO in occupied habitat.

### **MWPA’s Consistency with the Recovery Plan for NSO**

The activities planned in the approved and proposed MWPA projects are consistent with the intent of the Revised Recovery Plan for the NSO (USFWS 2011). The primary goal of MWPA is wildfire prevention to protect Marin County communities from catastrophic fire damage. While not the intended goal of the MWPA projects, the MWPA program’s success would also protect Marin County’s wildlife habitat from destructive wildfires, including key NSO habitat. The purpose of the approved and proposed fuels reduction projects is to minimize wildfire intensity and rate of spread in the event of an ignition, which could prevent a wildfire that would burn at an intensity that severely damages the forest and associated NSO habitat. This purpose is consistent with the goals of the Revised Recovery Plan for Northern Spotted Owl, which specifically addresses the need for fuels management and invasive species control to prevent stand-replacing fires and habitat degradation.

The approved and proposed fuels reduction projects also have the potential to improve foraging habitat for NSO by reducing understory density and therefore permitting foraging by owls in flight, with the added benefit of reduction in fuel load.

From the 2011 Recovery Plan:

*In some cases, failure to intervene or restore forest conditions may lead to dense stands heavy with fuels and in danger of stand-replacing fires and insect and disease outbreaks.*



*...our intent in this Revised Recovery Plan is to embed spotted owl conservation and recovery within broader dry forest ecosystem restoration efforts to increase the likelihood spotted owl habitat will remain on the landscape longer and develop as part of this fire adapted community instead of being consumed by uncharacteristic wildfires.*

*...opportunities exist to conduct vegetation management to enhance development of late-successional characteristics or meet other restoration goals in a manner compatible with retaining resident spotted owls. Restoration activities conducted near spotted owl sites should first focus on areas of younger forest less likely to be used by spotted owls and less likely to develop late successional forest characteristics without vegetation management.*

The purpose and outcome of MWPA projects align with the goals of the Revised Recovery Plan; to conduct vegetation management activities in an ecologically sound way which integrates the dual objectives of effective stand-replacing fire prevention alongside NSO habitat restoration and conservation goals.

## **Northern Spotted Owl Natural History and Ecology**

### ***Northern Spotted Owl Life History***

The NSO is a medium-sized owl ranging from 18 to 19 inches in length and weighing between 1 and 2 pounds. This species is dark brown with round whitish spots and is identified by its dark eyes framed by prominent facial disks (CDFW 2016). The northern spotted owl is distinguished from the similar barred owl (*Strix varia*) by its darker coloration, spotted flanks, greenish bill, and slightly smaller size (Sibley 2000). NSO is a long-lived species with a life span of twenty or more years in the wild (CDFW 2016).

NSO are known for having an affinity for old growth forests. In general, suitable habitat for NSO is characterized as old forests with large trees and a closed canopy (60 to 70 percent canopy cover) with multiple canopy layers (Lesmeister et al. 2018). NSO prefer dense canopy closure of mature and old-growth trees with logs, standing snags, and live trees with broken tops. They also require open space in the understory or less dense habitats to allow flight under the canopy to forage (Gutierrez et al. 2020). In Marin County, NSO regularly use a variety of forest types including “coast redwood, Bishop pine, Douglas-fir forests, and mixed evergreen-deciduous hardwood forests (e.g., California bay, tanoak and coast live oak)” (CDFW 2016; Ellis 2020). In addition to forest structure, habitat suitability is also influenced by the availability of prey, presence of competitor species, risk of predation, and availability of suitable nesting locations (Lesmeister et al. 2018).



Figure 3. An adult spotted owl. Photo by Julie Woodruff.

### ***Woodrat and Other Prey Habitat***

Dusky-footed woodrats are a major prey species for NSO occurring at elevations below 1,250 meters (Sakai and Noon 1993) and are abundant in older forests. In the southern range for NSO, including the Marin County population, woodrats are a primary prey species, and action to preserve or enhance this prey base can improve habitat suitability and breeding success for NSO (CDFW 2016). NSO have been shown to select woodrats over other prey species and to select habitat with high prey abundance. A positive association has been found between abundant woodrat populations and NSO breeding success (Ward et al. 1998; CDFW 2016). NSO populations located in areas where woodrats are a dominant prey occupy smaller home ranges and are associated with higher usage of younger forest and edge habitat that would support the woodrat populations (CDFW 2016; Zabel et al. 1995).

Dusky-footed woodrats occur in a variety of habitat conditions, including both old, structurally complex forests and younger seral stages of forests, and are often associated with streams (Carey et al. 1992; 1999; Williams et al. 1992; Sakai and Noon 1993; Hamm and Diller 2009). Within suitable habitat, woodrats primarily utilize stick houses, which are built to support vital functions such as storing food, denning, and nesting (Carraway and Verts 1991). Research has suggested that thinning or associated



practices (e.g., burning slash piles) could be detrimental to dusky-footed woodrats if it reduces hardwoods, shrubs, or downed wood, yet treatments could ultimately benefit woodrats if the work results in new growth of shrubs or hardwoods (Williams et al. 1992; Innes et al. 2007; USFWS 2011). A trapping study conducted in the Mayacamas Mountains of Mendocino County found that dusky-footed woodrats were captured most frequently at nests in areas with high-canopy cover and low-scrub cover, as opposed to areas with low-canopy cover and high-scrub cover (Slowik 2015). These findings suggest that understory composition may not be as important of a habitat component as canopy cover in regards to woodrat abundance than previously thought.

