Western Riverside County
Multiple Species Habitat Conservation Plan
Biological Monitoring Program

2020 Northern Harrier Survey Report

Female-type adult Northern Harrier (*Circus hudsonius*) photographed by Conan Guard.

1 April 2021

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NOTE TO READER:

This report is an account of survey activities conducted by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. Reserve assembly is ongoing and is expected to take 20 or more years to complete. The Conservation Area includes lands acquired under the terms of the MSHCP and other lands that have conservation value in the Plan Area (called public or quasi-public lands in the MSHCP). In this report, the term "Conservation Area" refers to these lands as they were understood by the Monitoring Program at the time the surveys were conducted.

The Monitoring Program monitors the status and distribution of the 146 species covered by the MSHCP within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies [i.e., the California Department of Fish and Wildlife (CDFW, formerly California Department of Fish and Game) and the U.S. Fish and Wildlife Service]. Monitoring Program activities are guided by defined conservation objectives for each Covered Species, other information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees. A list of the lands where data collection activities were conducted in 2020 is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies.

The primary author of this report was the 2020 Avian Program Lead, Nicholas Peterson. This report should be cited as:

Biological Monitoring Program. 2021. Western Riverside County MSHCP Biological Monitoring Program 2020 Northern Harrier Survey Report. Prepared for the Western Riverside County Multiple Species Habitat Conservation Plan. Riverside, CA. Available online: https://www.wrc-rca.org/species-surveys/.

While we have made every effort to accurately represent our data and results, the reader should recognize that data management and analysis are ongoing activities. Anyone wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

Please contact the Monitoring Program Administrator with questions about the information provided in this report. Questions about the MSHCP should be directed to the Executive Director of the RCA. Further information on the MSHCP and the RCA can be found at www.wrc-rca.org.

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INTRODUCTION

The Northern Harrier (also referred to as "harrier"; *Circus hudsonius*, formerly *C. cyaneus*; Chesser et al. 2017) is one of 45 bird species covered by the Western Riverside County MSHCP and is a Species of Special Concern in the State of California (Davis and Niemela 2008). The statewide population is considered moderately reduced (>20% to ≤40%) since population estimates reported by Grinnell and Miller (1944), with a 2008 estimate of 1000–10,000 birds. Breeding Bird Survey (BBS) data from 1993–2017 further indicate that Northern Harrier detections within the Coastal California Bird Conservation Area, which includes western Riverside County, have declined significantly, at a rate of 3.7% per year (Pardieck et al. 2020). This means that BBS detections of harriers have declined a cumulative 60% during that time period. Additionally, the range size of Northern Harriers in California is slightly reduced (>10% to ≤20%) since the publication of Grinnell and Miller (1944). By 2028, habitat loss, habitat degradation, or other human-induced threats are projected to moderately reduce (>10% to ≤15%) the species' population in California (Davis and Niemela 2008).

Five species objectives are identified for Northern Harriers, three of which are directed at conserving breeding locations and monitoring nests (Dudek & Associates 2003). Seven known and historic harrier breeding locations are identified in the MSHCP: Mystic Lake/San Jacinto Wildlife Area (WA), Lake Skinner/Diamond Valley Lake, Chino Hills, Lake Mathews/Estelle Mountain, Lake Elsinore grasslands/Collier Marsh, Vail Lake/Wilson Valley/east Temecula Creek, and Garner Valley (Figure 1). Objective 5 of the MSHCP species account specifies that the continued use of, and reproduction in, ≥75% of the known and historic locations (hereafter Core Areas) by harriers be documented at least once every five years. Finally, two additional areas, Potrero and the Prado Basin/Santa Ana River, are identified as containing suitable breeding habitat (Dudek & Associates 2003).

The Northern Harrier is a medium-sized raptor whose breeding range extends south of the Alaskan tundra and throughout Canada, south to southern California, east to southern Texas, and across to northern Virginia (Hands et al. 1989). Outside of the Plan Area in California, breeding harriers occur in the Central Valley, Sierra Nevada Mountains, and northeastern California at elevations ranging from sea level to 1700 m (Garrett and Dunn 1981). Documentation of harriers breeding in western Riverside County is sparse (Garrett and Dunn 1981), though some locations within the Plan Area, including Mystic Lake/San Jacinto WA (Garrett and Dunn 1981), Lake Skinner (Bloom 2002, pers. comm. *in* Dudek & Associates 2003), Chino Hills, Lake Mathews/Estelle Mountain, Lake Elsinore grassland/Collier Marsh, Vail Lake/Wilson Valley/east Temecula Creek, and Garner Valley (Cooper 2001) are identified as historical breeding locations. The MSHCP identifies these historical breeding locations as the breeding Core Areas for Northern Harrier (Dudek & Associates 2003).

