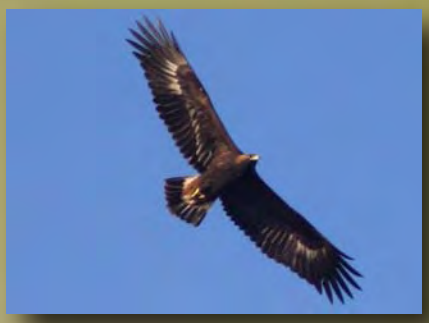
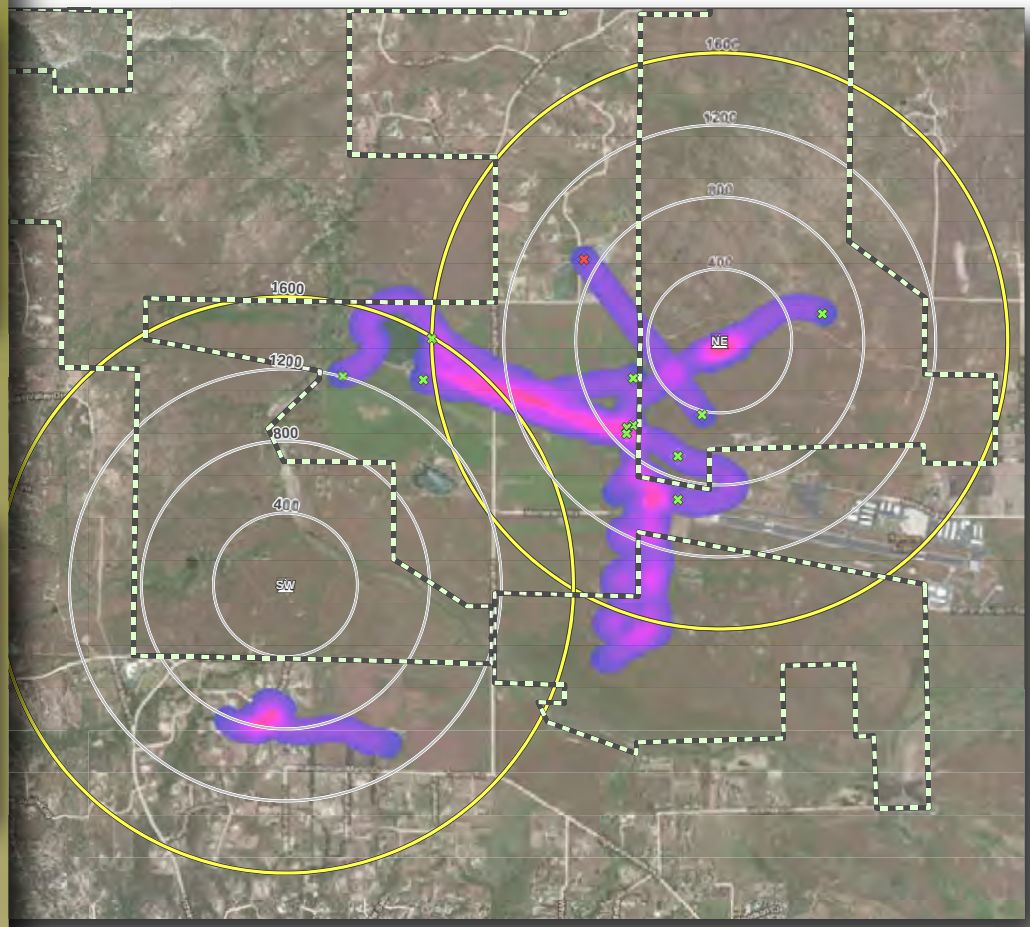


YEAR 1: SEPTEMBER 2013 THROUGH AUGUST 2014

RAMONA GRASSLANDS PRESERVE RAPTOR SURVEYS SUMMARY REPORT

County of San Diego,
Department of Parks and Recreation



Prepared for:
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County of San Diego
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San Diego, CA 92123
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401 West A Street, Suite 1200
San Diego, CA 92101
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December 2014

YEAR 1:
SEPTEMBER 2013 THROUGH AUGUST 2014
RAMONA GRASSLANDS PRESERVE RAPTOR SURVEYS
SUMMARY REPORT

FOR THE
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CHAPTER 1
INTRODUCTION

The Ramona Grasslands Preserve (Preserve) has been documented as a viable raptor foraging and breeding site (CBI 2007; County of San Diego 2010; WRI 2007). Golden eagles (*Aquila chrysaetos*) use the grasslands for foraging and have established nesting territories in the vicinity (e.g., Bandy Canyon and Kimball Valley) (CBI 2007). In 2013, a bald eagle (*Haliaeetus leucocephalus*) pair established a nest on the Preserve for the first time, and successfully fledged young.

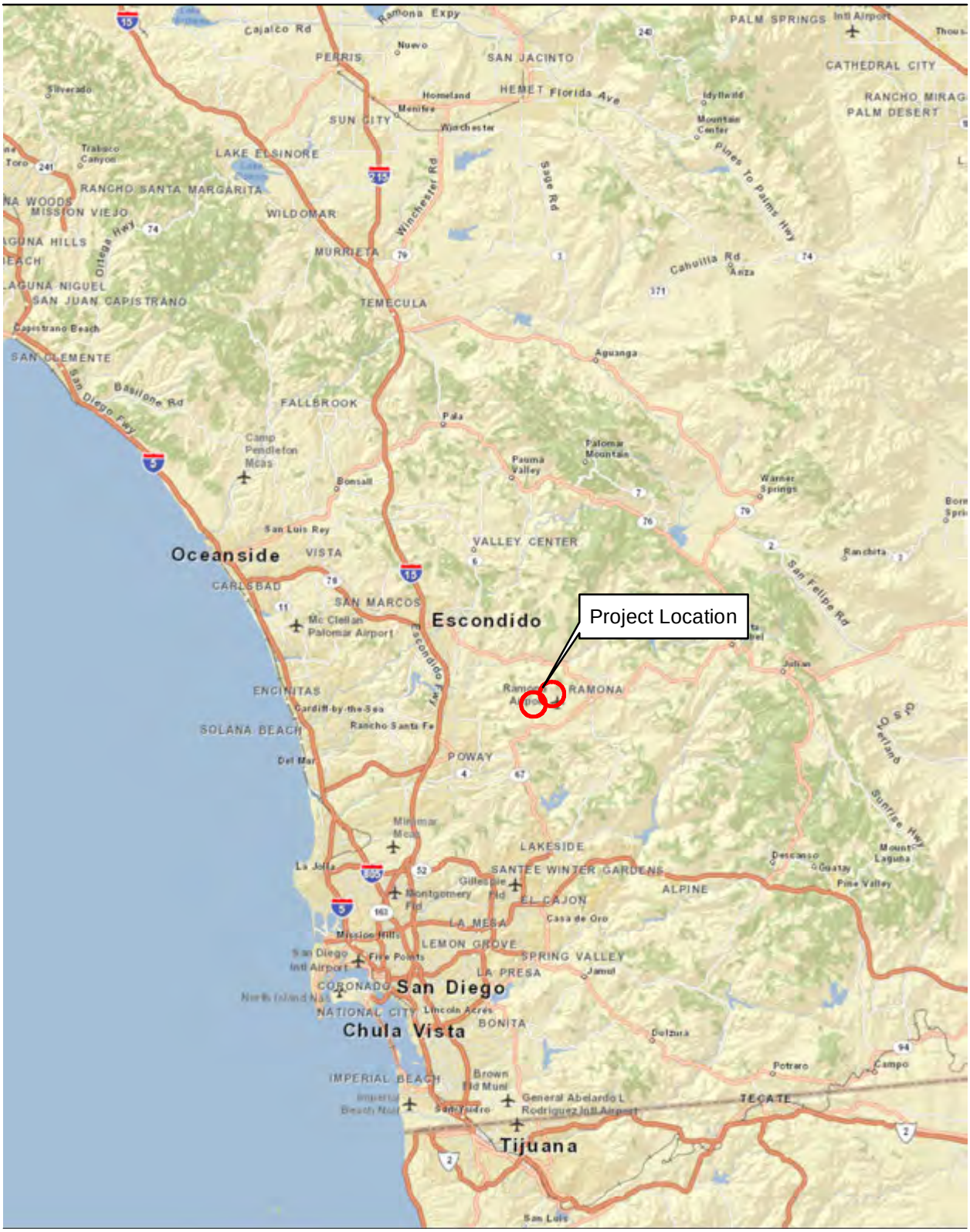
A 3-year raptor study was initiated by the County of San Diego (County) Department of Parks and Recreation (DPR) to collect baseline information on eagle and other raptor activity at the Preserve. Raptor foraging surveys and golden eagle nest monitoring was conducted by AECOM at the Preserve from September 2013 through August 2014 on behalf of the County DPR. AECOM worked in partnership with the U.S. Fish and Wildlife Service (USFWS) to complete these surveys. This report summarizes the results of Year 1 (September 2013 through August 2014) of the 3-year study. AECOM will continue surveys for Year 2 and Year 3.

1.1 PURPOSE OF STUDY

The purpose of this study is to conduct an eagle/raptor foraging study (study) for the Preserve and golden eagle nest monitoring in Bandy Canyon. Baseline information will provide a better understanding of species abundance and distribution within the Preserve, and be useful in informing management decisions (e.g., trail feasibility and alignments, seasonal closures) and will provide a reference point for any future studies or assessments pertaining to public use. Although a multi-use trail system is open to the public in the southwestern portion of the Preserve (Oak Country Trails II), the remainder of the Preserve is currently closed to public use. The Preserve Trail Plan (Appendix A) proposes opening the northeast portion of the Preserve in Phase I and a portion of the southwest Preserve in Phase II. Most of the northwest will be closed to the public except for occasional docent-led hikes at appropriate times of the year. The southeast portion of the Preserve will have no public use.

1.2 STUDY LOCATION

The Preserve is located in the Santa Maria Valley, situated between the coastal mesas and the mountains of the Peninsular Ranges in west-central San Diego County near the town of Ramona, California (Figure 1). The Preserve is bordered by rural residential development to the south and



Source: ESRI

6 0 6 12 Miles

Scale: 1 = 760,320; 1 inch = 12 miles

Figure 1
Regional Map

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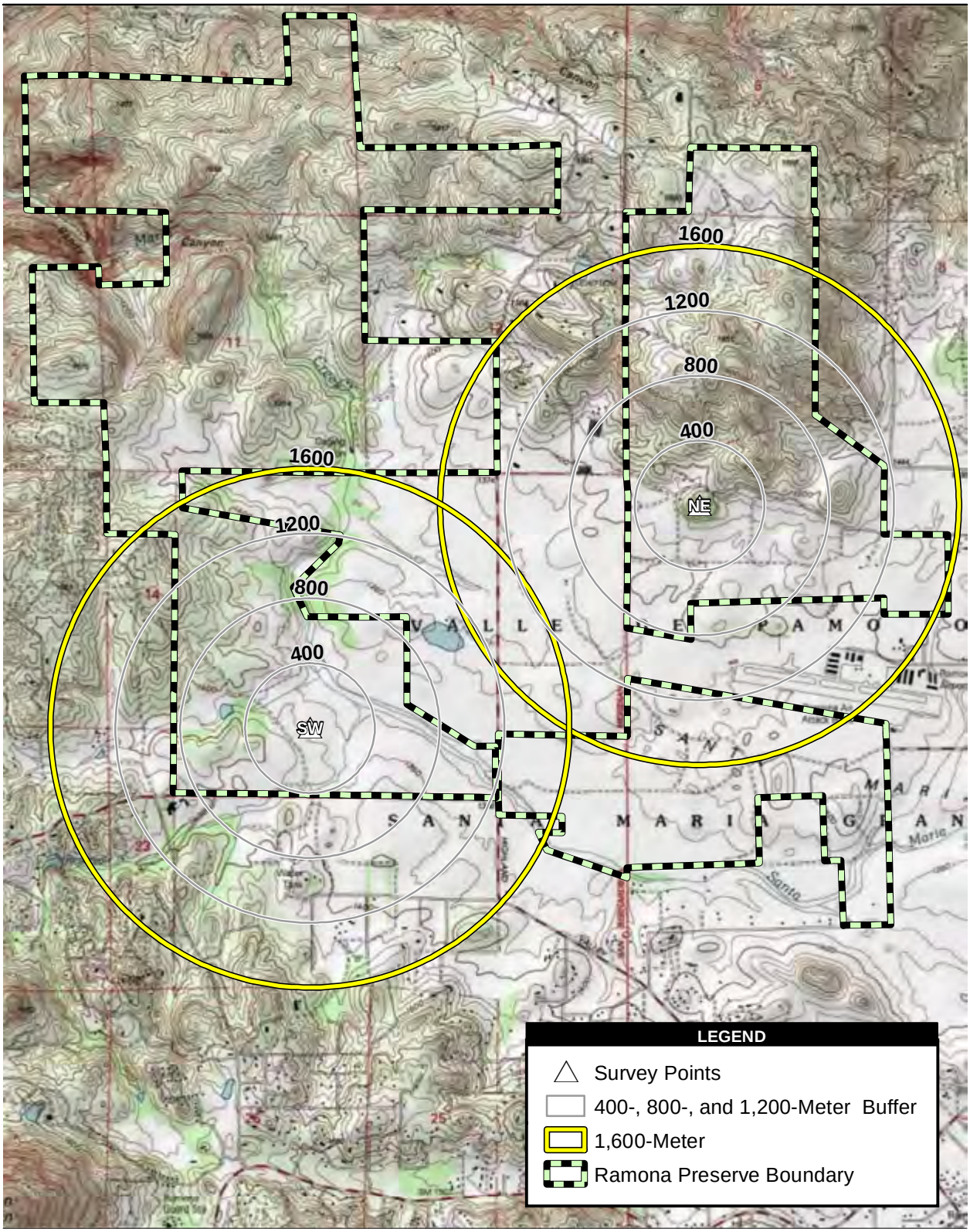
the town of Ramona to the east, and is bisected by the Ramona Airport and Ramona Municipal Water District land (Figure 2). Medium-density development is planned for areas southeast, northeast, and west of the Preserve. The northern and western boundaries of the Preserve are mainly characterized by open space and agricultural uses (grazing). The grasslands have been historically used for commercial grazing. Under County ownership, managed grazing is still used for vegetation management.



Source: USGS 7.5' Topographic Quadrangle Valley Center, CA 1978, Rodriguez Mountain, CA 1985

1,500 0 1,500 3,000 Feet

Scale: 1 = 36,000; 1 inch = 3,000 feet

Figure 2
Vicinity

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CHAPTER 2
METHODOLOGY

Raptor point count surveys occurred within the Preserve and were conducted by biologists from AECOM and USFWS. AECOM also conducted golden eagle nest monitoring at locations outside of the Preserve. Survey and monitoring methodologies are described below.