Study findings regarding woodrat abundance and vegetation treatments vary due to the variation in treatment types. One study that assessed understory vegetation's effect on small mammal composition found that "a structurally and compositionally diverse understory provides food and cover for many small mammal species" (Kalies and Chambers 2010). In this study, woodrat and other small mammal abundance was observed to decrease with increased understory vegetative cover, which may be due to the species' reliance on fungi, pine trees, and nuts for food rather than understory vegetation (Kalies and Chambers 2010). Another study found that woodrat abundance is promoted by growth of understory vegetation but declines as the forest stand matures, which may be due to the change in the understory reducing available food, limiting suitable nest sites, and increasing predator vulnerability (Hamm and Diller). Based on these studies, as density increases in the understory, occupancy of woodrats was reduced and a lack of understory also correlated to reduced occupancy, although both studies indicate that food may ultimately influence abundance in a particular area as well as predation. Understory vegetation (such as poison oak) will also regenerate quickly after treatment and be able to provide cover again within a couple of growing seasons. Dusky-footed woodrats also tend to nest in highest densities in riparian areas, which are inherently lower fire-risk areas and typically are not targeted by more intensive vegetation treatments that could disturb woodrats.

While woodrats may be more vulnerable to predation in the small subset of their habitat where fuel break projects occur due to understory vegetation thinning or occasional nest disturbance, woodrats will still be able to utilize tree canopies and adjacent forest habitats as treatments are conducted in discrete areas generally around communities. While woodrats may be affected on an individual basis, no landscape-level change will significantly alter woodrat populations to the degree that NSO may be affected. Typical project activities include reducing dense dead and down woody debris and removing nonnative invasive broom followed by a period of rapid regrowth and periodic retreatment as different areas are treated and others are left until the next treatment cycle. While the baseline condition of many project areas is generally a very dense, weedy understory, project activities create a larger diversity of understory conditions on the landscape ranging from light cover to moderate and dense cover. Per the studies, it appears that a moderately dense understory has been found to promote woodrat occupancy as mentioned in the above, although the presence of other food sources may be more critical than understory vegetation. Such understory conditions also provide the opportunity for native herbaceous plants to germinate in areas where dead vegetation, broom and other invasive



species once dominated. These native herbaceous plants are generally not removed as part of fire fuels reduction. Such activities could lead to a more biodiverse understory.

Areas of low intensity burns showed higher woodrat populations than areas of high intensity fires (Williams et al. 1992). Some studies have found that low to medium intensity prescribed burns may not significantly impact woodrat populations if patches of habitat are maintained (Lee and Tietje 2005). Prescribed burns may cause immediate, short-term negative impacts on woodrat populations, but regular prescribed burns on the landscape encourage overall net positive long-term impacts on woodrat population trends (Vreeland and Tietje 1998). This correlation may be because prescribed burns can encourage “reduced competition for oak regeneration, rejuvenation of vegetation, and reduction of fuel load and the threat of catastrophic wildfire” (Vreeland and Tietje 1998). USFWS (2011) found similar results that correlate manual forest thinning and woodrat populations, where these practices could be detrimental to woodrat populations in the short term but may provide benefits in the long term if they result in increased growth of shrubs or hardwoods. Management to prevent high intensity fires has been found to benefit woodrat populations by preventing the resulting sharp population declines and slow recolonization resulting from high-intensity fires (Williams et al. 1992).

### **Woodrats in Marin County**

In Marin County, woodrats are the primary prey item for NSO, which make up over 75% of their diet by weight (Press et al. 2012). Other prey that may be used in Marin County by NSO include deermice (*Peromyscus sp.*), meadow voles (*Microtus sp.*), brush rabbits (*Sylvalagus bachmani*), and birds (Fehring 2003). NSO residing near urban areas may also predate on species such as domestic mice (*Mus musculus*) and brown rats (*Rattus norvegicus*). While woodrats are the primary prey item for NSO in Marin County, this species is not limited to feeding on woodrats exclusively and may utilize a variety of other species as a prey source. In southern portions of the northern spotted owl range (encompassing Marin County), variable habitat (including younger forest stands and shrub cover) helps to support woodrat populations, and habitat heterogeneity (meaning a mosaic of old growth and younger forest stands) is important in supporting NSO populations (CDFW 2016; Zabel et al. 1995). Maintaining and enhancing woodrat habitat adjacent and within forests with suitable structure for NSO is likely to benefit the species (Zabel et al. 1995; Sakai and Noon 1997).

A study was conducted in 2002 to assess importance of woodrats to NSO as a prey base in forested areas. The study found, on average, that there are 0.95 woodrat houses per hectare (/ha) across all plant communities, with California bay habitat having the highest density at 1.19 woodrat nests/ha (Fehring 2003; as cited in Ellis 2020). Using this ratio, it is expected that there are approximately 0.95 woodrats/ha within the Marin County area, or potentially slightly more, as Marin County’s NSO habitat includes a strong component of evergreen hardwood species (Ellis 2020), which woodrats utilize heavily. This study’s findings could also be an underestimate of actual woodrat numbers in forested areas of Marin County, as woodrats do not always exclusively use nests and may also utilize tree cavities, nest boxes built for other species (such as wood ducks or small owls), downed logs, homes, and outbuildings,



or other refugia. Results from Fehring's study are similar to another woodrat trapping study that estimates abundance at approximately 0.9 woodrats/ha (Ward et al. 1998). The Marin County woodrat density estimates (Fehring 2003; Ellis 2020) were higher than the 0.41 woodrats/ha density found in a woodrat trapping study in large, old growth habitat in northwestern California (Sakai and Noon 1993; Press et al. 2010). Extrapolating this average woodrat/ha number to the average home range size of a single NSO (1,173 ha; USFWS 2011), results in an estimation of approximately 1,173 woodrats per NSO home range, most of which are likely found in more densely forested portions of an NSO's home ranges along riparian streams and away from the WUI (Wildland Urban Interface). Based upon the expected high density of woodrats in Marin County, it is unlikely that targeted fuel reduction activities would significantly impact woodrat population density, particularly when considering implementation of woodrat nest avoidance measures and work areas focused on the WUI and away from prime habitat within densely forested areas.