Throughout their range, harriers tend to nest on the ground in patches of shrubby or dense vegetation (Toland 1986). Nests are typically constructed near water but may also be in agricultural fields or grasslands several miles from water (Call 1978). The nest usually consists of a mound of sticks or grasses when built on wet habitat, or a cup of grasses when constructed on dry sites (Call 1978). Wet nest sites seem to be preferred,

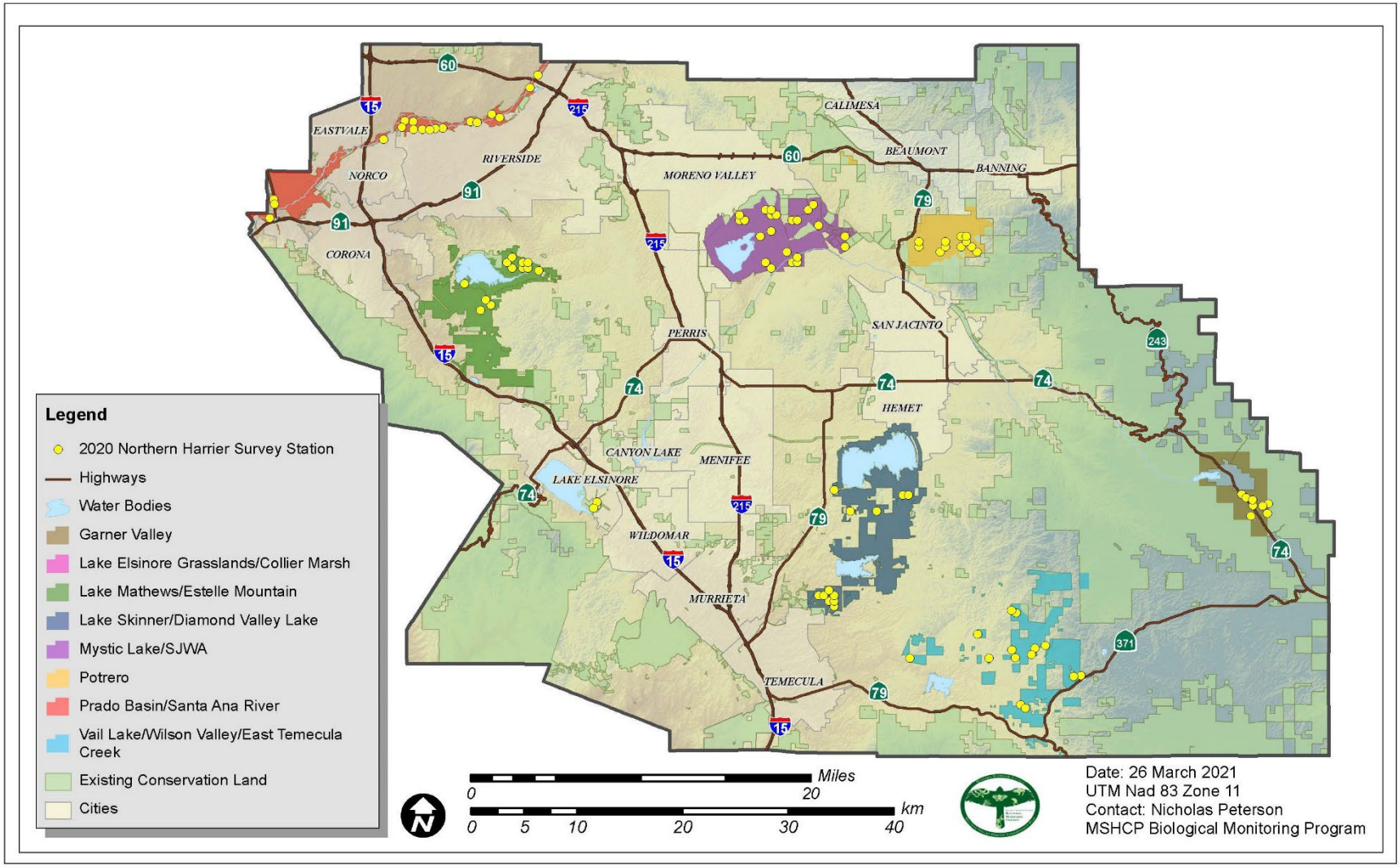

Figure 1. Northern Harrier Core Areas, and survey locations in 2020.

due to a decreased risk of predation, and nesting in less optimal habitats such as dry cropland may result in increased nest failure due to predation or human disturbance (Smith et al. 2020).