2.1 RAPTOR POINT COUNT FIELD SURVEYS

Prior to initiating surveys, two locations with an optimal viewshed were chosen to conduct 4-hour point counts to observe raptor foraging behaviors. These locations are found in the northeast quadrant and the southwest quadrant of the Preserve. The locations were visited and confirmed in September 2013 during a reconnaissance site visit with County DPR, AECOM, and USFWS staff, and are known as the northeast (NE) and southwest (SW) point count stations. The locations of these point count stations are depicted in Figure 2.

One point count station is located at a high point (a hill feature known as the "look out" or "house on the hill") in the northeast quadrant of the Preserve. This location, herein referred to as the northeast point count station, provides unlimited sky visibility for the entire Preserve, including visibility toward the southeast, southwest, and northwest. A mountain ridge occurs to the north and northeast. Certain raptor behavior, such as prey diving, may not be visible from this vantage point toward the northern boundary of the northeast quadrant. However, good visibility of the rocky outcrops used by raptors for perching can be had from this vantage.

The southwest point count location is located at a rocky outcrop to the north of the staging area located off Highland Valley Road, in the southwest quadrant of the Preserve. This point count station provides unlimited sky visibility for the entire Preserve in all cardinal directions. Photos taken in cardinal directions from each point count station are depicted in Appendix B.

Surveys were initiated on September 26, 2013, and the final survey for Year 1 was completed on August 30, 2014. Biologists surveyed from the two point count locations described above in a single day. AECOM surveyed once per month for an entire calendar year, and USFWS surveyed once per month from November 2013 through July 2014. Three surveys occurred in each season: spring (March, April, and May), summer (June, July, and August), fall (September, October, and November), and winter (December, January, and February). Each location was surveyed for a 4-hour period, typically between 7:30 a.m. and 5:30 p.m. The starting point count location generally rotated each month (i.e., begin morning survey at northeastern quadrant one month,

and the following month begin the morning survey at the southwestern quadrant). USFWS conducted surveys on separate days from AECOM to accrue more data and collect a more robust data set. USFWS typically conducted surveys during the second week of each month, and AECOM typically conducted surveys during the last week of each month.

Raptor-adapted avian point count surveys generally followed the protocol established in the USFWS *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy Version 2* (USFWS 2013). Although this guidance document is geared toward fatality studies for wind energy projects, it contains useful updated survey protocols that were adapted for this study.

The entire Preserve is the study area; however, for accuracy in making positive identifications of raptor species, the survey area focused on a 1,600-meter radius from the two point count stations within the Preserve. Surveys were focused specifically on observing and recording spatial use and behaviors of raptors within and adjacent to the Preserve. Precedence when recording data was given first to eagles, then to other special-status raptors, and finally to other non-special-status raptors. However, data was collected on all raptor species when feasible. Data was collected at greater distances than 1,600 meters both in the Preserve and on adjacent land for eagles and other special-status raptors when identified as a special-status species. Data was collected at greater distances than 1,600 meters only to give a general idea of how each raptor is using the Preserve, since accuracy in data collection deteriorates as the subject grows more distant.

Prior to beginning surveys, the biologists used a range-finder with aerial maps to establish distance references for mapping raptors. After the survey began, the biologists systematically scanned a 360-degree view of the horizon, overhead, and below their location with the unaided eye, binoculars, and a spotting scope at an unlimited distance for the duration of the 4-hour survey. Raptor detections were recorded on electronic data forms, and flight paths recorded on hard copy aerial maps. Pendragon software installed on HP Travel Companions was used to create electronic data forms. The electronic forms included data validation checks for data collected in the field to minimize errors in user data entry. General data, including start and end times and date, were taken at the beginning and end of each survey. Weather data was taken at the start and end of each survey, and every hour during the survey. Survey dates, personnel, and weather conditions are depicted in Appendix C.

When a raptor was detected within or near the Preserve boundary, the biologist began data collection by recording the following:

- Date and time of observation.
- Identification tag (i.e., a unique value assigned to an individual raptor to allow biologists to take data on multiple observations of the same individual and to allow data to be distinguished between multiple individuals that may be present in the Preserve).
- Identification of the raptor species.
- The initial distance, direction/bearing, and direction-of-flight of the raptor observation.
- Raptor's behavior within the Preserve (e.g., direct flight, circle soaring, meandering, kiting, hovering, stooping/prey diving, perched). Definitions of these behaviors are as follows:
    - Direct flight – Continuous flapping of wings in a directional flight
    - Circle-soaring – Rising in a circular motion with wings out-stretched (often associated when raptors catch thermals, a column of rising air in the lower altitudes of the earth's atmosphere)
    - Meandering – A wandering flight with no directional course
    - Stooping/prey diving – To dive from above with wings folded, usually in pursuit of prey
    - Perched – Stationary on an object (e.g., tree, rock, ground, utility pole)
- Time observed within or adjacent to the Preserve (0–2 minutes, 3–5 minutes, 6–10 minutes, greater than 10 minutes). If only a single raptor was in view for an extended period of time (i.e., greater than 10 minutes) or exhibited several styles of foraging techniques, more data on behavior was noted.
- Number of individuals.
- Detection type (i.e., visual or auditory).
- Raptor flight paths were mapped in the field for all raptors (precedence given to eagles and other special-status raptors) on hard-copy aerial maps.
- Mapped flight paths depicted where the raptor displayed foraging behaviors.

Data collected (with the exception of flight paths) is provided in Appendix D. Flight paths of raptors were mapped on hard-copy aerial maps. One of two maps was used for this component, depending on the distance the raptor was observed. One map was a "zoomed-in" view of the point count station with a 1-mile (1,600-meter) radius from the center of the point count station. This map was used to more accurately map the raptor's flight path within the survey area. The

next map was a "zoomed-out" view of the point count station with a 3-mile (4,800-meter) radius from the center of the point count station. This map was used when raptors were detected at greater distances than the 1-mile (1,600-meter) survey area, and provided an opportunity to map raptors using the Preserve and adjacent land to help understand how raptors are using other parts of the surrounding landscape.

Although not a special-status raptor, per a request from USFWS, ferruginous hawk (*Buteo regalis*) was mapped with a higher priority than other non-special-status raptors. For purposes of this study, special-status is defined as federally (USFWS) or state (California Department of Fish and Wildlife) listed as threatened or endangered, as a state fully protected species, or as a species of special concern.

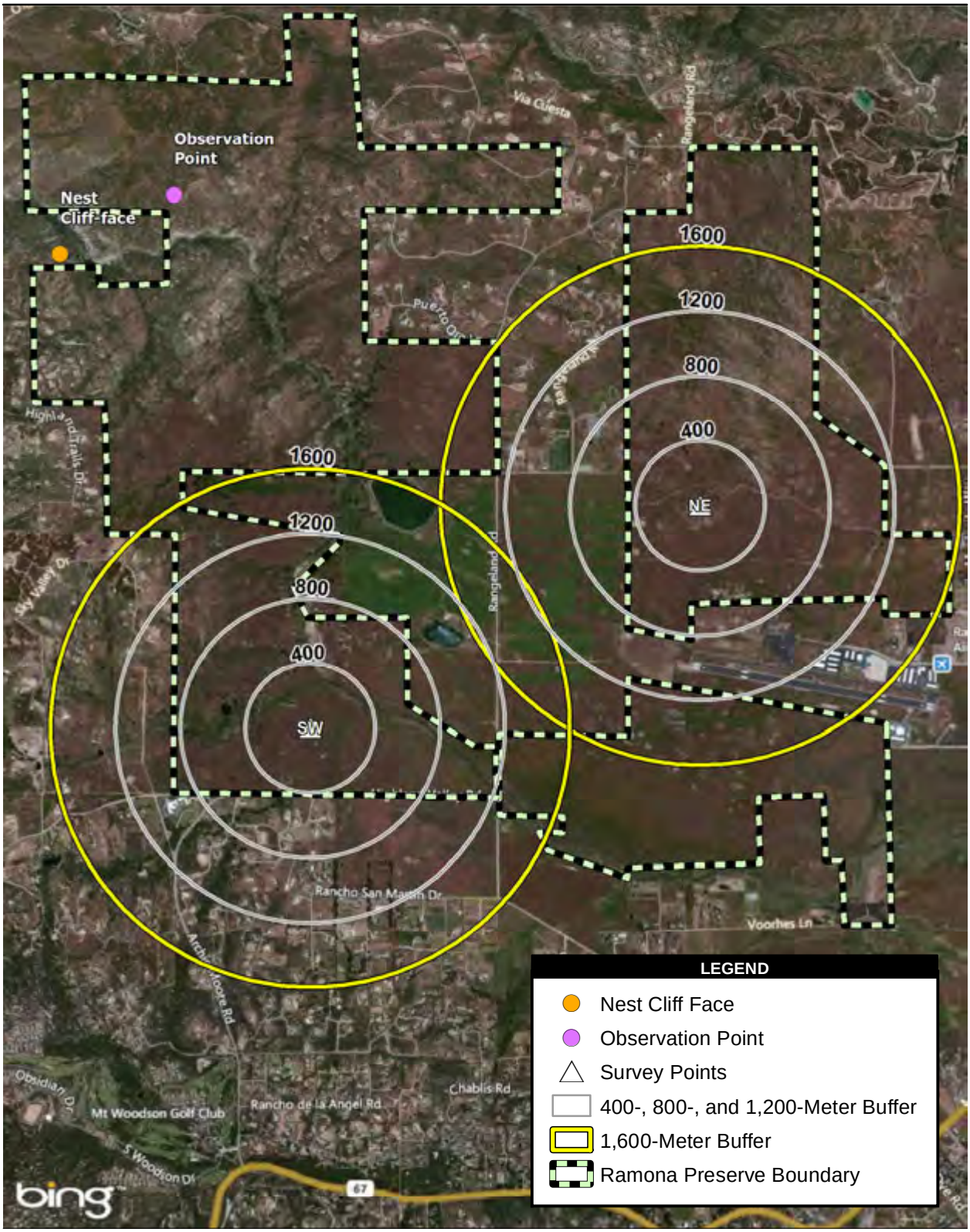
Flight paths of eagles, special-status raptors, and non-special-status raptors that were recorded by AECOM and USFWS are depicted in Appendix E.

2.2 GOLDEN EAGLE NEST MONITORING

The purpose of golden eagle nest monitoring was to determine if golden eagles were present and if the nesting site was active or inactive in 2014. On September 11, 2013, County DPR staff, along with USFWS and AECOM biologists, visited a known historic nesting area for golden eagles off-site of the Preserve in Bandy Canyon. This visit was to determine a proper observation point (OP) to observe golden eagles during their nesting season. As recommended by Pagel et al. (2010), observation points were no closer than 300 meters and generally no farther than 700 meters away, where terrain allowed. Mr. Pagel with USFWS was present during this visit and assisted with determining the appropriate location for the monitoring efforts. The OP selected was approximately 780 meters (approximately 0.5 mile) north of the cliff face where eagles have nested. This location was approved by Mr. Pagel that day in the field.

The cliff face of Bandy Canyon where the eagles have nested is north-facing, and the OP was situated on the north side of Bandy Canyon. Biologists were able to look southwest across the canyon and observe golden eagle nesting behaviors and determine nest success, if applicable. The locations of the OP and the nesting site cliff-face are depicted in Figure 3.

Two 4-hour monitoring sessions were conducted: the first on January 23, 2014, and the second on March 10, 2014. Both surveys were conducted between 8 a.m. and 1 p.m. A spotting scope was used so biologists could view the nest from a greater distance than with binoculars and gather necessary data to conclude if a nest was active or inactive. The information collected is based on recommendations by Pagel et al. (2010). General data, including start and end times, date, and weather, were taken at the beginning and end of each survey. The date, time, and



Source: USGS 7.5' Topographic Quadrangle Valley Center, CA 1978, Rodriguez Mountain, CA 1985

1,500 0 1,500 3,000 Feet

Scale: 1 = 36,000; 1 inch = 3,000 feet

Figure 3
Golden Eagle Nest Monitoring Location

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duration of each golden eagle observation at the nest site were recorded. In the event that eagles did nest, for each observation, the biologist recorded eagle nesting behaviors, which may include the following:

- Nest building
- Incubating
- Feeding young
- No activity

Additional observational data, such fledgling observations/behaviors, prey items, and territory interactions, were noted when possible. The primary focus was determining golden eagle nest status (i.e., active or inactive).

2.3 ANALYSIS

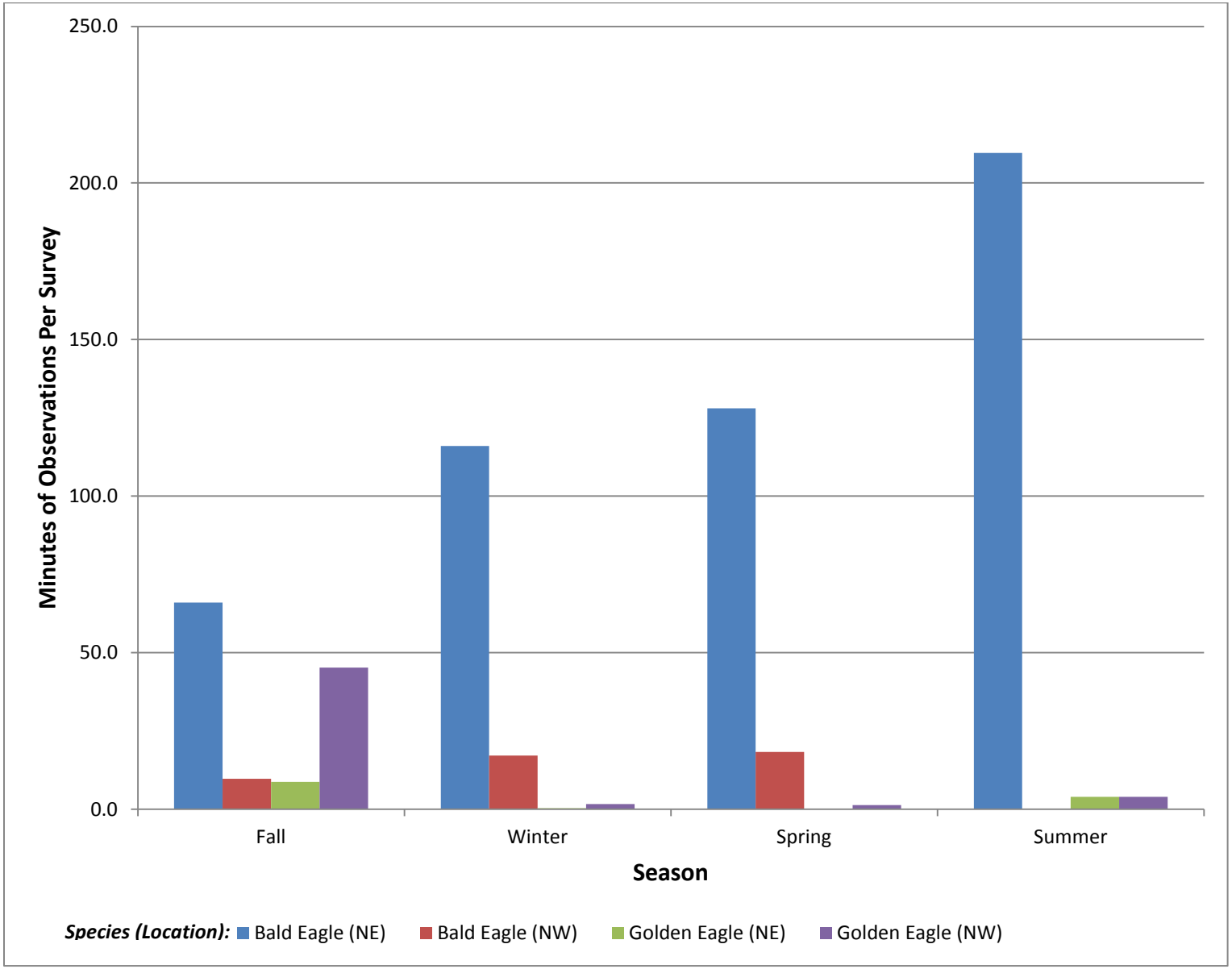
Species richness, relative frequency of observation, the duration of observations, and an abundance estimate were calculated to better understand raptor activity and use at each point count station. Analysis involved all observations that were detected at a point count station. Metrics were quantified for each season and for the calendar year from September 2013 through August 2014.