### ***Northern Spotted Owl Breeding Ecology***

The breeding season for NSO in Marin County generally extends from February 1 through July 31 (Cal. Code Regs., tit. 14, § 895), but they typically do not initiate nest building and incubation until March or April (Gutierrez et al. 2020). Inland populations of NSO (such as in the western Washington Cascades) may nest later with a protracted fledgling stage into September (USFWS 2011). As described previously, suitable nesting habitat for the species typically consists of old forests with large trees, although Marin County NSO use relatively younger forests than those further north (MMWD 2019). NSO do not build their own nest. They require suitable nest sites in their breeding territories such as tree cavities, broken-top trees, mistletoe brooms, abandoned raptor or squirrel nests, or other accumulations of debris (CDFW 2016). Most of the local owl territories are in canyon bottoms or mid-slope locations with perennial waterways. NSO subadults are capable of reproduction in their first year, but nesting success increases when owls reach adulthood ( $\geq$  year 3). Clutch sizes are generally 1 to 2 eggs, and the incubation period lasts approximately 30 days. After hatching, chicks remain in the nest for another 34 to 36 days and continue to receive parental care for several months after fledging (CDFW 2016).

Avian species, including NSO, are at their most sensitive during the breeding season. Across species, avian disturbance is of greatest concern during the breeding season because chicks are too young to flee (fly away) from danger, and highly disturbed parents are at risk of abandoning their nests or may be subject to depredation from other predatory species who find incubating adults.

The NSO breeding season starts when the female begins to spend most of her time on or near the nest, typically in February or March. The female then initiates egg-laying, and incubates from roughly March through April, rarely leaving the nest during this time. The mate of the incubating NSO provides nearly all her food during this time. Nestlings are born about 30 days after laying, and the nestling stage continues for the next month and a half, typically falling between April and June. As the nestlings grow larger, the mother begins to forage for increasingly longer periods of time. The nestling stage is followed by the fledgling stage, which includes the period after the young leave the nest until they become



independent of their parents. Within three days of fledging, young can fly short distances and primarily move by jumping and climbing; within a week they can fly short distances between trees. During this period, fledglings and parents stay together to hunt and forage but are no longer restricted to the nest area (USFWS 2012). Because of the NSO nestlings' reliance on the nest through the nestling stage, the most sensitive time for owls is considered to be between the early laying stage and the end of the nestling stage. Breeding season (laying through fledging) for NSO is considered February 1 – July 31 for coastal areas including all of Marin County, and February 1 – August 31 for inland areas (USFWS 2011).

## **NORTHERN SPOTTED OWL THREATS**

### **Northern Spotted Owl Decline**

After the listing of the northern spotted owl as federally threatened under the ESA, in 1990, the USFWS released a Recovery Plan for the species in 2008 and a revised Recovery Plan in 2011. In the 2008 Recovery Plan, the two predominant threats to the persistence of NSO were identified as: 1) habitat loss due to timber harvest and fire, and 2) competition with barred owls (USFWS 2011). Since listing, there has been a continued decline of NSO and their habitat, especially in the northern portion of the range, despite extensive maintenance and habitat restoration in recent years (USFWS 2011). Habitat protection alone is not enough to recover the species, and barred owl still poses a major threat to the existence of NSO. In Marin County, however, the NSO population is relatively stable, primarily because there is an absence of large-scale habitat loss and few barred owls have invaded Marin County and displaced the resident NSO (MarinAudubon.org 2021).

#### ***Habitat Loss – Timber Harvest***

It is estimated that since the early 1800s, between 60 and 88 percent of NSO habitat has declined (USFWS 2011). The loss of northern spotted owl habitat to timber harvest on federal lands, however, has declined since the 1990 listing of the species and the implementation of the NWFP in 1994 (USFWS 2011, CDFW 2016). With the reduction in timber harvest due to state and federal regulations, high-severity wildfires have surpassed timber harvest as the leading cause of suitable habitat loss for NSO on federal land (Lesmeister et al. 2018). On non-federal lands, habitat loss due to commercial timber harvest continues to be substantial (CDFW 2016; Lesmeister et al. 2018), while on federal lands (i.e., national forests) habitat loss is estimated at 1 percent annually in California and 1.5 percent annually in Washington and Oregon (USFWS 2011). Timber harvest disrupts the structural characteristics, landscape patterns, and community composition of a forest and the level of the disturbance is determined by the duration and scale of the harvest.

Commercial timber harvest occurred in Marin County starting in the early 1800's, accelerating in the 1850's and 1860's with the advent of the gold rush, and continued on until the mid-20<sup>th</sup> century. Over the past 30 years, NSO conservation efforts have focused on preventing large-scale logging operations from permanently removing NSO habitat, specifically old-growth forests, due to the species becoming



listed under the Endangered Species Act in 1990. Historically, NSO's greatest threat has been habitat loss due to large-scale logging, especially clear-cutting, which removes all trees from a particular area regardless of species or size class, leaving an expanse of open land. NSO received lots of public attention in the 70's and 80's as protection of this species was directly related to the reduction of logging practices in the Pacific northwest.

Today, there are no active Timber Harvest Plans in Marin County, therefore pressure from logging activities in the region are absent. The pendulum has swung in the opposite direction, however, and decades of fire prevention and suppression have led to conditions in NSO nesting habitat which are conducive to highly destructive, stand-replacing wildfire. Fire and fuels management projects are needed to clear the fuels buildup in the Marin forests and protect NSO habitat from stand-replacing wildfire.