Data on pair formation and breeding dates for harriers in southern California are sparse, but range wide, males tend to arrive on breeding grounds 5–10 d before females, sometime between late February and early April. Nests are built soon thereafter, with construction lasting several days to two weeks. Eggs are laid between late March and late June, with the timing correlated with prey abundance (i.e., high *Microtus* vole abundance leads to earlier egg-laying). Incubation lasts 28–36 d, and nestlings fledge at about six weeks (42 d) of age; however, fledglings remain in the vicinity of the nest for an additional two weeks. Overall, the breeding season lasts 120–135 d (Smith et al. 2020).

Goals and Objectives

1. Document the distribution of Northern Harriers in the MSHCP-identified Core Areas.
    a. Conduct repeat-visit transect surveys within accessible Northern Harrier foraging and nesting habitat in the Plan Area, recording all bird species observed.
2. Determine whether Northern Harriers are successfully reproducing within the MSHCP-identified Core Areas.
    a. Following detection of a suspected breeding pair or a possible nest site, send a team of three biologists to the site to conduct rope-dragging in the vicinity of the detection. If an active nest is detected as a result, monitor the nest until it fails or fledges young.

METHODS

Survey Design

We conducted surveys for Northern Harriers by making repeat visits (n = 3 visits) to line transects (n = 87 transects; Figure 1) within the MSHCP-identified Core Areas. We developed distance sampling survey methods using techniques described in Buckland et al. (2001) and Rosenstock et al. (2002). The design we used allows for the calculation of harrier density and transect-level detection probability (p) given an adequate number of detections and can be used to evaluate correlations between covariates (MacKenzie et al. 2006).

We began study site selection by selecting Northern Harrier habitats that were identified as primary breeding (i.e., cismontane alkali marsh, freshwater marsh, playas and vernal pools, and grassland) and secondary foraging or wintering habitat (i.e., agricultural land, Riversidean alluvial fan sage scrub, and coastal sage scrub) by the MSHCP (Dudek & Associates 2003) within our ArcGIS (ESRI 2019) vegetation layer (CDFG et al. 2005). Selecting both primary and secondary habitats ensured the best chance of encountering harriers, whether in their breeding or foraging habitat. Next, we eliminated from our study site layer all places in which coastal sage scrub a) exceeded 10% density, or b) was on a slope exceeding 25 degrees. This enabled our biologists to navigate transects while thoroughly scanning for harriers, rather than having to hike

through thick vegetation or over difficult topography. Furthermore, investigators have suggested that, while harriers may nest near dense shrubs as a defense against predators, nesting in areas of high shrub density may have the negative effect of inhibiting take-off and landing for the harriers (Limiñana et al. 2006).

After we identified appropriate harrier habitat in GIS, we clipped that layer to a separate GIS layer consisting of the seven harrier Core Areas designated by the MSHCP, and the two additional areas that may contain breeding habitat; collectively, we will refer to these nine areas as the survey areas. Next, because the surveys areas and their associated harrier habitat appeared to fall within two categories (large and small), we concluded that it would not be possible for us to maintain a constant transect density (# of transects/ha of harrier habitat) throughout the Plan Area given the timeframe of the study and our limited number of personnel (i.e., large survey areas, of which there were four, would each have to contain >100 transects to ensure the smaller survey areas had an adequate number of transects). Instead, we decided to place transects at a density of 1 transect/~95 ha of habitat in the larger survey areas (i.e., Lake Mathews, Lake Skinner, Potrero, and San Jacinto WA) and 1 transect/~8 ha of habitat in the smaller survey areas (i.e., Chino Hills, Garner Valley, Lake Elsinore, Santa Ana River, and Wilson Valley).

Next, we generated randomly-located transect center points, separated from one another by at least 500 m, at our desired densities within the survey areas. We oriented transects in a north-south direction (Buckland et al. 2015), except where this was not feasible due to the configuration of small parcels of Conserved Land. Transects were 250 m long, consisting of three navigational points: one central point and two termini, each of which were 125 m from the central point.

Field Methods

We began surveys on 28 January 2020 and completed them on 3 June 2020. We commenced surveys no earlier than 0.5 h after sunrise and each observer attempted to conduct a minimum of five transects per day. We terminated surveys early if the temperature exceeded 35 °C or during heavy precipitation or fog. Additionally, we did not conduct surveys for 48 h following significant precipitation events, any time vehicles could leave ruts in roadways, or any time there was significant snow or ice accumulation on the roads being used to access transects. Harrier flight activity increases with wind speed (Wilkinson and Debban 1980), so we did not terminate surveys due to high wind speeds unless wind caused safety concerns for our personnel (e.g., dust/debris storms).