Species richness is a measure of the species diversity of an area. This was calculated by tallying all raptor species observed at a survey point for each season and for the calendar year. The relative frequency of raptor observations was quantified by summing the number of raptor observations, including repeat observations of the same individual, in a given season and dividing by the number of surveys in a given season.

Raptor use of an area was quantified by calculating the minutes of observation per survey. This metric is the sum of all minutes a raptor species was observed over all surveys in a season divided by the number of surveys that occurred in that season. The minutes each species was observed included both perched and flight observations. The minutes of observations per survey location for eagles during all seasons is presented as a graph in Figure 4.

To avoid overestimating the abundance of raptors, a minimum number of individuals of each raptor species detected per season was calculated as a metric of abundance of individual raptor species. Without observing tagged/marked raptors or uniquely plumaged individuals, it is not possible to know how many unique individuals of each species were actually observed. Minimum numbers of unique individuals of a given raptor species were determined as follows:

Figure 4. Eagle Activity within the Vicinity of Each Point Count Location (September 2013–August 2014)



multiple individuals observed during a single scan, differences in age or plumage characteristics (e.g., molt, color morph, aberrant/leucism), and/or observing tagged/marked individuals. This metric (minimum number of individuals) is a better representation of species abundance than summing up all observations across the survey effort.

Flight paths of eagles and other special-status raptor species were also digitized and analyzed for areas of concentrated usage using geographic information system (GIS) technology, specifically GIS software ArcGIS 10.2.1 with the Spatial Analyst Extension. The density of the flight paths was derived using the linear density tool within the Spatial Analyst toolset. The tool's process resulted in a raster dataset where each cell within the raster was assigned a value based on the total linear feet within a given radius of the cell, divided by the search area. A raster graphics image is a dot matrix data structure representing a generally rectangular grid of pixels, or points of color, viewable via a monitor, paper, or other display medium. For this analysis, the linear feet measured was the digitized flight path of the various bird species. The search radius was set at 250 feet (76.2 meters), giving a total search area for each cell of approximately 196,349 square feet (18,241 square meters). The search radius of 250 feet (76.2 meters) was chosen to generalize patterns in near, but not overlapping, flight paths, but still allowing for enough detail to identify many individual flight paths.

CHAPTER 3
RESULTS AND DISCUSSION

A variety of raptors use the Preserve as either year-round residents or seasonal visitors that migrate to (and from) or through the region. The Preserve is actively used by raptors to forage and nest. Below, spatial use, including areas of preference (if any), and how special-status raptors detected within Year 1 of the study typically used the Preserve are described. All raptor species detected on and off the Preserve, regardless of distance from observer, for each season and within the calendar year from September 2013 through August 2014 are included in Appendix F.

3.1 RESULTS AND DISCUSSION OF RAPTOR FORAGING ACTIVITY

A total of 21 surveys were completed within the Preserve by AECOM and USFWS biologists during Year 1 of this study (Table 1). A total of 13 raptor species were detected between both the northeast and southwest point count stations (Table 3-1). At the northeast point count station, 13 species were identified, and at the southwest point count station, 11 species were identified (Table 3-1). As depicted in Table 3-1, the number of unique raptor species was highest during the fall and winter seasons. A list of all raptor species detected from each point count station per season is depicted in Table 2.

Table 1
Number of Surveys and Species Richness
(September 2013–August 2014)

Season	Number of Surveys[1]	Number of Distinct Species Identified	Number of Raptor Observations per Survey[2]
Northeast Point Count Station			
Fall	4	10	8.3
Winter	6	9	6.7
Spring	6	8	3.0
Summer	5	6	4.4
Northeast Subtotal	*21*	*13*	*5.4*
Southwest Point Count Station			
Fall	4	10	9.5
Winter	6	8	3.8
Spring	6	7	2.3
Summer	5	5	1.6
Northwest Subtotal	*21*	*11*	*4.0*
Total	**42**	**13**	**4.7**

Each survey was 4 hours in length
Includes repeat observations of the same individual

Of the 13 raptor species detected, four were identified as having special status by either USFWS (federally sensitive species) or the California Department of Fish and Wildlife (state sensitive species), or both: bald eagle (state endangered and fully protected; federal Bald and Golden Eagle Protection Act), golden eagle (state fully protected; federal Bald and Golden Eagle Protection Act), American peregrine falcon (*Falco peregrinus anatum*; state fully protected), and northern harrier (*Circus cyaneus*; state species of special concern). Bald eagles were observed for the longest duration per survey (i.e., minutes per survey) of all raptor species (Table 2).

Non-special-status raptor species observed were American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), prairie falcon (*Falco mexicanus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk, and rough-legged hawk (*Buteo lagopus*). Red-tailed hawks were the most abundant raptor species within and adjacent to the Preserve. As such, not all observations of this species were recorded so observers could focus on recording special-status species observations. Table 2 summarizes the number of minutes each of these species were observed per survey for each point count station and season, and the minimum number of unique individuals detected of each species at each point count station and season. Non-special-status raptor species will not be discussed further in this report.

A detailed discussion of each of the four special-status species detected on-site is provided below.

Bald Eagle

Bald eagles were detected during every season and during nearly every survey. Two adults (a pair) appeared to be present throughout the year (Table 2; Figure 4). During the winter season, an immature bald eagle was observed during one survey, in addition to the adults. It was unclear if this individual was a long-distant migrant or a dispersing individual from another local bald eagle nesting location. The majority of bald eagle observations occurred at the northeast point count station (Table 2; Figure 4). As depicted in Table 2 and Figure 4, bald eagles were detected every season from the northeast point count station, with combined observations ranging from an average of 66 minutes per survey in the fall season to 209 minutes in the summer. At the southwest point count location, bald eagles were detected every season, with the exception of summer. Combined observations from the southwest point count station ranged from 3 minutes per survey in the fall season to 18 minutes per survey in the spring.

Approximately 0.33 mile (500 meters) southwest of the northeast survey location is a row of three eucalyptus (*Eucalyptus* sp.) trees. According to the County DPR this location is where bald eagles had nested the previous year, and they again successfully nested in 2014, raising a single nestling that eventually fledged. Immediately south is one eucalyptus tree by itself. This tree is

Table 2
Raptor Species Observed within 1,600 Meters of Each Point Count Location (September 2013—August 2014)

Common Name	Scientific Name	Fall		Winter		Spring		Summer		Total (All Seasons)	
		Minutes of Observation per Survey[1]	Minimum Number of Individuals[2]	Minutes of Observation per Survey[1]	Minimum Number of Individuals[2]	Minutes of Observation per Survey[1]	Minimum Number of Individuals[2]	Minutes of Observation per Survey[1]	Minimum Number of Individuals[2]	Minutes of Observation per Survey[1]	Minimum Number of Individuals[2]
Northeast Point Count Station											
American Kestrel	*Falco sparverius*	0.5	1	1.2	1	0.3	1	2.6	2	1.1	2
American Peregrine Falcon	*Falco peregrinus anatum*	0.3	1	-		-	-	-	-	-	1
Bald Eagle	*Haliaeetus leucocephalus*	66.0	1	116.0	2	128.0	2	209.6	3	132.2	3
Cooper's Hawk	*Accipiter cooperii*	1.3	1	-	-	0.2	1	0.4	1	0.4	1
Ferruginous Hawk	*Buteo regalis*	28.8	3	12.5	3	0.2	1	-	-	9.1	3
Golden Eagle	*Aquila chrysaetos*	8.8	1	0.3	1	0.2	1	4.0	1	2.8	1
Merlin	*Falco columbarius*	-	-	0.2	1	0.8	1	-	-	0.3	1
Northern Harrier	*Circus cyaneus*	0.3	1	0.7	1	-	-	-	-	0.2	1
Prairie Falcon	*Falco mexicanus*	5.3	2	3.0	1	0.2	1	0.2	1	2.0	2
Red-Shouldered Hawk	*Buteo lineatus*	-	-	-	-	-	-	0.2	1	-	1
Red-Tailed Hawk	*Buteo jamaicensis*	15.0	Many[3]	0.5	2	0.2	1	-	-	3.0	6
Rough-Legged Hawk	*Buteo lagopus*	-	-	0.3	1	-	-	-	-	0.1	1
Sharp-Shinned Hawk	*Accipiter striatus*	1.5	1	-	-	-	-	-	-	0.3	1
Northeast Subtotal		*127.5*	*Not Applicable*	*134.7*	*Not Applicable*	*130.0*	*Not Applicable*	*217.0*	*Not Applicable*	*151.6*	*Not Applicable*
Southwest Point Count Station											
American Kestrel	*Falco sparverius*	7.8	2	1.8	1	20.3	2	-	-	7.8	2
American Peregrine Falcon	*Falco peregrinus anatum*	1.3	1	0.3	1	-	-	0.6	1	0.5	1
Bald Eagle	*Haliaeetus leucocephalus*	3.8	1	17.2	1	18.3	1	-	-	12.0	1
Cooper's Hawk	*Accipiter cooperii*	0.8	1	-	-	0.3	1	-	-	0.2	1
Ferruginous Hawk	*Buteo regalis*	4.8	2	6.7	1	-	-	-	-	2.8	2
Golden Eagle	*Aquila chrysaetos*	45.3	2	1.7	1	1.3	1	4.0	1	10.4	2
Merlin	*Falco columbarius*	-	-	0.3	1	-	-	-	-	0.1	1
Northern Harrier	*Circus cyaneus*	0.3	1	-	-	+	-	-	-	-	1
Prairie Falcon	*Falco mexicanus*	1.3	1	0.3	1	0.2	1	1.6	1	0.8	1
Red-Shouldered Hawk	*Buteo lineatus*	0.3	1	-	-	2.0	2	0.2	1	0.7	2
Red-Tailed Hawk	*Buteo jamaicensis*	8.0	Many[3]	28.8	2	0.3	2	2.0	2	10.3	6
Northwest Subtotal		*79.3*	*Not Applicable*	*57.2*	*Not Applicable*	*42.8*	*Not Applicable*	*8.4*	*Not Applicable*	*45.7*	*Not Applicable*
Total		**103.4**	**Not Applicable**	**95.9**	**Not Applicable**	**86.4**	**Not Applicable**	**112.7**	**Not Applicable**	**98.6**	**Not Applicable**

Number of minutes a raptor species was observed over all surveys in a season divided by the number of surveys that occurred in that season.
Minimum number of individual known to occur or use the area.
More than five individuals were detected during point count surveys and it was not possible to keep track of the number occurring in the vicinity of the point count station.

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where both adult bald eagles spent much of the time perched both during the nesting season and the remainder of the year.

During observations from the northeast point count station, these eagles were seen several times, mainly preying on California ground squirrels (*Otospermophilus beecheyi*) or stealing prey from other raptors. The eucalyptus trees described above provided optimal perches for the eagles to scan the majority of the grasslands within the Preserve, and also nearby small reservoirs/cattle ponds where the bald eagles likely prey on waterfowl. The eagles sometimes stayed perched for the entire survey, but would also take off from the trees and ride a thermal, circle-soaring over the Preserve and adjacent lands, likely looking for prey items. The eagles were also observed perching on rocky outcrops on the mountain ridge along the north side of the northeast point count station. Observations from the southwest point count station were generally of the eagles in flight and perching near reservoirs/cattle ponds.

Seasonal use of the Preserve by bald eagles and an annual overview of bald eagle use of the Preserve are depicted in Figures 5a through 5e. The highest density/spatial use of the Preserve was observed from the northeast point count location. The areas depicted as having high density use as observed from the southwest point count station was typically when eagles were circle-soaring. Lesser density areas were observed as meandering flights while bald eagles were looking for prey items. Photographs of bald eagles observed within the Preserve are found in Appendix G.

Golden Eagle

Golden eagles were detected every season within the Preserve, but were not observed during every survey (Table 2; Figure 4). The golden eagles observed were not abundant, nor did they spend much time within the Preserve. It was unknown if these golden eagle observations were of year-around residents or were migrant or wandering individuals. A minimum of three unique golden eagles were observed. This was determined by age and seeing more than one individual simultaneously.

As depicted in Table 2 and Figure 4, golden eagles were detected every season from both the northeast and southwest point count stations. From the northeast point count station, combined observations ranged from an average of 8 minutes per survey in the fall season, to less than 1 minute per survey in the spring season. At the southwest point count location, combined golden eagle observations ranged from an average of 45 minutes per survey in the fall season to an average of 1 minute per survey in the spring.

