Lead Agency
Lake Mead National Recreation Area, National Park Service

Featured Project
Wildlife Inventory Monitoring and Management (project no. 2003-NPS-229-P-2004-07)

Report on Riparian, Lowland, and Upland Bird Monitoring (2004-2005), Including Southwest Willow Flycatcher, within Lake Mead National Recreation Area

Project Description
This monitoring project was conducted to determine the distribution, abundance, and potential threats to bird species within Lake Mead National Recreation Area (LMNRA), including Southwestern Willow Flycatchers (*Empidonax traillii extimus*), and if necessary take appropriate actions to protect specific habitats. The index of success for this project was the acquisition of information on locations, numbers, and threats to bird species, categorized as covered, evaluation or watch listed under the Clark County Multiple Species Habitat Conservation Plan (MSHCP), that can be used to guide management actions.


Black-tailed gnatcatcher observed at Sugarloaf Spring.

Project Status
The two years of monitoring for riparian, lowland, and upland bird species has been completed. The following document represents the final report for work performed by the National Park Service, LMNRA, with funding received from the Clark County MSHCP during 2004 and 2005.


Conducting call-broadcast survey at Cottonwood Cove.

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Funding Awarded
$103,485*

Funding Spent
$103,485*

* This amount represents total funding received and spent on work stipulated for bird monitoring and management under project number 2003-NPS-229-P-2004-07. Specifically, $53,330 of these funds were stipulated for personnel costs associated with the riparian, lowland, and upland bird surveys, including several species categorized as

covered, evaluation or watch listed under the Clark County MSHCP. Travel and equipment costs for these surveys were incorporated into the general budget lines for all bird projects. In addition to the work described herein, project funding was used for monitoring and management actions for peregrine falcons and bald eagles. Reports for these species are provided in separate documents.

Completion Date or Status
Project Completed, January 31, 2006

Products Produced from Project
This project consisted of monitoring efforts for riparian, lowland and upland bird species, and southwestern willow flycatchers. The survey efforts have been successful at documenting the general presence and relative abundance of bird populations over time in given locations within LMNRA and across Clark County. For regional assessment of most lowland and riparian birds, data from point counts and intensive area surveys have been shared with the Great Basin Bird Observatory. Data from the southwest willow flycatcher surveys have also been shared with the Arizona Game and Fish Department (AGFD), Nevada Department of Wildlife (NDOW), the U.S. Bureau of Reclamation (USBR) and the U.S. Fish and Wildlife Service (USFWS).

Report on Riparian, Lowland, and Upland Bird Monitoring (2004-2005), Including Southwestern Willow Flycatcher, within Lake Mead National Recreation Area

Final Report for work performed by the National Park Service, Lake Mead National Recreation Area during 2004 and 2005 with funds from the Clark County Multiple Species Habitat Conservation Plan (2003-NPS-229-P-2004-07)

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INTRODUCTION

From 1999 through 2003, bird populations within Lake Mead National Recreation Area (LMNRA) were monitored using protocols established by the Institute for Bird Populations and reported as part of the National Monitoring of Avian Productivity and Survivorship (MAPS) program (DeSante and Nott 2000). The MAPS protocols, however, were labor intensive and researchers attempting to institute a MAPS program within LMNRA were only able to monitor a single site in a given year. Prior to the completion of the minimum five year monitoring protocol, a fire altered habitat conditions at the original study site to such an extent that birds could no longer be safely captured there (i.e. risk of sun exposure while in mist nets was unacceptably high). A second MAPS station was established in 2002 in the Virgin River riparian zone, but due to limited funding has not been studied since 2003. MAPS data are primarily useful on a very large scale (.e.g. regionally or nationally). A limited spatial approach to bird monitoring, however, does not capture the variable nature of populations across diverse habitats encountered within a large, heterogeneous area like LMNRA. Consequently, in order to gather data that will be more useful to Clark County a change was initiated in the bird monitoring program at LMNRA beginning in 2004.

LMNRA is located in a unique area of the eastern Mojave Desert near a transition zone with the Colorado Plateau and Sonoran Desert. The park boundaries traverse numerous habitat types and share borders with the fastest growing urban area in the nation. In order to gain data on bird distribution and habitat-specific relative abundances across a number of sites throughout LMNRA, the NPS has adopted an 'all bird' monitoring strategy. This strategy employs standard fixed radius point count surveys as well site specific monitoring through intensive area searches. These protocols were consistent with regional efforts to monitor bird species across Clark County and Nevada (GBBO 2003).

In 1997, the Great Basin Bird Observatory (GBBO) was formed largely in response to a Nevadas Partners in Flight (NPIF) initiative to implement an 'all bird' monitoring program within Nevada (Neel 1999). A statewide, habitat-based bird monitoring program was recognized as necessary for the development of conservation

strategies for Nevada birds and their habitats. The GBBO (2003) protocols have been adopted by many federal and state agencies throughout Nevada. The monitoring plan implemented by GBBO covers 13 major habitats/ecosystems, including several within LMNRA (e.g., Mojave scrub, lowland riparian, mesquite−catclaw, salt desert scrub, pinyon−juniper). Sampling efforts were allocated among habitats to maximize monitoring of bird species categorized as covered, evaluation or watch listed under the Clark County Multiple Species Habitat Conservation Plan (MSHCP).