### ***Fuels Management Projects***

Fuels management projects have very different objectives than large-scale logging; the treatment strategies are much lower impact during project activities, and treatment will not result in direct destruction of NSO habitat. Fuels management involves the removal of "fuel", or woody debris which can accelerate wildfires. Fuels can include fallen leaf/duff accumulations, small diameter saplings, dead and dying trees and vegetation, shrubs, nonnative forbs and grasses, and other accumulations of natural vegetation and deadfall. Unlike logging operations, fuel management projects generally retain mature native trees as these trees are more resilient to wildfire than small diameter trees. Generally, fuel management activities reduce horizontal and vertical continuity of fuels while maintaining forest canopy, the shade from which helps reduce growth of weedy understory species and maintains moisture in the soils and understory plants. It is also important to note that fuels management does not inherently change forest structure or composition; rather, the activities are conducted with consideration for the longevity of the forest stand with the ultimate goal of preventing or reducing the intensity of destructive wildfire that may otherwise destroy the forest.

While many fuel management activities within forested settings focus on removal of weedy understory shrubs and plants and removing lower limbs of trees, some also include removal of small diameter trees to reduce the density of a stand. These forest thinning activities, do not take all trees in a stand as observed with clear-cutting; typically, forest thinning practices selectively remove specific or groups of trees from an area and are created with the intention to maintain forest health while encouraging new growth or survival of remnant trees by reducing competition for water and nutrients. While timber harvest and forest thinning activities decrease habitat use by spotted owls, NSO have also been documented nesting in selectively logged and managed thinned forests (USFWS 2011). The population of NSO in Marin County is not directly impacted by commercial tree harvesting or thinning operations as it had been in the past, but NSO still face threats of habitat loss due to development, high-severity wildfire driven by climate change and years of fuels buildup, and human disturbance (Cormier 2020).



### ***Habitat Loss – Relationship with Fire Regimes***

In the 2011 Revised Recovery Plan for the Northern Spotted Owl, high-intensity wildfire was identified as one of the most concerning threats to the subspecies (USFWS 2011). The impact of wildfires on NSO is dependent on the size and severity of the fire. Large scale, high-severity wildfires (i.e., stand-replacing fires) can cause the loss of suitable forest structure for nesting and roosting in NSO (CDFW 2016; Lesmeister et al. 2018). For example, one study that had been tracking California spotted owl (CSO) nesting since 1993 surveyed the same owls in a portion of their survey area that burned in the 2015 Kings Fire in the Sierra Nevada (Jones et al. 2016). The study found that CSO use of the survey area significantly declined following this high-severity fire, including local extinction at sites burning at over 50% high-severity (Jones et al 2016). Alternatively, smaller scale and low-severity wildfires may increase habitat suitability by opening up the understory for improved hunting; indeed, NSO are likely accustomed to low and moderate-severity frequent fires in seasonally dry forests (Peery et al. 2019). These types of fires also help prevent larger, more destructive wildfires (Lesmeister et al. 2018). Fuels treatments may have long-term benefits by limiting stand-replacing fires, and conserving habitat for nesting and roosting (CDFW 2016).

### ***Habitat Loss – Forest Stand Structure***

NSO typically prefer to nest in old-growth forest, which is characterized by a multilayered canopy cover with large trees (typically greater than 30 inches in diameter at breast height [DBH]), and understory vegetation that is dense enough to provide cover but also open enough to allow owls to fly within and beneath it to hunt and forage (CDFW 2016), although NSO in Marin County may utilize nest trees much smaller than this. Years of fire suppression have encouraged the growth of understory vegetation in old-growth forest, which not only increases the risk of high-severity fire in these areas, but also reduces the foraging quality for NSO.

When managed carefully to ensure that no take of nesting NSO occurs, understory clearing can reduce fire risk and improve foraging for NSO. While spotted owls avoid harvest areas during and immediately after thinning, they have been observed to use recently thinned habitat for nesting, roosting, and foraging 10 to 50 years after treatment (USFWS 2011). Spotted owls have also been observed to use burned areas of all severities as habitat for foraging with possible preference for low severity burn areas (USFWS 2011). This preference may be related to the density of vegetation in low severity burn areas, which are favorable to dusky-footed woodrat populations (Wilson and Forsman 1992). NSO also require open space in the understory to allow flight and successful foraging (Gutierrez et al. 2020), and females likely forage in less dense habitat than males due to sexual size dimorphism (Sisco 1990; Solis and Gutierrez 1990; Gutierrez et al. 2020); therefore, fuels treatments in NSO habitat with dense understory may improve foraging habitat. Understory thinning may also remove prey species cover, thereby increasing woodrat, and other prey species, susceptibility to predation by NSO. San Francisco dusky-footed woodrats prefer to build nests in riparian areas near water sources (Bravo 2016) or can be found in brushy shrub fields, which NSO tend to avoid presumably because the vegetation is impenetrable



(Sakai and Noon 1997; Gutierrez et al. 2020). Riparian areas are inherently lower fire-risk areas and typically are not targeted by more intensive vegetation treatments, due to those areas in general being wetter and riparian vegetation more hydrated than upland areas away from water sources. As a result, riparian and chaparral or other shrubby or densely vegetated areas would serve as a continual population source of woodrats, should predation by NSO of woodrats increase in treated forested areas. If existing woodrat nests are avoided by vegetation removal treatment activities, impacts to prey density should not be affected as vegetation immediately surrounding woodrat nests will also be left and only a subset of available habitat to woodrats would be treated.