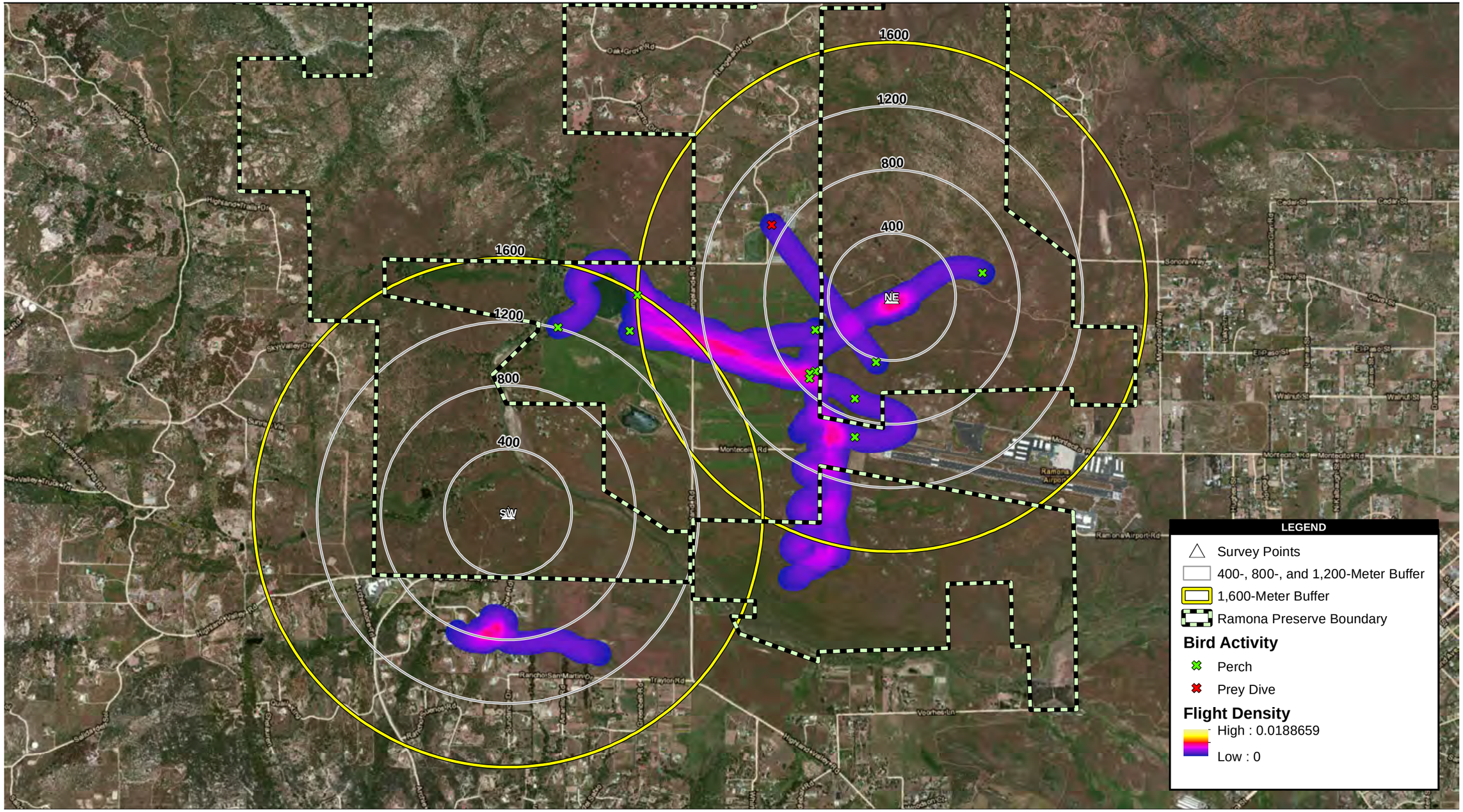
Golden eagles were observed perched on a couple of occasions, but observations were typically made while golden eagles were in flight as they meandered and circle-soared looking for prey throughout the grasslands and mountains within the Preserve. There is no clear area of the Preserve that the golden eagles appear to favor seasonally. The seasonal use of the Preserve by golden eagles and an annual overview of golden eagle use of the Preserve are depicted in Figures 6a through 6e. As depicted, there is not a clear higher density/spatial use area the golden eagles preferred within the Preserve. The annual overview (Figure 6e) illustrates that the entire Preserve is patrolled by golden eagles that forage. Although the golden eagles are not nesting within the Preserve, there is a nest site in Bandy Canyon adjacent to the Preserve, and these golden eagles are likely using the Preserve for foraging purposes only (see also Section 3.2). Photographs of golden eagles observed within the Preserve are found in Appendix G.

After completing Year 1 surveys, it is clear that golden eagles use the entire Preserve to forage. Obtaining more data in Year 2 and Year 3 of this study may help to clarify where golden eagles prefer to forage seasonally.

With the current drought conditions in California, the Preserve may not have been as active with raptor activity due to the lesser quantities of prey items. Therefore, accurate recommendations cannot be made until future surveys are completed.

American Peregrine Falcon

American peregrine falcons were detected during all seasons within the Preserve except spring, but were not observed during every survey (Table 2). The number of unique individuals observed is unknown. Considering peregrine falcons were observed three of the four seasons, some observations were likely of year-around residents breeding nearby in San Diego County, and other observations could have included migrating individuals. Peregrine falcon was observed only one time from the northeast point count location in the fall season. This observation was for less than 1 minute from the northeast point count location. Peregrine falcon was observed from the southwest point count station in all seasons with the exception of the spring season. At the southwest point count location, peregrine falcon observations ranged from 1-minute observations in the fall season to less than 1-minute observations during the winter and summer.



*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 5a
Fall Bald Eagle Flight Density Map

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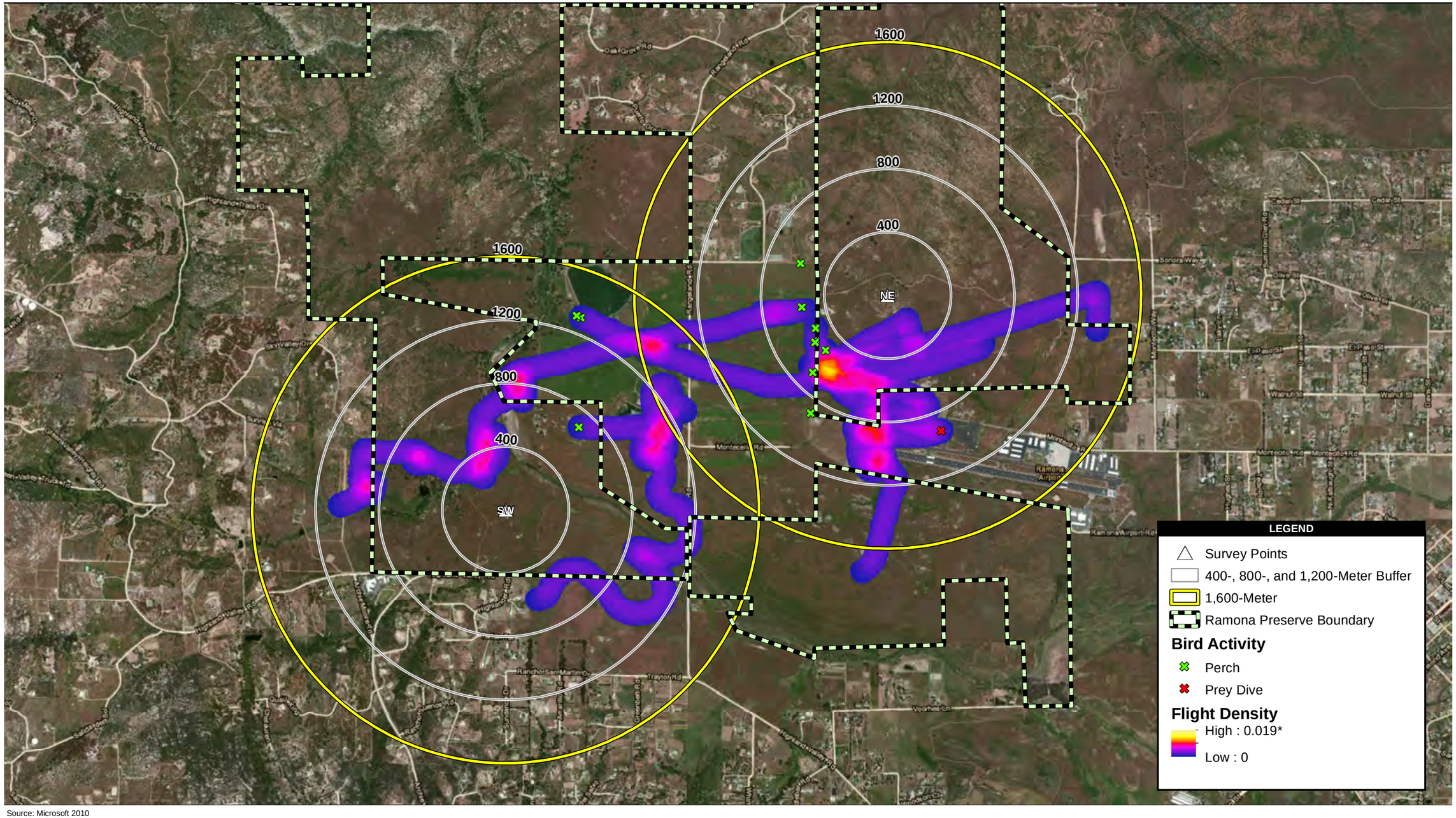

Source: Microsoft 2010

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 5b
Winter Bald Eagle Flight Density Map

Path: P:\2013\60278233_DPR_2012\06GIS\6.3_Layout\Task 006\Year1_report\Fig5b_Winter_Surveys_BAEA_Density.mxd, 10/21/2014, sorensenj

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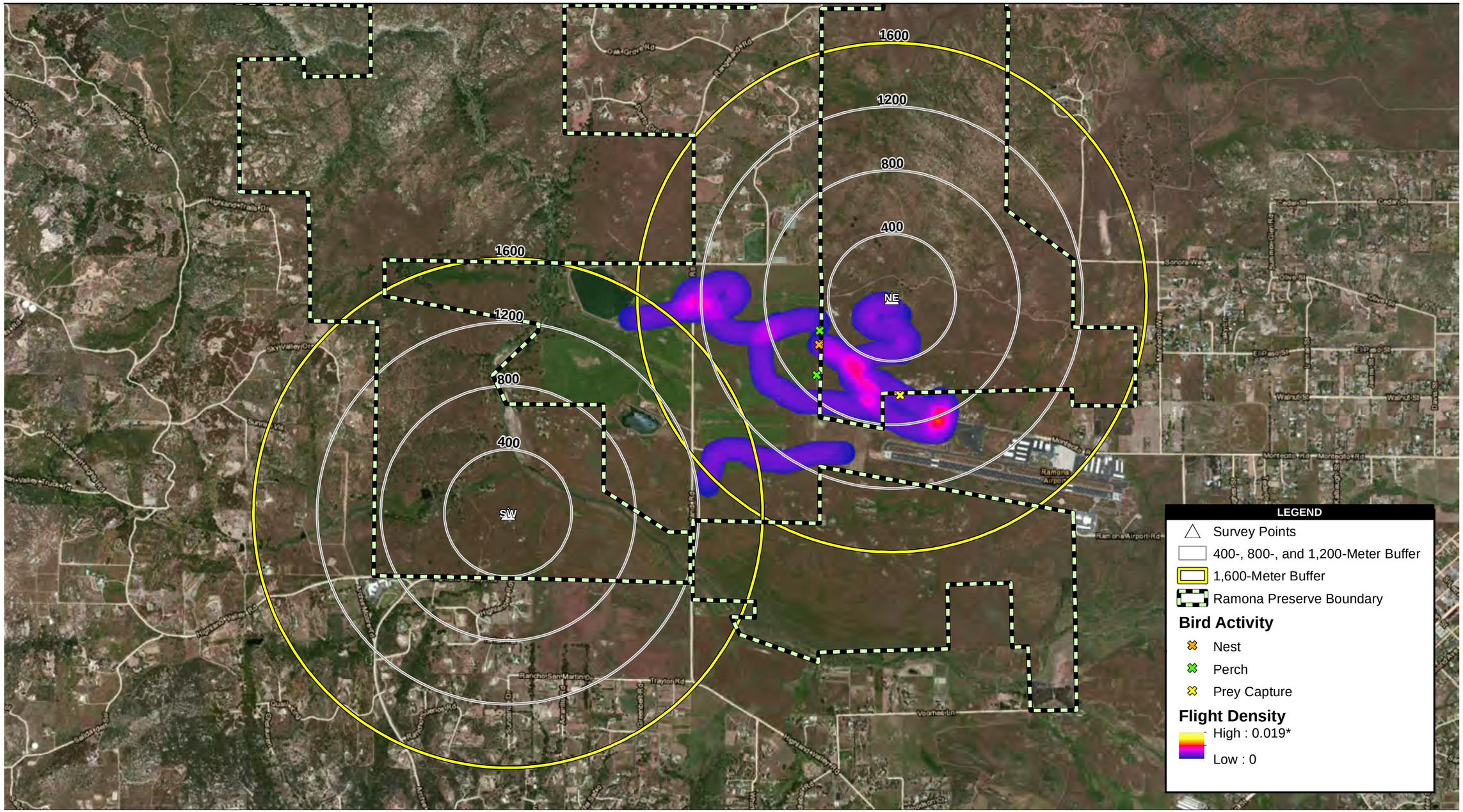

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 5c
Spring Bald Eagle Flight Density Map

Path: P:\2013\60278233_DPR_2012\06GIS\6.3_Layout\Task 006\Year1_report\Fig5c_Spring_Surveys_BAEA_Density.mxd, 10/21/2014, sorensenj