At the beginning of the survey (i.e., at one of the termini), observers recorded on their data sheet the transect start time, ambient temperature (°C), and sky conditions. Observers surveyed transects beginning at one of the transect termini and navigating to the central point, and then to the opposite terminus of the transect, ensuring that they remained along a straight path during the survey. Observers attempted to walk at a constant speed while surveying for harriers, spending a minimum of 10 min walking the length of the transect. For each perched harrier encountered perpendicular to the transect, observers recorded its distance (m), determined using a laser rangefinder, and the sighting angle (°) to the bird relative to the transect. If a harrier was detected and was not perpendicular to the transect, the observer still recorded on the data sheet the presence of the bird, but we did not record distance and sighting angle. Observers did not record the

sighting angle or distance to harriers that were flying because measuring such distances with a rangefinder was difficult or impossible.

While walking the transect, observers also recorded on their data sheet information for all bird species detected. For non-covered species, observers recorded information for only the first individual of that species detected, which provided species richness data for the site. For such species, observers recorded the four-letter species code, age class information, and sex. For Covered Species, observers recorded the four-letter species code, age class, and sex for every individual detected along the transect. If observers were unsure whether they had already recorded data on an individual (i.e., they were double-counting), they erred on the side of caution and recorded information on that individual. If a harrier was detected during a survey, observers spent as much time as necessary to determine whether the harrier had an active nest nearby. This was done while either standing on the transect and observing the harrier or following completion of the transect survey.

Finally, in 2020 we incorporated a removal sampling design for our harrier surveys to use our time more efficiently (MacKenzie et al. 2006). If we detected a harrier along a transect during a survey, we did not conduct additional surveys along that transect in subsequent survey rounds; however, we did revisit the site to search for nests.

RESULTS

Northern Harrier Detections and Nesting

We conducted three survey rounds for Northern Harriers in 2020, during which we detected 140 avian species, including 27 covered by the MSHCP (Appendix A). We have detected harriers in six (85.7%) of the seven Core Areas within the current five-year reporting period (2016–2020), including incidental observations in 2017 in Garner Valley and Lake Elsinore grasslands/Collier Marsh; and transect-level detections during 2020 Northern Harrier surveys in Mystic Lake/San Jacinto WA, Lake Mathews-Estelle Mountain, Lake Skinner/Diamond Valley Lake, and Vail Lake/Wilson Valley/east Temecula Creek. We have never detected harriers in the Chino Hills Core Area. Additionally, we detected Northern Harriers at Potrero and Prado Basin/Santa Ana River, both of which are identified by the MSHCP as containing suitable harrier breeding habitat (Figure 2). Finally, we did not find any evidence of harrier nesting within the Plan Area in 2020, or more broadly within the current reporting period (Table 1).