### ***Barred Owl Competition and Hybridization***

The barred owl is native to eastern North America, but due to unknown causes, the range of this species has expanded beyond its historic range and into western North America in the past century (CDFW 2016; Lesmeister et al. 2018). The range of the barred owl now completely overlaps that of the northern spotted owl (Lesmeister et al. 2018). The barred owl and northern spotted owl are similar species both in terms of appearance and habitat requirements. Barred owls are larger than spotted owls, lighter in coloration, and can be identified by their streaked (as opposed to spotted) belly (Sibley 2020). Barred owls have more diverse diets, can use a broader range of forest habitats, and have higher reproduction and survival annually (CDFW 2016). Barred owls defend their territories more aggressively than NSO, are aggressive towards spotted owls and have been observed attacking and even killing NSO (CDFW 2016; Lesmeister et al. 2018) As a result, barred owls have a competitive advantage over NSO and can displace them into lower quality habitat (CDFW 2016). Barred owls are dominant when the two owls interact and can impact the habitat use and reproduction of NSO, contributing to population declines (Van Lanen et al. 2011; Lesmeister et al. 2018), lower occupancy of historic northern spotted owl territories (Lesmeister et al. 2018), lower detection rates, lower survivorship, and lower reproduction (USFWS 2011).

Another threat barred owls present to NSO populations is hybridization. Spotted owls and barred owls can interbreed and produce fertile offspring, and there is evidence of this hybridization occurring both in field identification of hybrids and through genetic sampling (Lesmeister et al. 2018; Haig et al. 2004). Hybrid individuals can be identified by plumage characteristics, vocalization, and morphological measurements (Hamer et al. 1994). A genetic study found 3 percent hybridization between barred owls and NSO in north central California (Barrowclough et al. 2005). While levels of hybridization are currently not considered high risk to the species, these rates may increase as barred owls become more abundant within the NSO range (Lesmeister et al. 2018; USFWS 2011). Hybridization puts NSO at risk for outbreeding depression, which can increase the risk of extinction of the species as part of the breeding population is diverted to hybrid pairings (Lesmeister et al. 2018; Haig et al. 2004).

While no breeding barred owl pairs were observed in the 2020 Marin County survey by Point Blue, the researchers did observe barred owls in six geographically distinct locations throughout the county and concluded that the species may be breeding nearby (Cormier 2020).



### ***NSO Response to Human Disturbance***

NSO are sensitive to human disturbance, particularly during the breeding season, when breeding pairs are tied to a nest site and are unable to escape major disturbances and may abandon their nest if too stressed. Noise or visual disturbance that occurs during the day during breeding season has the potential to impact breeding behavior and cause harm to the nestlings (USFWS 2020). Human disturbances generally fall into two categories, visual and auditory. The USFWS released a memorandum in 2020 providing guidance on human activities that have the potential to disturb the northern spotted owl. The USFWS (2020) guidance focuses on the level of stimulus in the form of visual disturbance or human generated noise that is likely to raise to the level of take, which is prohibited under the ESA without a specific authorization (i.e., Incidental Take Permit). This USFWS memorandum clarified that “disturbance,” as prohibited by Section 9 of the ESA, for NSO includes “any stimulus that significantly disrupts essential behaviors that may lead to the likelihood of harm,” such as:

- Flushing adult or juvenile NSO in breeding season (this is potentially a take)
- Increased risk of predation
- Increased risk of exposure to heat stress
- Risk of decreased reproduction
- Risk of decreased feedings
- Risk of decreased fledgling success
- Risk of reduced adult and juvenile fitness
- Increased risk of mortality of chicks

Studies of fecal corticosterone levels in NSO did not find a physiological stress response for short-duration and minimal repetition noise disturbance; however, prolonged activities such as timber harvest, did show an increase in stress (USFWS 2020). The USFWS guidance states, “A study of noise effects on Mexican spotted owls with a finding that the owls, during both the nesting season and the non-nesting season, did not flush from helicopter noise unless the noise was at least 92 dB(A)”, and that helicopters may be perceived as less threatening to nesting owls “because of their shorter duration, gradual crescendo in noise levels, minimal visibility, and lack of association with human activity” (USFWS 2020).

The recommendations noted two thresholds for auditory disturbance that may cause harm to NSO: an absolute tolerance limit and an “above-existing” tolerance limit. NSO were found to have a cumulative auditory tolerance limit of 82 decibels (92 decibels for aircraft) for the total sound in their habitat; above this level the nest site may become intolerable to the species and the species may be harmed. This threshold accounts for the cumulative noise level from the ambient noise and any other existing noise (i.e., line and point sources) at the site and the action-generated noise level. The “above-existing” sound threshold indicated in the guidance is related to the total increase in sound caused by the action above the ambient noise levels in the habitat. The USFWS determined that action-generated noise causing an



increase of 25 decibels or more above ambient noise was likely to result in disturbance of NSO to the point where the species may be harmed, although these studies do not specifically indicate the duration or frequency of the noise that results in harm. Existing studies are helpful in determining potential noise-related impacts from long-duration activities, but questions remain when considering potential impacts related to very short-duration and infrequent activities.

Studies have also shown that human-generated visual disturbance within 100 meters of an active nest is likely to cause harmful disturbance to nesting NSO (USFWS 2020). The USFWS concluded that NSO may be harmed from project-generated visual disturbances within 100 meters of the base of a nest tree or habitat.

## **MARIN COUNTY NORTHERN SPOTTED OWL – SPECIFIC LOCAL INFORMATION**

The local population of NSO in Marin County is well studied and there are over 50 documented activity centers in the county since 2011 (CDFW 2021). Activity centers are areas where a resident single or pair of spotted owls has demonstrated concentrated use. Based on NSO data collected, activity centers are mapped to represent researchers' estimation of greatest NSO activity, though the owls' territory may extend outside of these concentrated activity centers. NSO tend to nest in the same area from year to year, often reusing the same nest trees and stands if they were successful in prior years but may attempt nesting in nearby areas if their nests had failed previously (Sovern et al. 2011). Therefore, Activity Center data is updated frequently if pairs of NSO are tracked closely (surveyed) annually. Activity centers were originally created and mapped to protect NSO in areas of commercial logging and the USFWS provides specific recommendations for vegetation removal within these areas (USFWS 2019). Local interest groups (Marin Audubon Society, Point Blue, National Park Service) conduct regular surveys throughout Marin County annually to help map activity centers and closely monitor the population, as well as any potential barred owl invasion. Most NSO activity centers are located along the central and western portion of the county where the densest forested areas are located. However, there are known activity centers closer to towns and population centers, including near and within the towns of Novato, Bolinas, Inverness, and San Rafael (CDFW 2021). Based on both current and historical data (over 10 years old), NSO Activity Centers have been documented near towns within Marin County as early as the 1980s (CDFW 2021), but their presence in the area predates western colonization.