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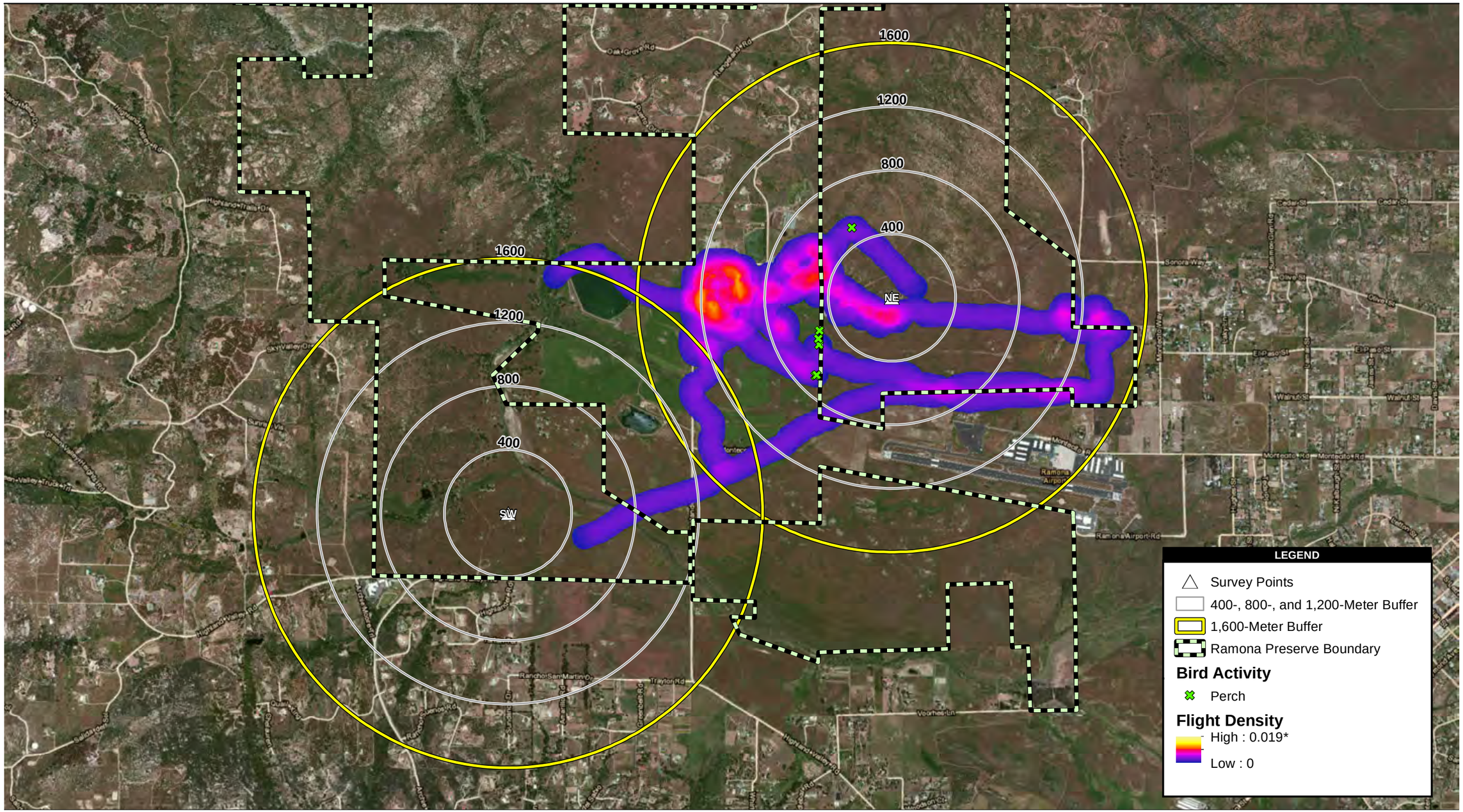

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 5d
Summer Bald Eagle Flight Density Map

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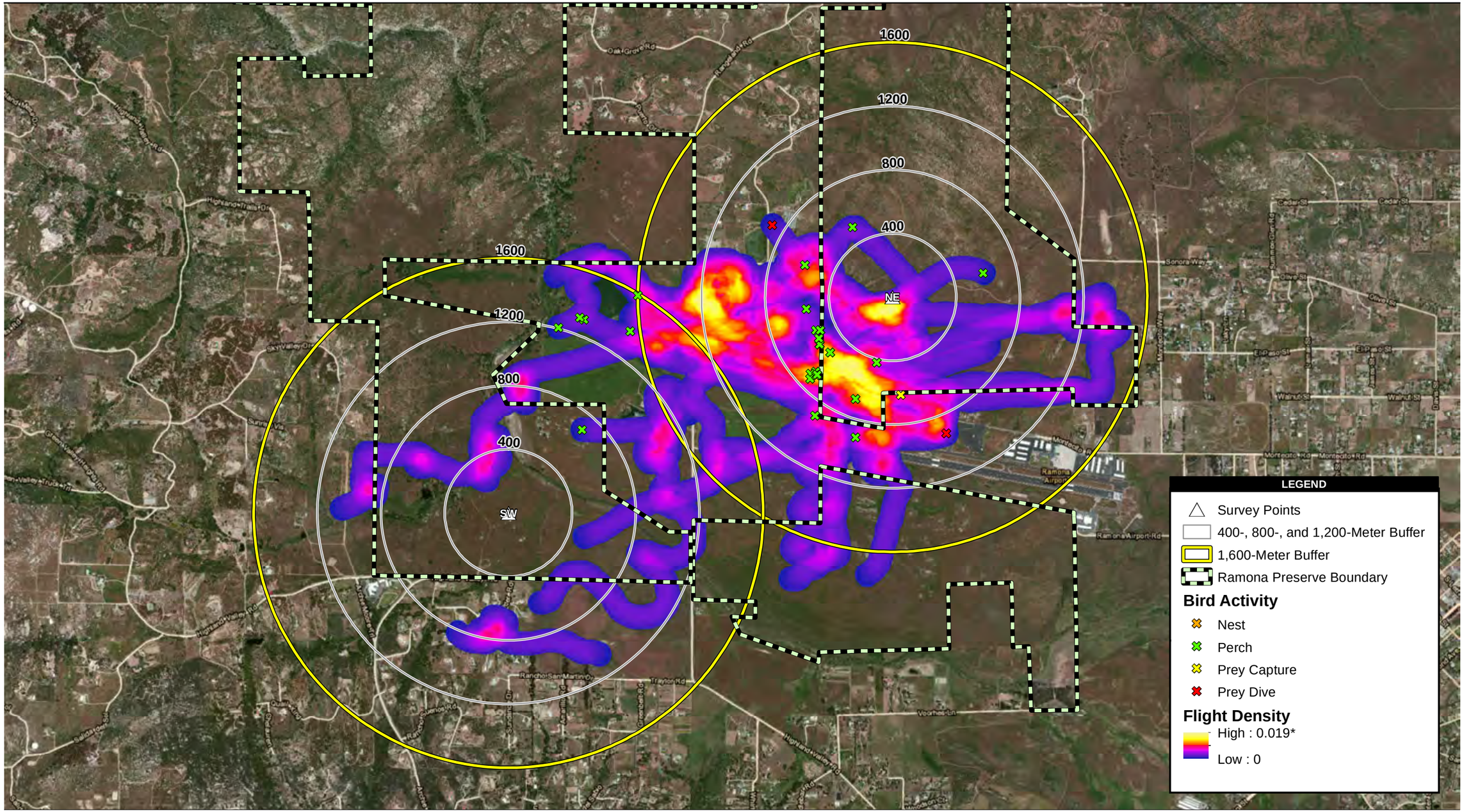

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 5e
Annual Bald Eagle Flight Density Map

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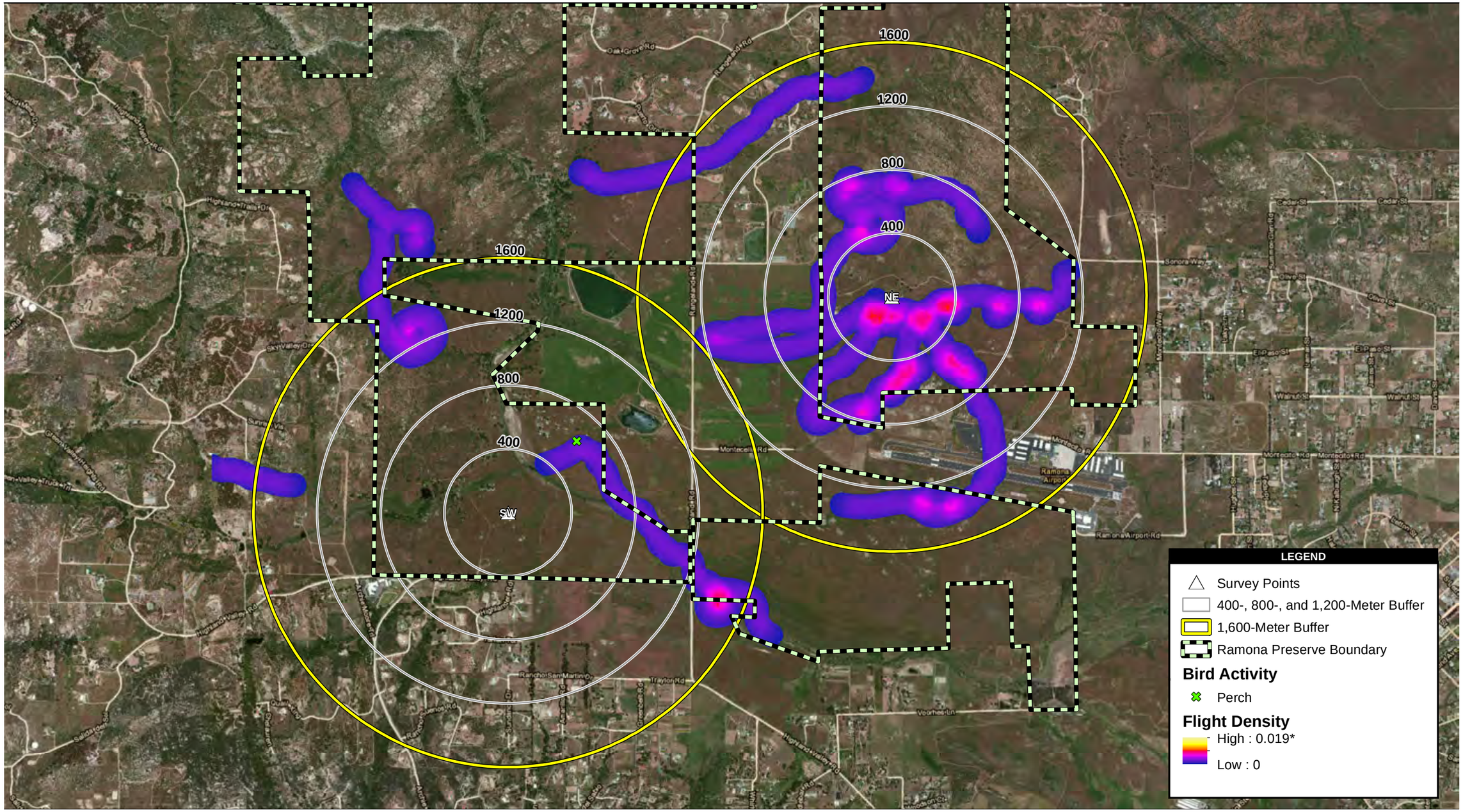

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 6a
Fall Golden Eagle Flight Density Map

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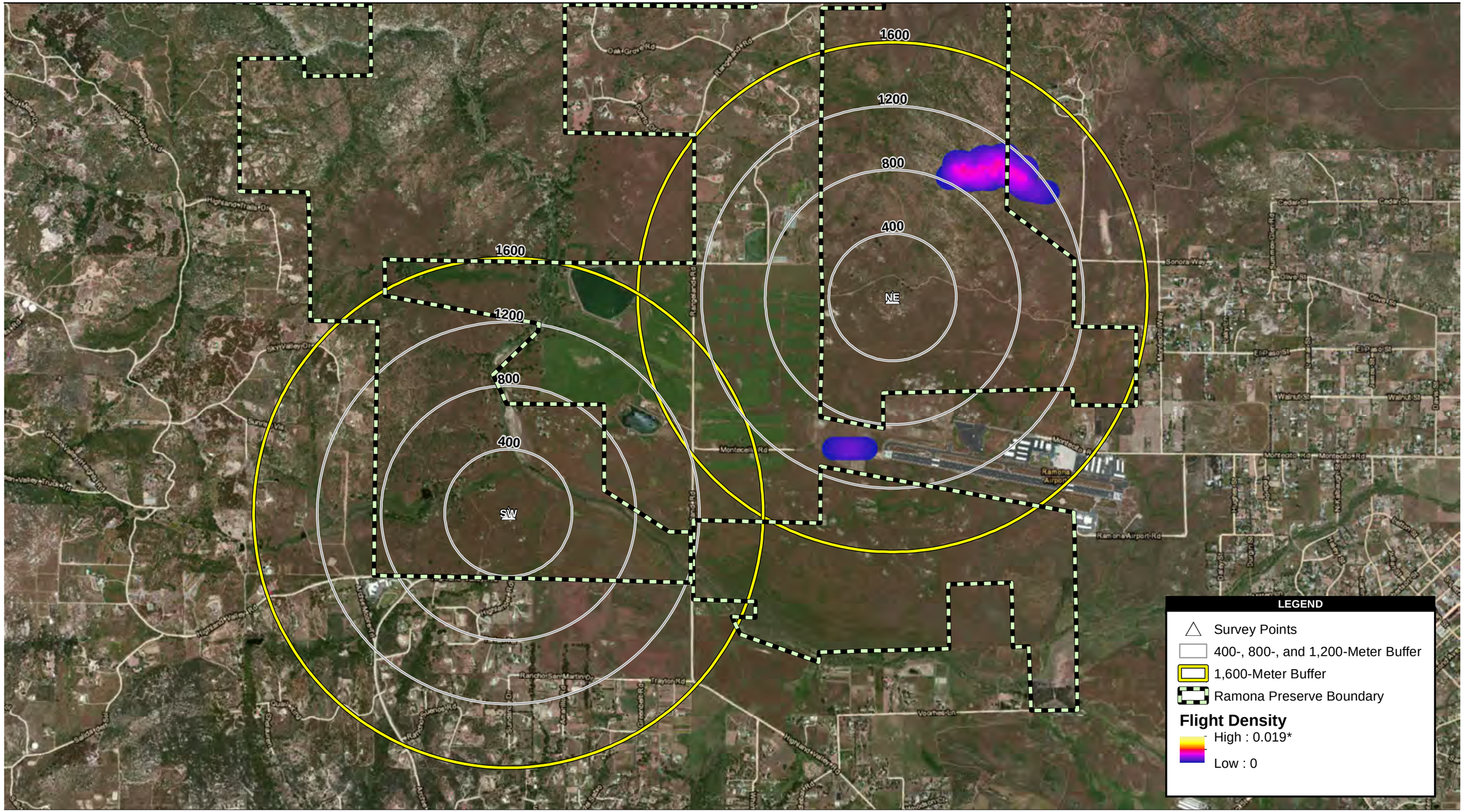

Source: Microsoft 2010

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 6b
Winter Golden Eagle Flight Density Map

