**San Diego County 2021 Northern Harrier Surveys:**

**Breeding Surveys and Habitat and Threat Assessments Information**

**Project Background**

Northern harriers (*Circus hudsonius*; NOHA) breed across much of northern North America, and down to Baja California on the west coast. Their numbers have been steadily declining in California, likely as a result of reduced breeding habitat availability.

San Diego Management and Monitoring Program (SDMMP) was established by SANDAG in 2008 to coordinate regional monitoring and management of rare, threatened, and endangered species and their habitats on conserved lands in western San Diego County. SDMMP identified the 2021 NOHA breeding surveys as an important first step to developing a management strategy to facilitate the species’ recovery in western San Diego County. The purpose of these surveys is to document NOHA status at historic and recently occupied breeding locations on conserved lands, map suitable habitat, and evaluate current habitat conditions and threats.

Data collected during the 2021 surveys will be used to identify and prioritize regional management recommendations. It is anticipated that land managers will use these recommendations to develop projects to maintain or improve NOHA breeding habitat. There is potential for land managers to obtain funding for high priority NOHA management actions through SANDAG’s TransNet Land Management Grant Program.

**2021 NOHA Survey Instructions**

This survey protocol outlines the methods for conducting NOHA surveys across San Diego County between April and July, 2021. A team of two surveyors will collect data using two different software packages-Fulcrum and Collector. All point data will be collected in Fulcrum and all polygon data will be collected in Collector. Please remain on trails and roads when on conserved lands. When a team of surveyors arrive at their survey area here are the steps to complete:

1. Within the Northern Harrier Surveys form, open a new Northern Harrier Fulcrum form and record the initial information. Once you select YES for Tailgate Safety Meeting Complete, additional fields will pop up. Complete the **Weather Information Section** and start filling out the **Survey Effort Section**.
2. Review the aerial map and determine a suitable survey route for searching for NOHA. In particular, try to identify survey spots that will afford good views of the entire polygon or part of the polygon.
3. Walk/drive to your first survey spot (staying alert for the presence of NOHA) and spend 15 or 30 minutes there depending on how broad the viewshed is. If the viewshed is limited, spend 15 minutes, and if it is expansive, spend 30 minutes. If habitat is completely unsuitable, you do not need to spend the full duration there.
4. Watch and listen for 15/30 minutes at the first survey location.
	1. Depending upon the survey area, there may only be one patch, or there may be multiple patches or a long linear patch. We want surveyors to **spend at least 15 min per suitable habitat patch** (regardless of occupancy). Ensure all survey areas have 100 percent visual and aural coverage.
	2. Within the Survey Effort Section, please record the Dominant Surrounding Land Use(s) as descriptive text.
	3. Also record the Nesting Substrate Suitability for each survey area. This is a “broad” view of the nesting substrate. Choose 1 for locations with vegetation suitable for nesting, 2 for locations where nesting substrate is present but it appears to be unsuitable for nesting (e.g., it is immature, too short, lacks sufficient foliage, too sparse, or has recently been burned); choose 3 for locations where nesting substrate is currently absent but could potentially return (e.g., grassland that has been mowed), or choose 4 if the site is permanently unsuitable (e.g., has been converted to urban development, orchard, or vineyard). Briefly describe why you came to your conclusion on nesting substrate suitability in Comments.
5. There are 2 types of sub-polygon data that will be recorded in BOTH Fulcrum and Collector: **Occupied and Unoccupied sub-polygons**. For both sub-polygons, please make sure the location of the data you collect is near the center of the polygon. Move the “Locate” icon to the center of the sub-polygon when recording data. Use a bad-elf or other higher accuracy GPS to record/delineate the sub-polygons in Collector.
	1. As a general rule, create as few sub-polygons as possible, and avoid overly segmenting the survey area. If there are large stretches of unsuitable habitat between patches of suitable habitat, then several sub-polygons may be necessary.
6. For habitat patches that are **UNOCCUPIED**, select **NO** for the question: Is Breeding Survey Area Polygon Occupied by NOHA?
	1. Then complete the **Sub-Polygon Form** for each sub-polygon that is unoccupied. Make sure to label each sub-polygon with the survey area name for the polygon you are surveying, plus a sequential number (i.e. if you are at Batiquitos Lagoon, your first sub-polygon name will be Batiquitos Lagoon 1). Use the same naming scheme for your polygons in Collector as the Fulcrum data will be linked to the Collector sub-polygons with name/number.
	2. Delineate each sub-polygon (aka habitat patch) in Collector using the same naming scheme as Fulcrum. Please be specific in your drawing and delineate the specific suitable vegetation community (freshwater wetland/marsh, brackish/salt wetland/marsh, native grassland, nonnative grassland, coastal sage scrub, etc.) that is considered unoccupied.
		1. If you get to an area and there is breeding habitat but it is unoccupied, please map the area, label it as unoccupied, and fill out the threats and management form.
		2. If you get to an area that has no potential to support any habitat for breeding (short grass, rocky terrain, heavily disturbed, etc.,) there is no need to map any polygons, and no need to fill out threats and management.
	3. Please take several photographs for each suitable sub-polygon and label/describe them.
7. For habitat patches that are **OCCUPIED**, select **YES** for the question: Is Breeding Survey Area Polygon Occupied by NOHA.
	1. Watch the birds for 30 minutes to assess whether they are flying over, foraging, or engaging in breeding activity. Enter whether “Breeding behavior?” was observed, and depending on the selection there will be options for selecting among **all** breeding behaviors observed, or if no breeding behavior, whether it was fly-over or foraging.
	2. If breeding behavior is observed, try to locate the nest site. If located, select among substrate choices for where nest is placed. DO NOT try to approach the nest site.
	3. If you observe any nonbreeding NOHA, please record/document them using both the drop-down menu after you select “No” for whether there is breeding behavior (options for foraging or fly-over will be available), and in the “Foraging behavior observed?” box, where it will ask you to select **all** substrate types they were foraging over.
	4. Record ALL data in the **NOHA Occupied Location Form**. Be as detailed as possible and take your time to understand what the birds are doing. Add comments/notes where necessary.
	5. Please spend the time necessary to assess the habitat usage.
	6. Complete the form detailed above for every sub-polygon that is occupied.
	7. Complete the threats and management recommendations.
	8. Please take several photographs for each sub-polygon and label/describe them. Take both zoomed out/landscape photos, and more zoomed in habitat based/nesting substrate type photos *if possible*. However, in most instance, it will likely not be possible to get close enough to a nest area to take a photo. And please do no approach a nest site.
8. For incidental species please keep track of TRBL and any potential predators (both mammalian, avian, and others) that are in close proximity to the NOHA habitat in the **Wildlife Observations** form.