## **MWPA APPROACH TO NORTHERN SPOTTED OWL IMPACT AVOIDANCE**

### ***Potential Impacts of Fuels Management Work for Fire Prevention and Ecological Resiliency***

Fuels reduction treatments proposed by MWPA may be employed to reach various goals, including the following:



- Defensible space – These projects reduce fuel loading and the intensity of a potential fire around homes and other structures consistent with Public Resources Code Section 4291 and local fire codes. They may involve public outreach and small-scale vegetation removal around private homes.
- Evacuation Route Improvements – These projects improve evacuation and ingress/egress routes (roadways) through communities and enable safer and more efficient evacuation and emergency vehicle access.
- Fuel break projects – These projects serve to create or maintain fuel reduction zones at key locations adjacent to occupied structures and open space areas. In the event of a wildfire, fuel break zones are helpful for firefighters, because they provide a “break” in the fuel, where a wildfire can be more easily stopped and brought under control. Fuel break projects are intended to reduce wildfire intensity and rate of spread in the event of ignition in the wildland or built environment. By creating a contiguous buffer between neighborhoods and open space lands, these projects would also provide defensible space for fire suppression crews to safely defend communities from wildfire and provide more time to evacuate residents.
- Fuels reduction projects – These projects focus on removing fuel loads across large areas where topography, ignition risk, or vegetation fuels necessitate intervention. The goal of fuels reduction projects is to reduce fuel loads across a larger area, thereby reducing the risk of ignition, rate of spread of a wildfire, and severity of a wildfire. For the MWPA, these types of projects would generally be planned and implemented with a variety of partners and reflect multiple objectives, such as improved ecosystem health. This treatment type is typically employed in open space or undeveloped areas which have high-risk baseline fuel loads.

Each type of fuels management project employs a combination of methods for vegetation removal. Typical equipment and methods, and the associated risks, are described below:

- Prescribed Herbivory – This treatment type is most effective in grasslands and forest understories and may be paired with manual clearance work. Grazing may utilize goats, sheep, or cattle to reduce understory fuels. Grazing animals are generally excluded from steep slopes, roadways, waterways, and riparian zones. Prescribed herbivory is generally low impact to sensitive resources but may not be appropriate in areas where livestock cannot be excluded from sensitive plant populations that would not benefit from prescribed herbivory, where risk of erosion is high, or in areas where vegetation is inedible or inaccessible to livestock.
- Hand pulling of invasive vegetation – This technique is typically utilized for stands of Scotch and French broom in Marin County. Hand-pulling involves hand removal of vegetation by crews on foot, using no saws or mechanical equipment. This treatment is considered low impact as it is similar to the impact expected from pedestrian traffic.
- Manual and Mechanical tools – Crews use chainsaws, pole loppers, broom pullers, chippers, and tractors or skid steers with a mower/masticator attachment to facilitate vegetation removal. Mechanical equipment typically produces a greater noise disturbance than hand tools.



Mechanical equipment also poses risks of hazardous material (gasoline or oil) leaks, or wildfire ignition. These risks can be addressed with standard best management practices. Examples of specific manual tools include:

- *Removal of dead and downed branches* – This may be done by hand or with small chainsaws or other equipment.
- *Tree limbing* – Large diameter trees are often “limbed”, or the lower limbs of trees are removed to reduce ladder fuels to the tree canopy. Trees are typically pruned between 2 and 10 feet from the ground, as long as this height does not exceed 1/3 of the tree’s full height. Restrictions on tree limbing height are project-specific and are outlined in each projects’ specifications.
- *Understory ladder fuel removal* – A portion of the vegetation near the ground is removed, often with the focus on removal of invasive species such as broom species, shrubs, and understory tree saplings. This is typically done with a mower, chainsaw, or equipment-loaded masticator. Ladder fuel removal is usually restricted by a specific diameter of vegetation removal, outlined in the specific project specifications.
- *Chipping* – Cut debris is chipped in a vehicle-towed or tracked chipper. Depending on environmental and safety conditions, chipped debris may be scattered on site or hauled off site for disposal at a proper disposal facility. Other biomass processing methods may be employed for chips and cut vegetation.
- *Removal of trees* – Hazardous trees, such as dead and leaning trees threatening structures or roads, may be removed using chainsaws, ropes, and other equipment. Generally, non-native trees are a higher priority than native trees for removal.
- *Air curtain burners* – Air curtain burners are sometimes used to remove cut debris rather than a chipper or pile burning. This equipment allows crews to dispose of cut debris in a manner that is more efficient than chipping. This equipment can be expensive to access and is not always a feasible option for all projects.

Most treatments emphasize removal of invasive species over native plant species, as this reduces the risk of wildfire while also improving the ecological function of the plant community. All projects avoid wetted streams and wetlands and sensitive resource areas unless specifically permitted through appropriate regulatory agencies. Additionally, fuel break work occurs typically on roadsides, behind neighborhoods and infrastructure, and along ridges where fuels breaks would be beneficial for first responders fighting wildfires and are not designed to cut or remove patches of habitat within forested NSO habitat or other sensitive habitat types.

The majority of treatment types have the potential to cause noise or visual disturbance to nesting birds including NSO if work occurs within close proximity to an active nest during the nesting season.