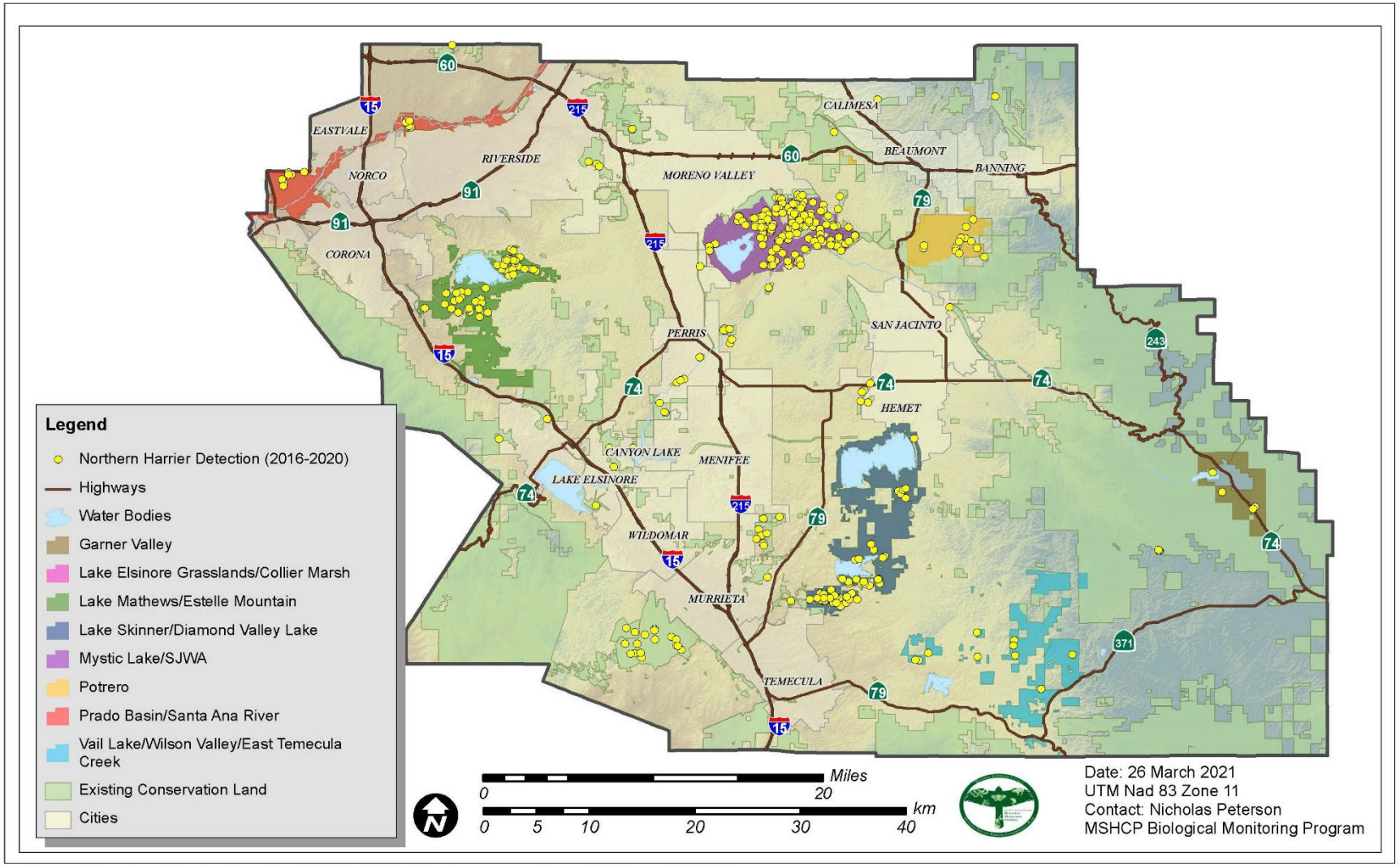

Figure 2. Northern Harrier detections (2016-2020) within the western Riverside County MSHCP.

Table 1. Most recent detection of, and successful nesting attempt by, Northern Harriers within each survey area, as observed by Monitoring Program biologists. Detections occurred incidentally or during focused 2020 Northern Harrier surveys. Parenthetical year precedes current reporting period (2016–2020) and thus does not count toward meeting the nesting objective.

Survey Area	Year of most recent Northern Harrier detection	Year of most recent successful nest
Core Areas		
Chino Hills	Never	Never
Garner Valley	2017	Never
Lake Elsinore grasslands/Collier Marsh	2017	Never
Lake Mathews-Estelle Mountain	2020	Never
Lake Skinner/Diamond Valley Lake	2020	Never
Mystic Lake/San Jacinto WA	2020	(2009)
Vail Lake/Wilson Valley/east Temecula Creek	2020	Never
Additional areas with breeding habitat		
Potrero	2020	Never
Prado Basin/Santa Ana River	2020	Never
Summary for current reporting period (2016–2020)	**85.7% of Core Areas 100% of additional areas**	**0% of Core Areas 0% of additional areas**

Detection Rates Within Survey Areas

Our biologists detected Northern Harriers along 40 (46.0%) of the transects we surveyed in 2020. More specifically, we detected harriers along more than half of the transects within the Lake Mathews-Estelle Mountain, Lake Skinner/Diamond Valley Lake, Mystic Lake/San Jacinto WA, and Potrero areas, but along less than 15% of transects within the remaining areas (Table 2).

Table 2. Number of transects surveyed within each survey area, and the number of transects within each survey area along which we detected Northern Harriers in 2020. We were unable to conduct any surveys within the Lake Elsinore grasslands/Collier Marsh Core Area due to COVID-19 closures.

Survey Area	No. of transects surveyed	No. (%) of transects with Northern Harrier detections
Core Areas		
Chino Hills	1	0 (0)
Garner Valley	8	0 (0)
Lake Elsinore grasslands/Collier Marsh	0	0 (NA)
Lake Mathews-Estelle Mountain	12	7 (58.3)
Lake Skinner/Diamond Valley Lake	10	6 (60)
Mystic Lake/San Jacinto WA	21	18 (85.7)
Vail Lake/Wilson Valley/east Temecula Creek	14	2 (14.3)
Additional areas with breeding habitat		
Potrero	11	6 (54.5)
Prado Basin/Santa Ana River	10	1 (10)
Overall	**87**	**40 (46.0)**

DISCUSSION

Northern Harrier Detections and Nesting

We observed Northern Harriers using Conserved Land in 85.7% of the seven Core Areas during the current reporting period (2016–2020) (Figure 2). As a result, we conclude that the objective requiring documentation of harriers using ≥75% of listed Core Areas is currently being met. These results are similar to what we reported for our 2015 Northern Harrier surveys, when we detected harriers in every Core Area except Chino Hills during that current reporting period, plus Potrero and Prado Basin/Santa Ana River.