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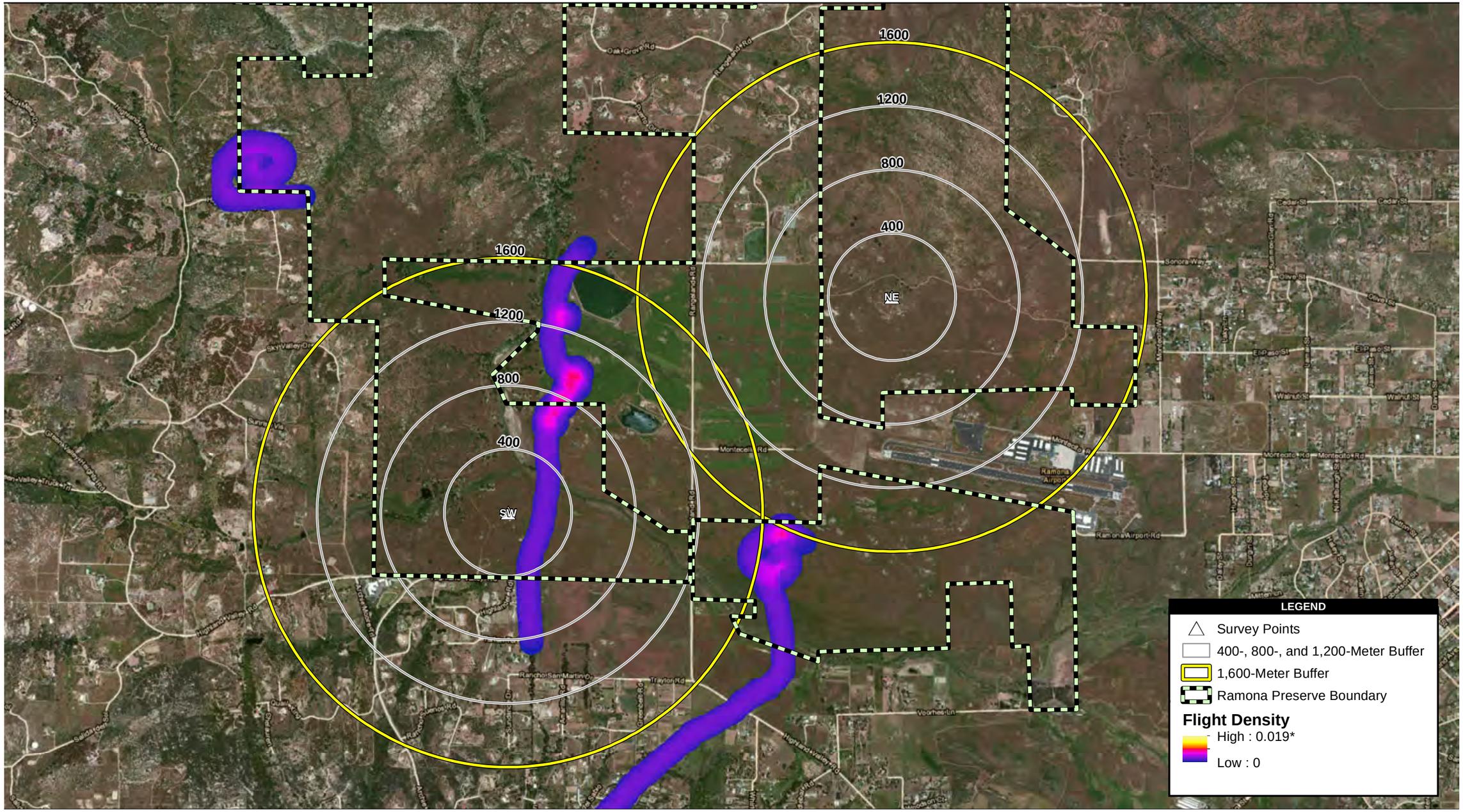

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 6c
Spring Golden Eagle Flight Density Map

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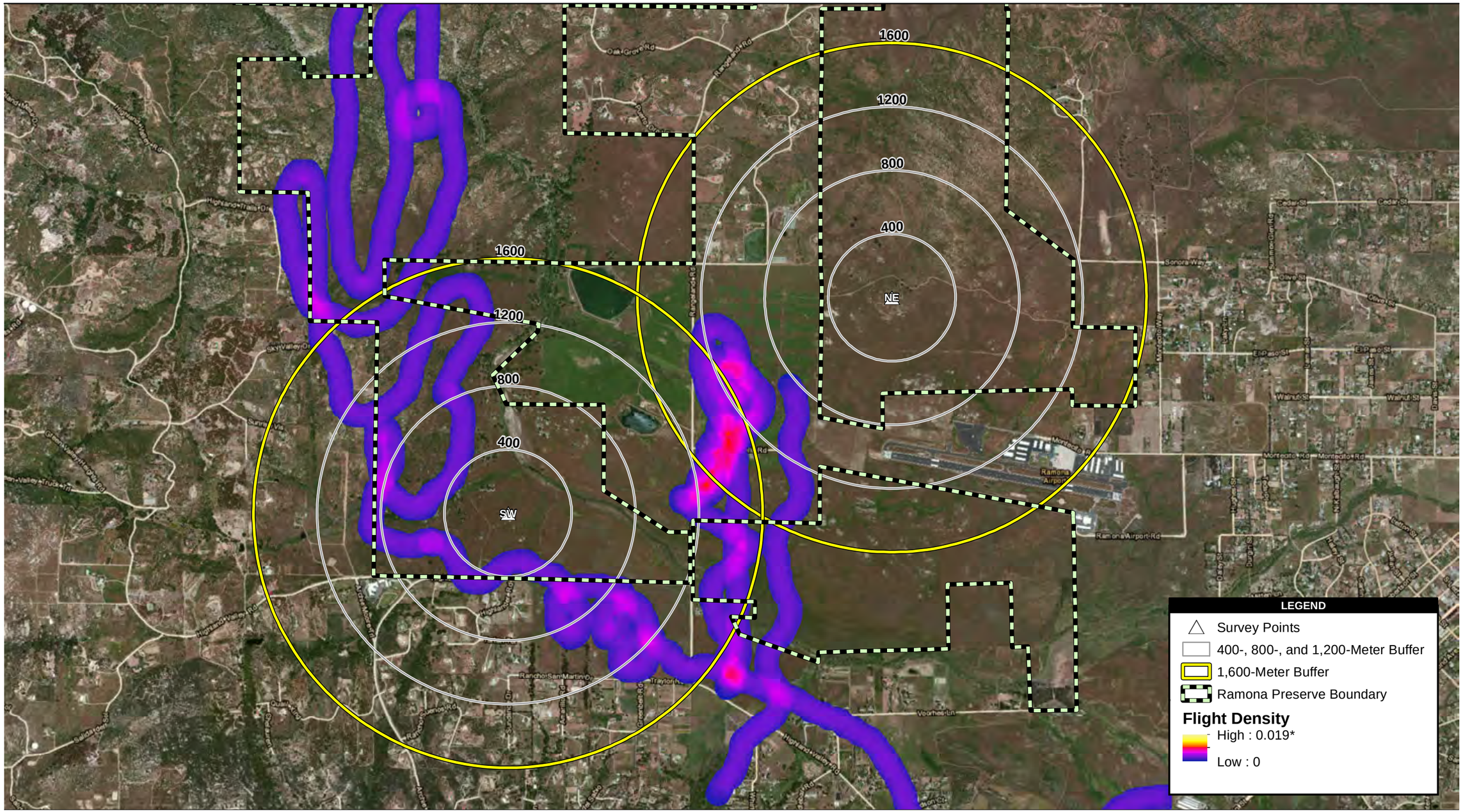

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 6d
Summer Golden Eagle Flight Density Map

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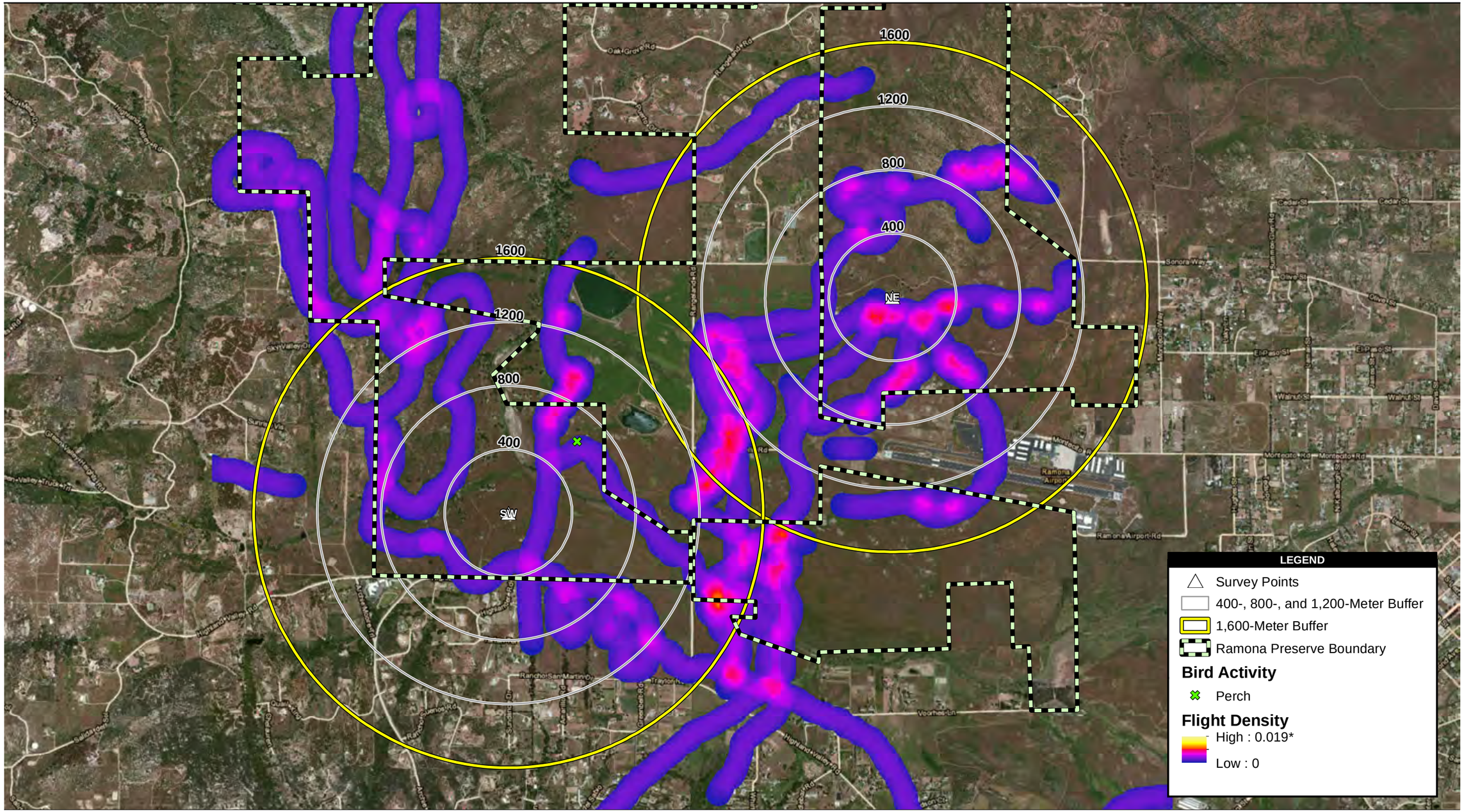

Source: Microsoft 2010

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 6e
Annual Golden Eagle Flight Density Map

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Observations of this species were generally brief, as they typically flew with a direct, powerful flight. Peregrine falcons were also observed catching thermals and circle-soaring high into the sky. This is an approach used to locate prey items and then swoop down at very high speeds. Peregrine falcons generally prey on a wide variety of avian species, including waterfowl, seabirds, pigeons, and songbirds. The Preserve has reservoir/cattle ponds that attract a variety of waterfowl, and the remainder of the Preserve has an abundance of other preferred prey items. Since this species was present, it is likely it was looking for prey.

The seasonal use and an annual overview of use of the Preserve by peregrine falcons are depicted in Figures 7a through 7d. As depicted, there is not a clear higher density/spatial use area the falcons preferred within the Preserve.

After completing Year 1 surveys, due to the lack of a robust dataset on peregrine falcon within the Preserve, there are no recommendations for areas to avoid within the Preserve. With the current drought conditions in California, the Preserve may not have been as active with raptor activity due to the lesser quantities of prey items. Therefore, accurate recommendations cannot be made until future surveys are completed.

Northern Harrier

Northern harriers were detected two times during the fall season and once during the winter season, and only during two survey days (Table 2). It is unknown if there were more than two individuals detected, as northern harrier was detected from both the northeast and southwest point count locations on the same survey day, in the fall season. At the northeast point count location, northern harrier was observed in the fall and winter seasons for less than 1 minute on both observations. At the southwest point count location, northern harrier was observed one time in the fall season for less than 1 minute.

Northern harriers typically favor grassland and marsh habitats. Generally they are seen flying low over the habitat; however, they do circle-soar and meander higher in the sky. Observations within the Preserve were of it flying low over the grasslands and also gaining altitude while circle-soaring. These northern harriers were actively foraging when observed, but no successful attempts to capture prey items were observed. The Preserve has extensive grasslands for northern harriers to forage and nest. However, northern harriers are ground-nesters, and the cattle roaming and grazing throughout the Preserve may hinder the chances of successful nesting. With the general absence of this species throughout Year 1, northern harrier was a rare observation, and the lack of any detections during the spring and summer seasons indicates that this species did not nest within the Preserve in 2014. It is possible that the extreme drought in California has affected and limited prey availability for northern harrier within the Preserve. The seasonal use

of northern harrier and an annual overview of northern harrier usage of the Preserve are depicted in Figures 8a through 8c. As depicted, there is not a clear higher density/spatial use area that northern harriers prefer within the Preserve.