### ***Impact Avoidance and Minimization***



MWPA reviewed NSO-focused resource avoidance measures from agencies, fuels reduction specialists, and members of the public to consolidate and implement avoidance measures that would be practical in the field and protect the sensitive resources in Marin County. Impact avoidance measures, referred to as MWPA project design and implementation features (PDIFs), have been developed and continue to be improved for all the sensitive resources that have potential to be impacted by the proposed vegetation management and wildfire fuels reduction activities being undertaken using MWPA funding, including riparian resources, culturally sensitive resources, sensitive plants, and many others. These measures are being applied to individual projects as appropriate.

While NSO are present year-round, during the nesting season, nesting owls are unable to leave the nest area to move away from loud noises or other disturbances without resulting in nest or chick abandonment, which would constitute “take” under state and federal laws. NSO nesting season begins in February and continues through the end of July, as described by Point Blue (Point Blue 2015). Several disturbance avoidance PDIFs apply specifically to the nesting season and are summarized below. This approach is standard practice for nesting bird protections across migratory bird species in California. Presumably, if an individual NSO is present near active work areas outside the nesting season (August 1 through January 31) and the owl is disturbed by that work, the bird can fly away, resulting in no “take” of the species. Additionally, NSO do not strictly stay in their nesting activity centers year-round; they are heavily utilized while NSO are actively nesting but may leave these activity centers if nesting has failed or has been completed for the year. If an individual NSO is encountered during work, all crews will have already received environmental training to identify and avoid the animal. Many MWPA project work areas occur in the vicinity of NSO activity centers, which involve workers and crew conducting vegetation thinning and removal of small trees (e.g., up to 8 inches DBH) (MWPA 2021). Implementation of the measures detailed below during work on these projects ensure that no significant impacts to NSO will occur as a result of project activities. CEQA categorical exemptions related to several approved projects that incorporate these measures are available online at [MWPA’s website](#).

MWPA has prepared four PDIFs to incorporate into all MWPA-funded projects: NSO-1 NSO-2, NSO-3, and NSO-4, all of which are provided in full below with the language as of the publication of this document. These features ensure that nests and nesting activities are not disturbed to the level of “take” (unless an Incidental Take Permit is obtained). As projects are processed, PDIF language may evolve and improve. Additionally, the PDIFs ET-1 (also provided below) for mandatory environmental awareness training addresses many sensitive resources and significant impact avoidance measures, including those specific to NSO. These PDIFs will provide full protection for this species in most cases. Additional coordination with partner agencies and organizations may also be incorporated into MWPA work to ensure crews can avoid active nests. PDIFs NSO-1 through NSO-4, and ET-1 require:

### **NSO-1: NSO Nesting Season Avoidance**

*Each project will be reviewed by a qualified biologist to determine if northern spotted owls have potential to occur near proposed project activities. Within areas where northern spotted owl*



*have the potential to occur, work, including mowing with heavy equipment, the mechanical removal of vegetation, or prescribed burning, including pile and broadcast burning, will occur outside of the northern spotted owl nesting season to the extent feasible (February 1 to July 31).*

*If work must occur during the northern spotted owl nesting season, either NSO-2 or NSO-3 will apply.*

## **NSO-2: Work During NSO Nesting Season – Surveys**

*Within an area where northern spotted owl has the potential to occur, when work will occur during the northern spotted owl nesting season (February 1 through July 31), and work is not considered low-impact by a qualified biologist the following measure will apply. Low impact type activities include, but are not limited to, goat grazing, hand pulling of weeds, hand trimming of trees and vegetation with non-mechanized equipment, chipping from existing roadways in residential areas, and use of mechanized equipment adjacent to roads or in residential areas that is a typical noise for the environment. In contrast, high-impact activities may include operation of heavy machinery in wildlands with lower baseline environmental noise, or work which produces noise disturbance for a longer duration than is typical in the environment.*

*The biologists will determine if a known breeding pair is found within 0.25 mile of the proposed activity (i.e., from existing surveys that season or historic data) and perform a nest check to confirm presence. If no survey data for the season has been completed for the areas, two surveys will be conducted by a qualified biologist (whose qualifications have been approved by the MWPA or lead public agency) for nesting northern spotted owls during the months of April and May preceding the commencement of these activities. At a minimum, the survey area will include all suitable nesting habitats within 0.25 mile of any planned activity sites, and then one of the two options listed below will be implemented. If access cannot be secured for surveys, then work should be delayed until after the nesting season, unless it can be shown that noise generation from the activities and the activities proposed would be below noise and visual disturbance levels for northern spotted owls (refer to USFWS Revised Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California) at the nest site, if known.*

*If it is conclusively determined that there are nesting northern spotted owls, planned activities that generate noise (e.g., mowing, heavy equipment usage, crews with hand tools that generate noise) in areas without regular human disturbances from human residency (e.g., leaf blowers, home construction and remodeling, roadways), that are within 0.25-mile of an identified active nest will not begin prior to September 1 unless the young have fledged, at which time work may begin no earlier than July 10. Prescribed burns may only occur within suitable northern spotted owl habitat (as determined by a qualified biologist) during the nesting season if protocol surveys*



*have determined that northern spotted owl nesting is not occurring in the area of planned activity.*

*If work must occur within 0.25 mile, and work has been determined to have the potential to impact an active northern spotted owl nest, CDFW and USFWS would be consulted to determine if take could occur and whether further permits are required.*

For projects with larger tree removal, including hazard trees, included in the prescription, the following PDIFs (NSO-3) will be implemented to ensure that NSO are not disturbed during nesting season. This PDIF provides additional protections related to the removal of large trees which could potentially serve as suitable nesting habitat for NSO:

### **NSO-3: NSO Habitat Alteration**

*For projects involving removal of large trees (10 inches DBH or greater) in potential northern spotted owl roosting, or nesting habitat (as identified during the desktop review) in areas without regular human disturbances from human residency, habitat alteration within core use areas (nesting and roosting habitat) will be planned in consultation with a qualified biologist.*

Additionally, dusky-footed woodrats are a primary prey species for NSO in Marin County, and nests are protected as part of our projects. The following PDIF protects woodrats within a project footprint:

### **NSO-4: Retain Dusky-Footed Woodrat Nests**

*Dusky-footed woodrats are important prey for northern spotted owls. Whenever feasible, project activities will leave dusky-footed woodrat nests intact. If possible, maintain a 3-foot buffer of vegetation around dusky-footed woodrat middens.*

This language has been prepared to be consistent with existing permit language adopted by local resource agencies and land managers. Below is an excerpt from the BFFIP (Draft EIR, Appendix F) (MMWD 2019), which includes work similar to, but more intensive for some activities than the MWPA's currently approved projects:

*The proposed projects will also improve foraging habitat for NSO to the extent that it will reduce understory density and therefore permit foraging by owls in flight, with the added benefit of reduction in fuel load. If existing woodrat nests are avoided, impacts to prey (woodrat) density should not be affected; a study of dusky-footed woodrats in the redwood region of California did not find an association between abundances of woodrats and different intensities of forest thinning (Hamm and Diller 2009).*

In addition to NSO-1 through NSO-4, implementation of PDIF ET-1 will ensure that all crews on site have received generalized training related to ecology, identification, and avoidance PDIFs for all



sensitive resources on site including NSO. The training will include an overview of NSO PDIF language NSO-1, NSO-2, NSO-3, and NSO-4 as applicable, so that crew members at all levels will assist with implementation of the NSO protection PDIFs.

### ***ET-1: Environmental Training for Biological Resources***

*All crew members and contractors will receive training from a qualified registered professional forester (RPF) or biologist prior to beginning a treatment project where sensitive biological resources could occur in the work areas. The training will describe the appropriate work practices necessary to effectively implement the appropriate project design and implementation features and to comply with the applicable environmental laws and regulations. The training will include the identification, relevant life history information, and avoidance of potentially present special-status species with potential to occur; identification and avoidance of sensitive natural communities and habitats with the potential to occur in the treatment area; best management practices; and reporting requirements. As appropriate, the training will include protocols for work, such as specific trimming methods, where applicable. The training will instruct workers when it is appropriate to stop work and allow wildlife encountered during treatment activities to leave the area unharmed, and when it is necessary to report encounters to a qualified RPF or biologist. The qualified RPF or biologist will immediately contact the California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS), as appropriate, if any wildlife protected by the California Endangered Species Act (CESA) or Federal Endangered Species Act (ESA) is encountered and cannot leave the site on its own (without being handled).*

### **Consistency with Revised Recovery Plan for the NSO (USFWS 2011) and Larger Scale Habitat Resiliency from Fuels Management for Larger Scale Ecosystem Resiliency**

Fuels treatments are designed for ecological resiliency, and as such, are not performed to the intensity levels of timber harvesting that is a recognized concern for the species. The types of work performed would not alter existing habitats in a way that would allow for encroachment of barred owls nor the loss of foraging and nesting habitat. Fuels treatments do not remove large volumes of timber or create open and disturbed patches of forest that are prone to encroachment by invasive species and rapid regeneration of primary successors. Rather, fuels treatments are designed to remove overgrown brush and vegetation, including small-diameter trees, downed woody debris, non-native invasive fire-prone species, and dead and dying shrubs and trees, as well as to limb-up existing trees, remove ladder fuels, and thin understory shrubs to prevent potential fires from reaching tree canopies, where they may spread more easily due to wind or other factors. Fuels treatments conducted within the wildland-urban interface at habitat edges, such as fuel breaks, are typically located in sub-optimal habitat for NSO and other species as well as outside of known NSO activity centers, where risk of affecting NSO habitat or individuals would be highest. Further, fuels treatments are designed to prevent or reduce the intensity



of potentially catastrophic fires, which may provide additional habitat protection for NSO by preventing fires from spreading into habitat from urban areas, such as roadsides, which are common ignition sources. While there are several known NSO activity centers near urban areas within Marin County including in residential backyards, implementation of the MWPA PDIFs will avoid significant impacts to NSO during nesting season. Activity centers and continually successful nest sites near urban areas and within neighborhoods indicate a level of tolerance of human activity and noise.

Fuels reduction treatments will improve ecosystem health and community safety in the short term by reducing wildfire risk and removing excessive fuels, but continued fuels management will need to be implemented and maintained over the long term to maintain a suitable buffer within the wildland-urban interface.

## **CONCLUSION**

MWPA's fuels reduction project activities aim to prevent highly destructive wildfires by thinning the understory to reduce ladder fuels, which will also provide improved foraging habitat for NSO. Decades of fire suppression have led to conditions that have increased wildfire intensity throughout the state, leading to over 4 million acres burned in 2020, the most destructive wildfire season on record (FMTF 2021). MWPA is in a unique position to address this problem, and their approach to forest management is not only intended to save human lives and structures, but also benefit the mature forests where NSO reside. Selective fuels reduction treatments in the forest understory could serve to maintain NSO nesting trees while thinning the understory, particularly non-native invasive species, and minimizing the risk of high-intensity wildfire. Selective understory thinning can increase NSO's access to the rodent prey base that lives there and therefore improve NSO habitat. Treatment activities such as mechanical removal of vegetation could have impacts on NSO if done without regard to ecological conditions, timing, or intensity of treatments, but the MWPA PDIFs are designed so these activities do not significantly impact nesting NSO and ensure that the species' prey base is maintained. The goals of fire prevention and NSO conservation can be mutually beneficial in stewarding the lands of Marin County toward greater fire resilience.



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