**Notes on Completing the Habitat and Threat Assessment Form**

When completing the habitat and threats assessment, please complete all fields on the form. In the next section, there are descriptions of high-quality habitat, threats and management techniques. Please review this to help you evaluate habitat and threats.

Please provide descriptions of habitat condition and the level and details of a threat. This **descriptive information is critical** for developing management recommendations after the surveys are completed. If you have ideas for management, please provide them. The insight from surveyors is very important for considering how best to manage threats or improve habitat conditions.

**Descriptions of NOHA Breeding Habitat and Threats and Potential Management Techniques**

The following descriptions of northern harrier breeding habitat, breeding and foraging behavior, and threats is heavily drawn from the Lab of Cornell’s *All About Birds* site.

**Habitat and Threats**

*Breeding Behavior*

* Northern Harriers usually fly slowly and low over the ground, their wings held in a V-shape as they glide. Most males have either one mate or two mates at a time, but some have up to five mates when food is abundant. Each male courts females and advertises his territory by performing sky-dancing displays: undulating, rollercoaster-like flights up to 1,000 feet off the ground, sometimes covering more than half a mile. Although they don’t protect large territories, both males and females vigorously defend the nest itself. Nesting females usually chase away other females, and males chase other males. Females incubate eggs and brood chicks, while males provide most of the food for the females and nestlings.

*Nesting Habitat Characteristics*

* Breeding Northern Harriers are most common in large, undisturbed tracts of wetlands and grasslands with low, thick vegetation. They breed in freshwater and brackish marshes, lightly grazed meadows, old fields, tundra, dry upland prairies, drained marshlands, high-desert shrubsteppe, and riverside woodlands across Canada and the northern United States. Western populations tend to breed in dry upland habitats, while northeastern and Midwestern populations tend to breed in wetlands.

*Nest Description*

* Either the male or the female chooses the nest site, which is on the ground and usually in a dense clump of vegetation such as willows, grasses, sedges, reeds, bulrushes, and cattails.
* Males sometimes start building a nest platform and the female finishes it. Later, both sexes bring in nesting material but the female takes charge of arranging them to form the nest. The nest platform is made with thick-stalked plants like cattails, alders, and willows. The inner lining uses grasses, sedges, and rushes. Nest building takes 1–2 weeks. The outside of the nest measures 16–24 inches wide by 1.5–8 inches high, while the interior is 8–10 inches wide by 2–4 inches deep.

*Foraging Behavior*

* Northern Harriers forage on the wing, coursing low over the ground. Unlike other hawks, they rely heavily on their sense of hearing to capture prey. In the breeding season they eat small mammals, reptiles, amphibians, and birds

*Threats to NOHA breeding and foraging habitat*

* Lack of suitable foraging habitat.
* Disturbance from humans (such as potential unauthorized trespass from adjacent trails; use of drones; off-road vehicles).
* Disturbance from dogs.
* Nest predators include coyotes, feral dogs, striped skunks, raccoons, red foxes, American Crows, Common Ravens, and Great Horned Owls.
* Livestock and deer sometimes trample eggs and nestlings underfoot.
* Fires can result in the loss of suitable breeding habitat.
* Invasive species encroachment making habitat less suitable.
* Removal due to foraging on federally threatened species (i.e. rails, California least terns).
* Other, please explain.

**Management Techniques**

*Reducing Human Disturbance*

* Posted notices about keeping dogs leashed, no off-road vehicles during breeding season, no drones, no off-trail hiking, have temporary trail closures, ranger patrols

*Predation Management*

* Trapping and removal of predators that are detected depredating nests.

*Other Threats Management*

* Keep cattle out of area if present in vicinity of nest site