We did not detect any evidence of nesting within the current reporting period, so we cannot conclude that the objective requiring successful reproduction within ≥75% of listed Core Areas is currently being met. Northern Harrier nests may be relatively rare on Conserved Land within the Plan Area, as evidenced by the fact that our Program biologists have found just four nests since 2009, despite intense and focused survey efforts in 2009, 2014, and 2020. Two nests, both of which we found in 2009, were within the Mystic Lake/San Jacinto WA Core Area. One of these nests fledged young and the other nest failed. A third nest was also found in 2009 and was within the Vail Lake/Wilson Valley/east Temecula Creek Core Area. This nest was ultimately abandoned during the incubation stage (Biological Monitoring Program 2010). Finally, our biologists located a fourth Northern Harrier nest in 2010 near the Lake Mathews-Estelle Mountain Core Area. Subsequent to its discovery, we determined the nest was on private property,

so we were ultimately unable to monitor the outcome of this nest (Biological Monitoring Program 2015).

Detection Rates Within Survey Areas

We detected harriers most frequently within the Mystic Lake/San Jacinto WA Core Area during our 2020 surveys (Table 1). This area is unique among our harrier survey areas because it consists of relatively flat, open habitat that is vegetated by grasses and shrubs, and it contains ponds and other flooded areas that are used for duck and upland game bird hunting. Not only do these habitats provide foraging and nesting opportunities for Northern Harriers (Bohall and Collopy 1984; Christiansen and Reinert 1990), but the open habitat meant that our observers were better able to detect low-flying, foraging harriers from long distances, likely increasing detection probability. Additionally, individual harriers could be detected on multiple transects on a given day because the large areas in which they foraged could potentially be intersected by multiple transects. Overall, the higher detection rate of harriers at Mystic Lake and San Jacinto WA may be an artifact of increased numbers of harriers attracted to the preferred nesting and foraging habitat relative to the other survey areas, but it could also be a result of our observers being able to detect the same harrier on multiple transects due to the relatively flat and open terrain that is characteristic of the area.

Compared to the Mystic Lake/San Jacinto WA Core Area, we detected harriers less frequently within the Lake Mathews-Estelle Mountain and Lake Skinner/Diamond Valley Lake Core Areas, and Potrero, although we still detected harriers along more than 50% of transects in all three sites in 2020 (Table 1). These areas are similar to Mystic Lake/San Jacinto WA in that they consist largely of open habitat that may be suitable for use by wintering and nesting harriers; however, these sites contain less wet habitat, such as marshes and irrigated agriculture, than Mystic Lake/San Jacinto WA, and may therefore have relatively fewer *Microtus* prey (Krebs 1966). *Microtus* voles are one of the preferred prey items of harriers (Bildstein 1988; Zakorski and Swihart 2020), and a paucity of *Microtus* voles could lead to fewer harriers during the nesting season. For example, harrier nesting has been documented as being closely associated with vole abundance, with decreased vole abundance resulting in similar decreases in harrier nesting (Hamerstrom 1979; Hamerstrom et al. 1985).

Another feature within Lake Mathews-Estelle Mountain, Lake Skinner/Diamond Valley Lake, and Potrero that is different than Mystic Lake/San Jacinto WA, is more varied topography. This could result in fewer harrier detections by our biologists because low-flying harriers could potentially go undetected if, for example, they were foraging on the other side of a hill below which an observer was surveying. Although we cannot currently quantify this, it is likely that some harriers go undetected due to these factors. While our 2009 analyses of Northern Harrier detection probabilities did not directly account for the effect of an observer's view being diminished due to topography or vegetation, calculating independent detection probabilities for each survey area presumed that there were different factors affecting the harrier detection probability in survey areas and that the detection probabilities varied among survey areas. Indeed, our data in 2009 revealed higher detection probabilities of Northern Harriers within the flat, open Mystic Lake/San Jacinto WA Core Area compared to any other survey site (Biological

Monitoring Program 2010). This may have resulted from differences in topography and vegetation density, but our relatively infrequent harrier encounter history in other sites made us reluctant to conclude this with certainty.