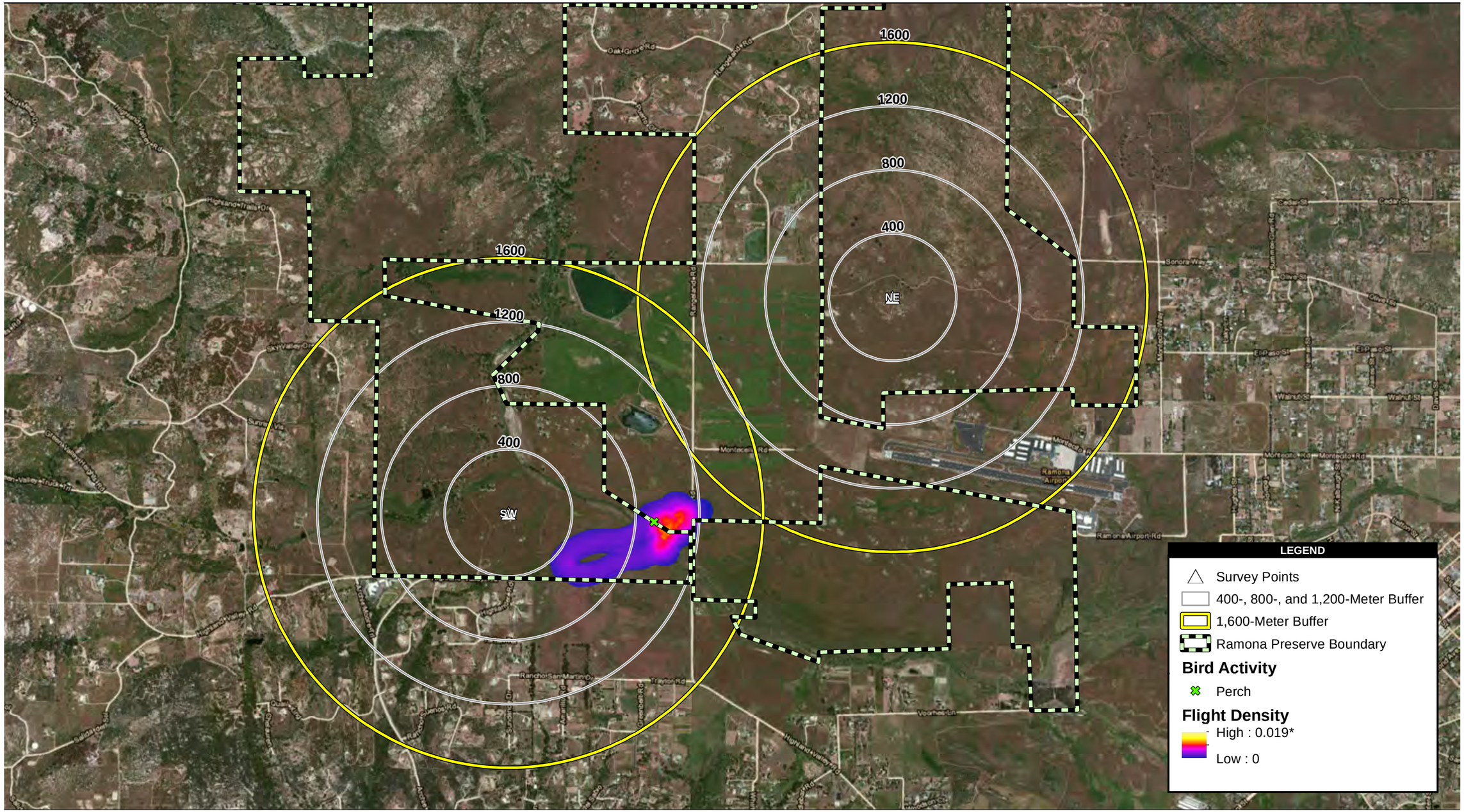
After completing Year 1 surveys, due the lack of a robust dataset on northern harrier, there are no recommendations for areas to avoid within the Preserve. The Preserve has extensive suitable habitat for northern harrier, but drought conditions may have limited raptor activity due to lesser quantities of prey. Therefore, accurate recommendations cannot be made until future surveys are completed.

3.2 GOLDEN EAGLE NEST MONITORING RESULTS AND DISCUSSION

Two separate monitoring surveys were conducted by AECOM in Bandy Canyon.

The first monitoring survey occurred on January 23, 2014, from 9 a.m. to 1 p.m. During this survey, a single adult golden eagle was observed at 9:30 a.m. on the cliff face a short distance from a nest. There were several old nests dispersed throughout this cliff face, so it was unclear which, if any, of the nests were currently active. At 10:45 a.m., the adult golden eagle took a short flight and landed next to a second golden eagle on the cliff face below the same nest. At 10:51 a.m., both of the golden eagles took flight. They both flew in the canyon for several minutes. At this time it was determined that the second golden eagle was not an adult, but a sub-adult. For approximately 3 minutes, the golden eagles engaged in different than normal flight styles, and flight displays were occurring, but it was unclear if it was a courtship flight or an aggressive flight display. After this observation, both golden eagles flew down the canyon toward San Pasqual Valley and out of sight for the remainder of the survey. No confirmed active nesting activity was observed.

The second monitoring survey occurred on March 10, 2014, from 8:15 a.m. to 12:15 p.m. During this survey, there were no golden eagles detected for the first 90 minutes. At approximately 9:45 a.m., a golden eagle was detected perched on a shrub approximately 984 yards (900 meters) south of the OP, on a mountain ridge. At 9:55 a.m., this eagle flew down the canyon toward the cliff face, and the second golden eagle flew after the first eagle. The second eagle was initially obscured and was perched in a grove of trees at the bottom of the canyon, approximately 744 yards (680 meters) away from the OP. Both of the eagles landed on the cliff face. The pair of golden eagles was perched on the cliff face at numerous locations throughout the survey, and at one point, one of the eagles landed on one of the nests. There was no sign that they were incubating eggs, but this pair remained close to one another and appeared to be engaging in courtship flight displays. At 10:30 a.m., one of the eagles flew back down to the grove of trees at the bottom of the canyon. The other stayed perched on the cliff face. At 10:50 a.m., the eagle



Source: Microsoft 2010

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 7a
Fall American Peregrine Falcon Flight Density Map

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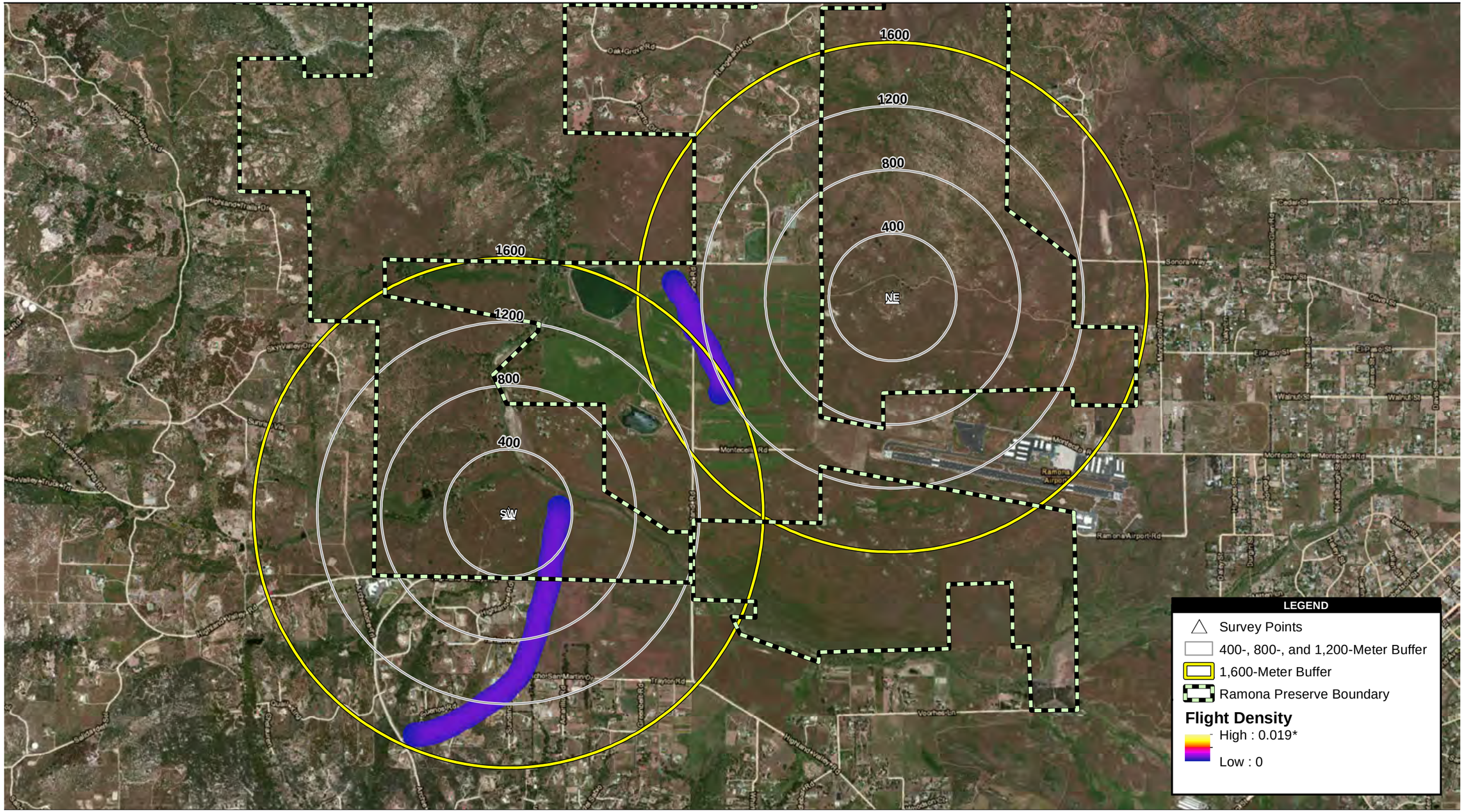

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 7b
Winter American Peregrine Falcon Flight Density Map

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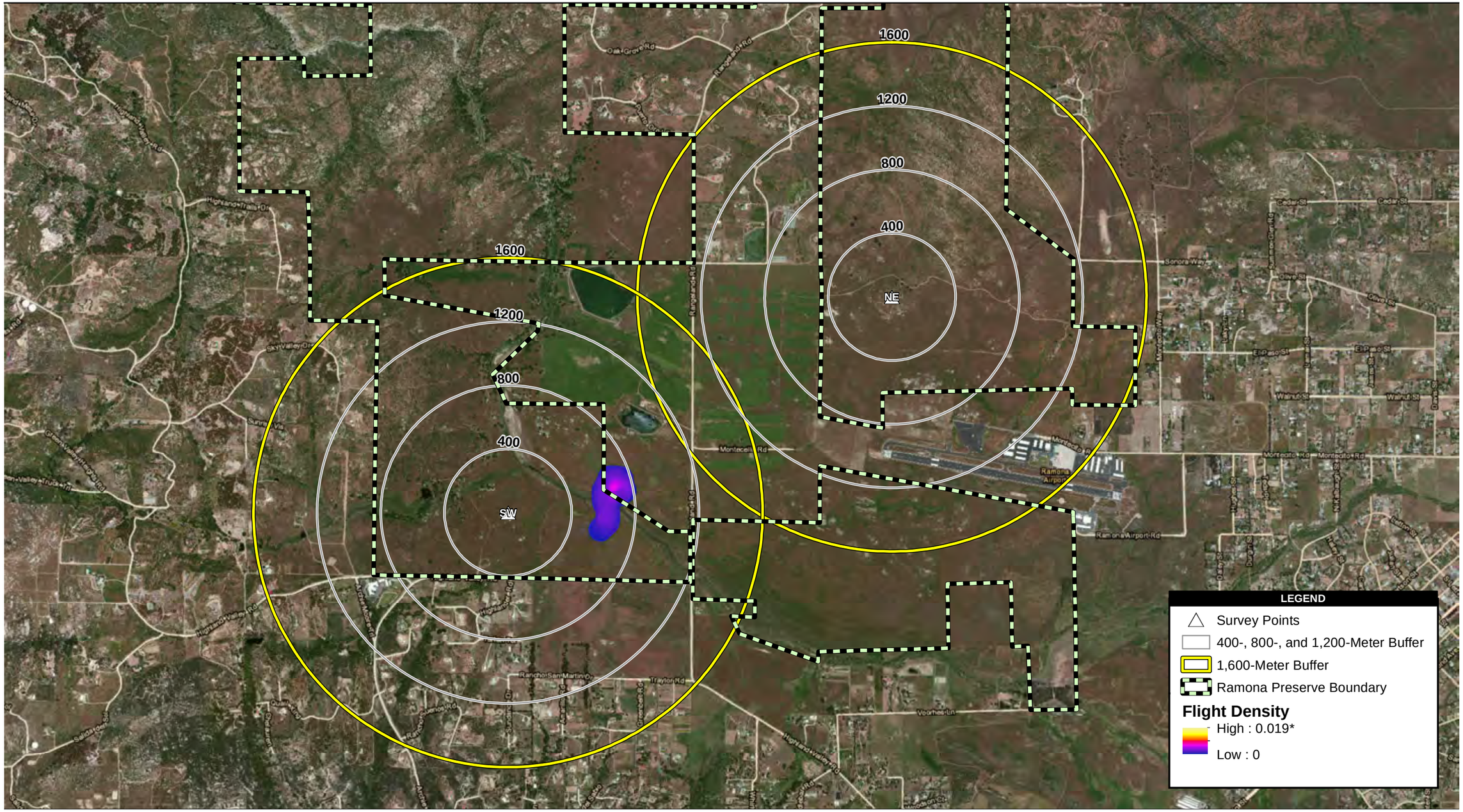

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 7c
Summer American Peregrine Falcon Flight Density Map

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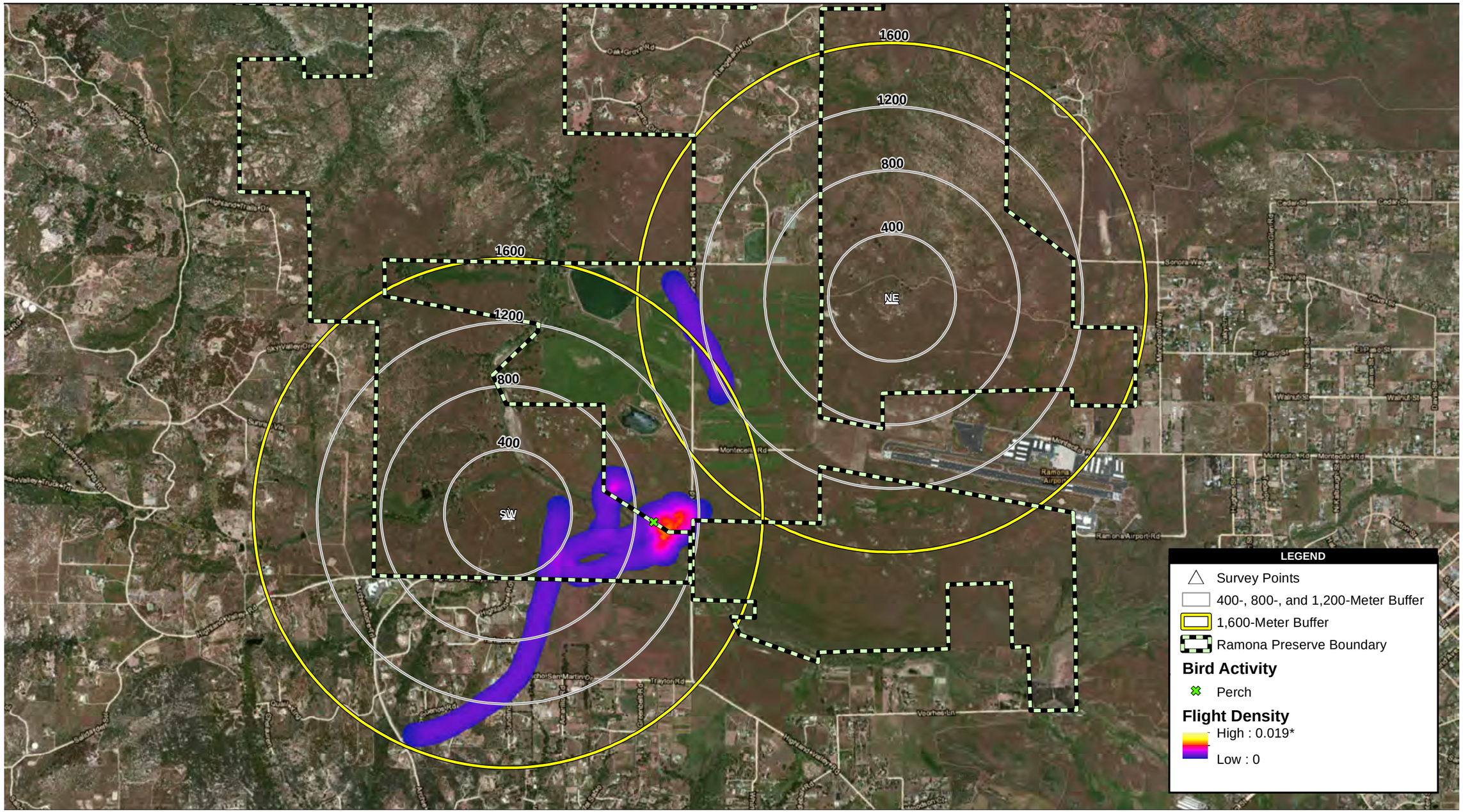