Detection frequencies within the remaining survey areas were low compared to Lake Mathews-Estelle Mountain, Mystic Lake/San Jacinto WA, and Potrero (Table 1), and we observed a similar pattern during our 2014 Northern Harrier surveys (Biological Monitoring Program 2015). Lower detection frequencies may result from challenges in detecting harriers that were present, or from harriers simply being less common in those areas. For example, locations such as Garner Valley and Prado Basin/Santa Ana River are relatively flat, which should be conducive to detecting Northern Harriers, but they also contain tall, dense vegetation that may reduce the likelihood of detecting low-flying harriers. Conversely, Vail Lake/Wilson Valley/east Temecula Creek generally has less tall, dense vegetation, but more varied topography that could make detections of harriers difficult. Finally, Garner Valley and Vail Lake/Wilson Valley/east Temecula Creek do not generally have the wet habitat that is preferred by Northern Harriers, which may reduce the likelihood of use by the species, especially during the drier nesting season, thereby reducing the frequency at which we detected the species in 2020.

Recommendations

Future Surveys

Because our biologists have not been able to detect many Northern Harrier nests using conventional ground-searching methods, we may want to consider using unmanned aerial vehicles (UAVs) in future survey efforts to increase our chances of locating nests. Investigators have revealed that UAVs, equipped with thermal-imaging cameras, were helpful in locating nests of ducks, which construct ground nests similar to those constructed by Northern Harriers. The investigators also indicated that the use of UAVs did not negatively affect the survival of nests and may decrease the rate of abandonment by adult birds (Bushaw et al. 2020). Further, UAVs may allow for a more efficient search of large areas compared to biologists who search an area on foot.

Conservation and Management

Efforts should be made to conserve the wet upland habitat in the vicinity of the intersection of Tripp Flats Road and Bautista Canyon Road. Specifically, there is a pond 300 m southwest of this intersection, near which we frequently detect foraging harriers. A portion of this site is San Bernardino National Forest property, but most of the habitat in which the harriers could potentially nest is privately owned. This area is not currently designated by the MSHCP as a known or historic nesting site for harriers, but the MSHCP specifies that any new nesting sites found by our Program can be included in the list of known and historic nesting locations (Dudek & Associates 2003).

ACKNOWLEDGMENTS

We thank the land managers in the MSHCP Plan Area, who in the interest of conservation and stewardship facilitate Monitoring Program activities on the lands for which they are responsible. Funding for the Biological Monitoring Program is provided by the Western Riverside Regional Conservation Authority and the California

Department of Fish and Wildlife. Program staff who conducted surveys in 2020 were Masanori Abe, Collin Farmer, Cristina Juran, Robert Packard, Nicholas Peterson, and Nathan Pinckard.

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Appendix A. Avian species detected during 2020 Northern Harrier surveys. Species in bold are covered by the MSHCP.

COMMON NAME	SCIENTIFIC NAME
Acorn Woodpecker	*Melanerpes formicivorus*
American Avocet	*Recurvirostra americana*
American Coot	*Fulica americana*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Kestrel	*Falco sparverius*
American Pipit	*Anthus rubescens*
American White Pelican	*Pelecanus erythrorhynchos*
Anna's Hummingbird	*Calypte anna*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Audubon's Warbler	*Setophaga auduboni auduboni*
Bald Eagle	***Haliaeetus leucocephalus***
Barn Swallow	*Hirundo rustica*
Bell's Sparrow	***Artemisiospiza belli***
Belted Kingfisher	*Megaceryle alcyon*
Bewick's Wren	*Thryomanes bewickii*
Black Phoebe	*Sayornis nigricans*
Black-chinned Hummingbird	*Archilochus alexandri*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Black-necked Stilt	*Himantopus himantopus*
Black-throated Sparrow	*Amphispiza bilineata*
Blue Grosbeak	*Passerina caerulea*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Brewer's Sparrow	*Spizella breweri*
Bufflehead	*Bucephala albeola*
Bullock's Oriole	*Icterus bullockii*
Bushtit	*Psaltriparus minimus*
California Gull	*Larus californicus*
California Horned Lark	***Eremophila alpestris actia***
California Quail	*Callipepla californica*
California Scrub-Jay	*Aphelocoma californica*
California Thrasher	*Toxostoma redivivum*
California Towhee	*Melozone crissalis*
Canada Goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Canyon Wren	*Catherpes mexicanus*
Cassin's Kingbird	*Tyrannus vociferans*
Cedar Waxwing	*Bombycilla cedrorum*
Chipping Sparrow	*Spizella passerina*

Appendix A. Continued.

COMMON NAME	SCIENTIFIC NAME
Cinnamon Teal	*Spatula cyanoptera*
Clark's Grebe	*Aechmophorus clarkii*
Cliff Swallow	*Petrochelidon pyrrhonota*
Coastal California Gnatcatcher	***Polioptila californica californica***
Common Raven	*Corvus corax*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	***Accipiter cooperii***
Costa's Hummingbird	*Calypte costae*
Dark-eyed Junco	*Junco hyemalis*
Double-crested Cormorant	***Phalacrocorax auritus***
Downy Woodpecker	***Dryobates pubescens***
Eared Grebe	*Podiceps nigricollis*
Eurasian Collared-Dove	*Streptopelia decaocto*
European Starling	*Sturnus vulgaris*
Ferruginous Hawk	***Buteo regalis***
Forster's Tern	*Sterna forsteri*
Gadwall	*Mareca strepera*
Grasshopper Sparrow	***Ammodramus savannarum***
Great Egret	*Ardea alba*
Greater Roadrunner	*Geococcyx californianus*
Greater Yellowlegs	*Tringa melanoleuca*
Green-winged Teal	*Anas crecca*
Hairy Woodpecker	*Dryobates villosus*
Hooded Oriole	*Icterus cucullatus*
Horned Lark	*Eremophila alpestris*
House Finch	*Haemorhous mexicanus*
House Wren	*Troglodytes aedon*
Hutton's Vireo	*Vireo huttoni*
Killdeer	*Charadrius vociferus*
Lark Sparrow	*Chondestes grammacus*
Lawrence's Goldfinch	*Spinus lawrencei*
Lazuli Bunting	*Passerina amoena*
Least Bell's Vireo	***Vireo bellii pusillus***
Lesser Goldfinch	*Spinus psaltria*
Lewis's Woodpecker	*Melanerpes lewis*
Long-billed Curlew	*Numenius americanus*
Lincoln's Sparrow	***Melospiza lincolnii***
Loggerhead Shrike	***Lanius ludovicianus***
Long-billed Dowitcher	*Limnodromus scolopaceus*
Mallard	*Anas platyrhynchos*

Appendix A. Continued.

COMMON NAME	SCIENTIFIC NAME
Marsh Wren	*Cistothorus palustris*
Merlin	***Falco columbarius***
Mountain Chickadee	*Poecile gambeli*
Mountain Quail	***Oreortyx pictus***
Mourning Dove	*Zenaida macroura*
Nashville Warbler	***Leiothlypis ruficapilla***
Northern Flicker	*Colaptes auratus*
Northern Harrier	***Circus hudsonius***
Northern Mockingbird	*Mimus polyglottos*
Northern Pintail	*Anas acuta*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Northern Shoveler	*Spatula clypeata*
Nuttall's Woodpecker	*Dryobates nuttallii*
Oak Titmouse	*Baeolophus inornatus*
Orange-crowned Warbler	*Leiothlypis celata*
Pacific-slope Flycatcher	*Empidonax difficilis*
Phainopepla	*Phainopepla nitens*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Prairie Falcon	***Falco mexicanus***
Pygmy Nuthatch	*Sitta pygmaea*
Red Crossbill	*Loxia curvirostra*
Redhead	*Aythya americana*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Ring-billed Gull	*Larus delawarensis*
Rock pigeon	*Columba livia*
Rock Wren	*Salpinctes obsoletus*
Rough-legged Hawk	*Buteo lagopus*
Ruby-crowned Kinglet	*Regulus calendula*
Ruddy Duck	*Oxyura jamaicensis*
San Diego Cactus Wren	***Campylorhynchus brunneicapillus couesi***
Savannah Sparrow	*Passerculus sandwichensis*
Say's Phoebe	*Sayornis saya*
Sharp-shinned Hawk	***Accipiter striatus***
Snowy Egret	*Egretta thula*
Song Sparrow	*Melospiza melodia*
Sora	*Porzana carolina*
Southern California Rufous-crowned Sparrow	***Aimophila ruficeps canescens***

Appendix A. Continued.

COMMON NAME	SCIENTIFIC NAME
Spotted Towhee	*Pipilo maculatus*
Tree Swallow	***Tachycineta bicolor***
Tricolored Blackbird	***Agelaius tricolor***
Tundra Swan	*Cygnus columbianus*
Turkey Vulture	***Cathartes aura***
Vesper Sparrow	*Pooecetes gramineus*
Violet-green Swallow	*Tachycineta thalassina*
Warbling Vireo	*Vireo gilvus*
Western Bluebird	*Sialia mexicana*
Western Grebe	*Aechmophorus occidentalis*
Western Kingbird	*Tyrannus verticalis*
Western Meadowlark	*Sturnella neglecta*
White-breasted Nuthatch	*Sitta carolinensis aculeata*
White-crowned Sparrow	*Zonotrichia leucophrys*
White-faced Ibis	***Plegadis chihi***
White-tailed Kite	***Elanus leucurus***
White-throated Swift	*Aeronautes saxatalis*
Wilson's Snipe	*Gallinago delicata*
Wrentit	*Chamaea fasciata*
Yellow Warbler	***Setophaga petechia***
Yellow-breasted Chat	***Icteria virens***
Yellow-rumped Warbler	*Setophaga coronata*