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 7d
Annual American Peregrine Falcon Flight Density Map

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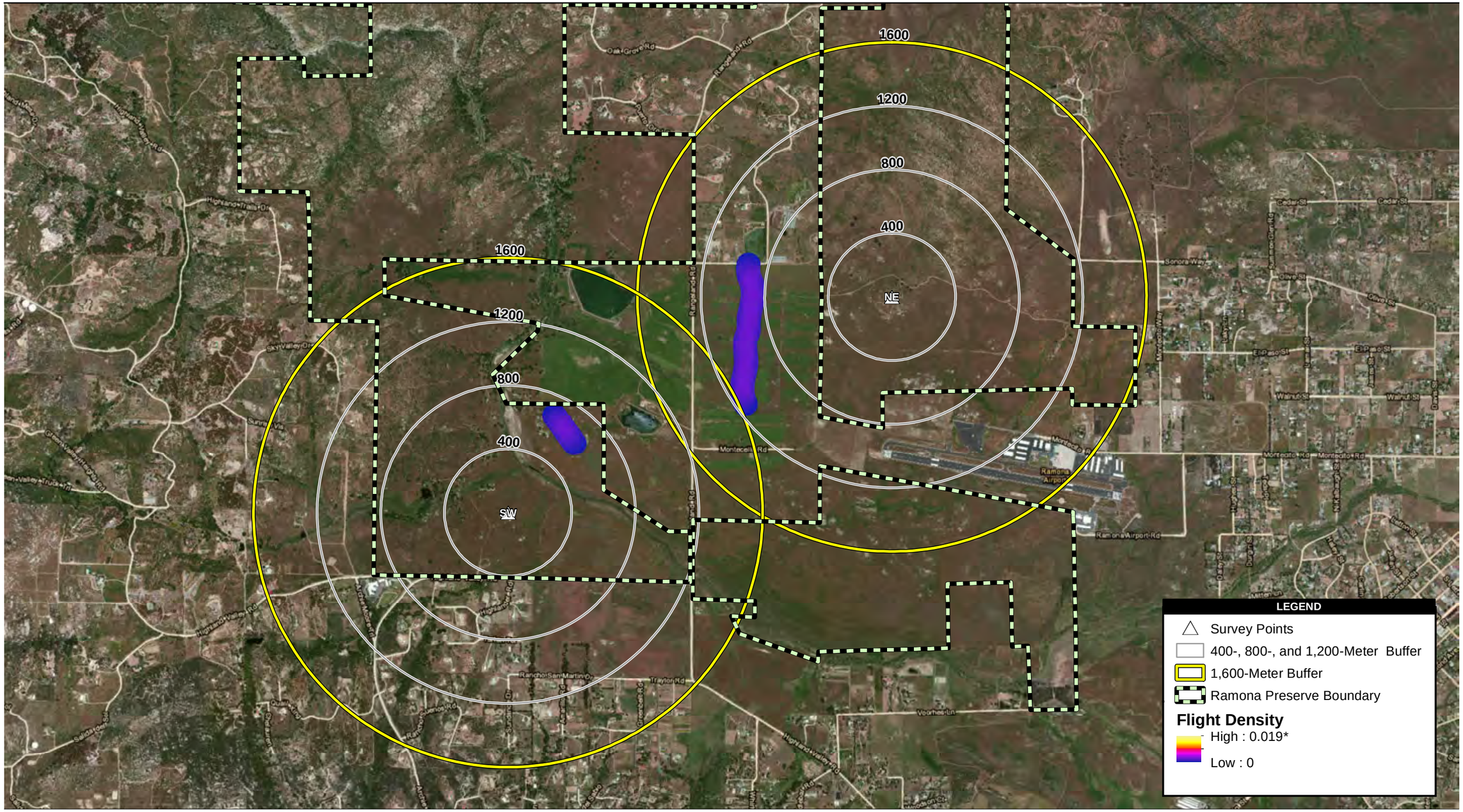

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 8a
Fall Northern Harrier Flight Density Map

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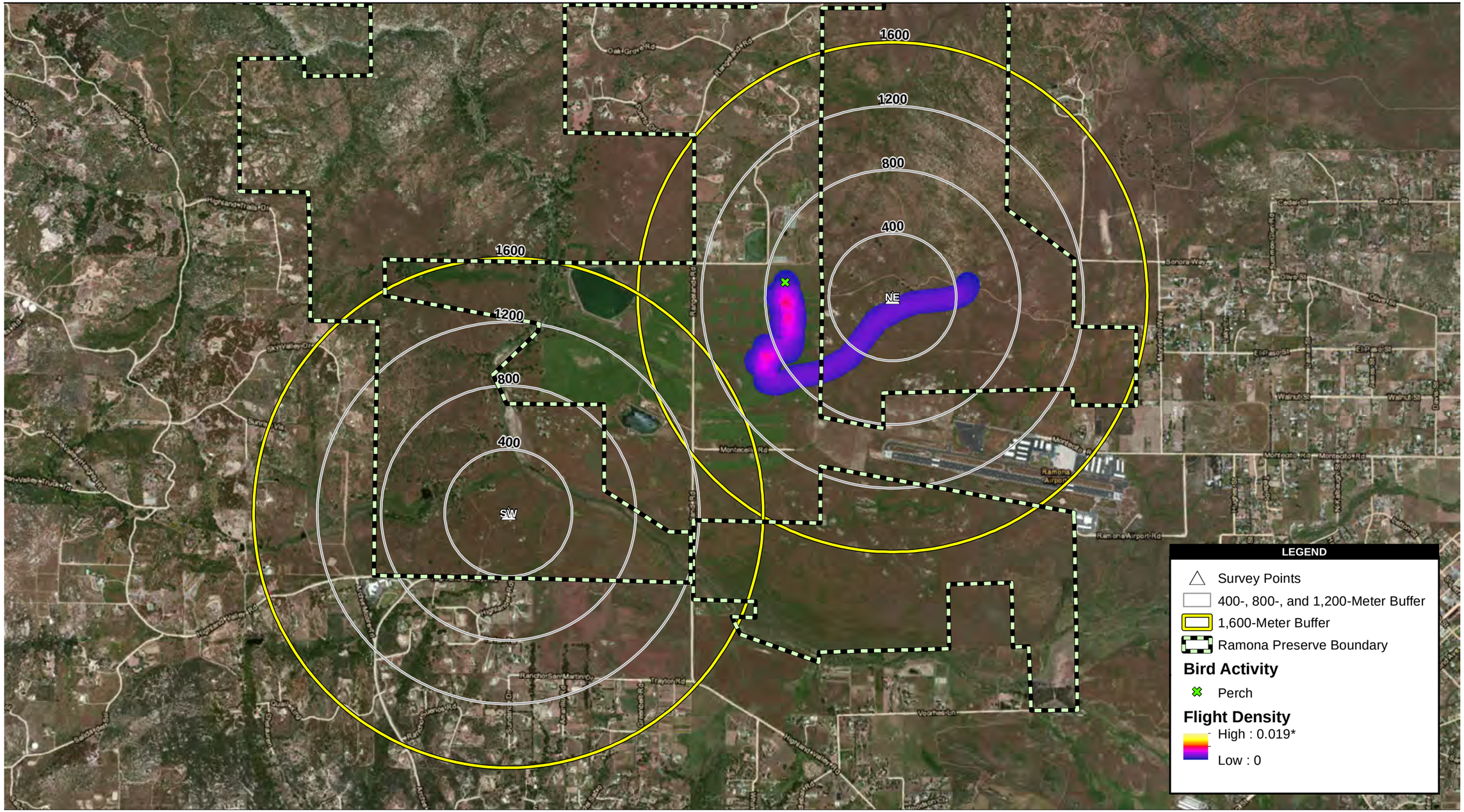

Source: Microsoft 2010

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Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 8b
Winter Northern Harrier Flight Density Map

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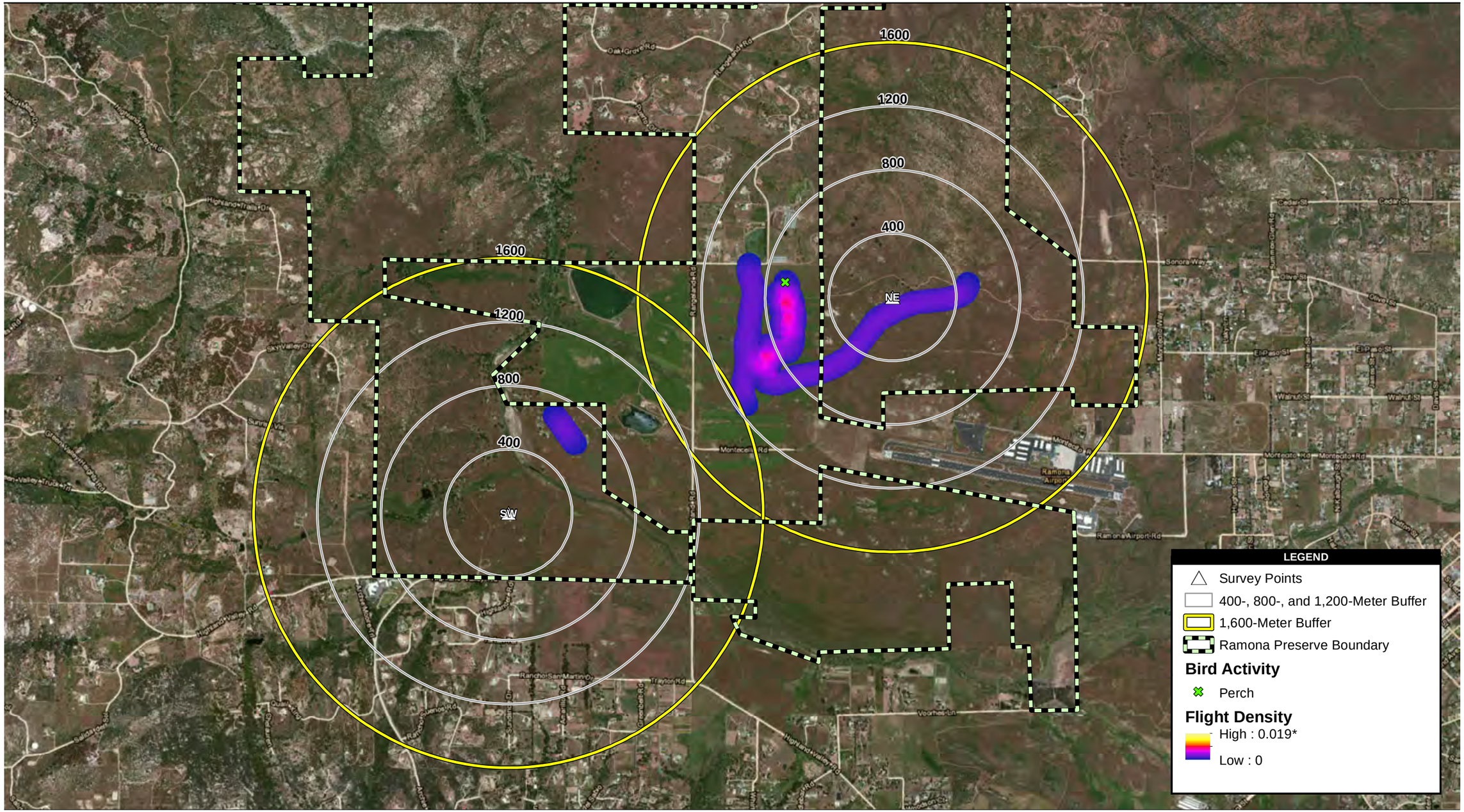

Source: Microsoft 2010

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

*Density units measured as linear feet per square feet within a search radius of 250 feet

Figure 8c
Annual Northern Harrier Flight Density Map

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flew from the cliff face, eventually flying up behind the eagle perched in the tree at the bottom of the canyon, and attempted to copulate with it. At this point, both golden eagles flew up and began to catch a thermal, and eventually made their way down the canyon toward San Pasqual Valley and out of sight for the remainder of the monitoring survey.

Although this apparent pair of golden eagles appeared to possibly be interested in nesting, no confirmed active nests were observed, nor did the eagles pay any particular attention to any part of the cliff face or any of the several nests located on the cliff. Therefore, it is only known that golden eagle individuals occupy this area for roosting and foraging. No other nest monitoring surveys were conducted by AECOM. Photographs of the OP and golden eagle pair are depicted in Appendix H.

With the current drought conditions in California, the golden eagles at Bandy Canyon may not have chosen to nest in 2014 due to the lesser quantities of prey items. Obtaining more data in Year 2 and Year 3 of this study may help to clarify if Bandy Canyon will continue to be an active nest site. The results of the monitoring surveys indicate that Bandy Canyon is occupied with golden eagles and is a sensitive area for the species and nesting.

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CHAPTER 4
RECOMMENDATIONS FOR SURVEY METHODOLOGY FOR REMAINING YEARS 2 AND 3

There are no recommendations to modify the survey methodology for the remaining two years of the study. The survey methodology conducted was successful in meeting the goals of this study, which is to collect baseline information on raptor species abundance and distribution within the Preserve and golden eagle nest use within Bandy Canyon. If feasible, it is recommended that a USFWS representative or equally qualified avian biologist continues to conduct surveys to supplement the surveys being conducted by AECOM.

During the analysis of data collected over the year prepared for this report, modifications to the originally proposed data analysis were determined necessary. It was originally proposed that the raptor data collected would be analyzed to determine the relative frequency of observations by calculating the mean number of raptors observed per hour of observation. Also, it was proposed that the duration of observations would be analyzed by calculating the mean number of minutes a raptor species was observed per hour of observation.

It was determined that this calculation could not be conducted due to the lack of raptor species detected on an hourly basis. Instead, the frequency of observations was based on the number of raptors per survey (as detailed in Table 1), and the duration of observations would be based on the mean number of minutes observed per survey (as detailed in Table 2). These changes to the data analysis are recommended for the remaining Years 2 and 3 of this study.

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CHAPTER 5
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