The southwestern willow flycatcher (*Empidonax traillii extimus*) is unique among the birds monitored within LMNRA in that this subspecies is federally listed as endangered by the U.S. Fish and Wildlife Service (USFWS 1995). This neotropical migrant breeds from New Mexico and Arizona, into southern California, Utah, southwestern Nevada, and possibly into west Texas. It nests primarily in riparian areas characterized by stands of mixed or monotypic broadleaf native (e.g., willows and cottonwood) or exotic (e.g., tamarisk and Russian olive) trees ranging in height from 3 to 15 m. The species has declined because of habitat elimination and alteration, disruption of natural flow regimes within river systems, overgrazing of riparian areas by livestock, and nest parasitism by brown-headed cowbirds (*Molothrus ater*).

Potential willow flycatcher habitat in LMNRA is found along the Colorado, Virgin, and Muddy Rivers, and in isolated stands of willows along Lake Mohave. Habitat must be regularly evaluated since the Lake Mead reservoir has a variable water level that can expose or inundate potential habitat at relatively unpredictable periods of time, and render the habitat unusable or provide for the rapid growth of beneficial emergent vegetation. The NPS monitoring of southwest willow flycatchers within LMNRA has been coordinated with several other agencies under the regional auspices of the Arizona Game and Fish Department (AGFD). However, much of the effort at LMNRA (i.e., the Overton Wildlife Management Area and along the Virgin River) has been conducted by environmental consultants contracted by the U.S. Bureau of Reclamation (USBR) to survey, monitor, and conduct demographic and ecological studies in suitable and historical riparian habitats throughout the region, as called for in the Lower Colorado River Multiple Species Conservation Plan (SWCA 2004).

GOALS AND DELIVERABLES

By coordinating with the statewide bird monitoring program and the AGFD southwestern willow flycatcher regional monitoring effort, the NPS cooperative strategy: (1) comprehensively covers all major habitats within the LMNRA and the county; (2) monitors most bird species covered by the MSHCP; (3) provides for both random point monitoring and project−specific monitoring; (4) provides for statistically sound bird databases that can be accessed and used by partners. The resulting databases will likely become reliable sources of bird population trends for the county and a useful reference for federal, state, and local resource managers.

Most of the lowland bird surveys performed within the LMNRA focused on riparian habitats and therefore targeted several species listed as ‘covered’ under the MSHCP. These species included the southwestern willow flycatcher (*Empidonax traillii extimus*), blue grosbeak (*Passerina caerulea*), phainopepla (*Phainopepla nitens*), summer

tanager (*Piranga rubra*), vermilion flycatcher (*Pyrocephalus rubinus*) and Arizona bell's vireo (*vireo bellii*). In addition, to capture needed data on several birds listed as 'evaluation' species under the MSHCP, surveys were also performed within upland habitats. The focus of these surveys was on several species of thrashers – crissal thrasher (*Toxostoma crissale*), Le Conte's thrasher (*Toxostoma lecontei*), and Bendire's thrashers (*Toxostoma bendirei*).

The monitoring work performed by NPS over the past two years addresses the biological goals presented in the Clark County MSHCP. This document states that one of its main goals for the 'covered' bird species listed is that populations of these species will remain stable or increase in population numbers. The measurement of this goal is unachievable without the effective monitoring efforts addressed by this project. Results from these surveys have been submitted to GBBO for sharing among partners. Southwestern willow flycatcher data have been submitted to the Nongame Branch of AGFD for inclusion into the regional monitoring effort. The following document represents the final report for work performed on riparian, lowland, and upland bird monitoring surveys during 2004 and 2005 by the NPS with funding received from the Clark County MSHCP (project no. 2003-NPS-229-P-2004-07)

MATERIALS AND METHODS

Point Counts and Intensive Area Surveys – In order to inventory and monitor land birds within LMNRA, the NPS used both point count and area search/territory mapping methods (the latter is also called an intensive area survey). These methods have been implemented regionally through the Nevada Bird Count (NBC) program and within the last several years have been implemented for land bird monitoring within the region (GBBO 2003). The NPS has adopted these methods in order to be consistent and data compatible with regional monitoring efforts and approaches used by other agencies.

Each point count transect was constrained to a particular habitat type, and only bird sightings made within 100 m of the surveyor were typically used for analysis. Along a transect, 10 minute point counts were conducted at 10 geo-referenced survey points spaced at least 250 m apart (thus transects were about 2.5 km long). Point counts were conducted each year between early April and the beginning of June. A Global Positioning Systems (GPS) was used to locate the transect points. Only a single transect was completed during a given day usually between sunrise and 10:00 a.m. Point counts were only performed if weather conditions were favorable (i.e., no strong winds or precipitation; Ralph 1993). At each point, all birds detected through auditory or visual cues were recorded during three time intervals (0-3 min., 3-5 min., 5-10 min.). Fly-overs were recorded separately. Any current breeding evidence was reported by species.

In addition to point count surveys, the NPS established several intensive area survey plots within habitat stratums, which were surveyed approximately 8-10 times each during the breeding season to determine the total number of breeding birds within a plot (Sutherland 2000). These intensive area searches and territory mapping efforts were also performed as a double-sampling tool to correct for biases in density estimates from the point count method (Bart and Earnst 2002). In essence, these plots provided an unbiased measure of breeding density at a particular site, and could be overlaid with point count

data collected by a different surveyor to derive correction factors for possible biases that may influence detection of birds during a point count survey (GBBO 2003).

In order to answer specific questions about bird occupancy and breeding at specific sites, intensive area surveys can be tied to specific project related questions. Within LMNRA, plots were situated in areas scheduled for vegetation restoration projects or which already had restoration projects, predominately removals of salt cedar (*Tamarix ramosissima*). Thus, this monitoring may be used for long-term assessments of site restoration on bird breeding activities.

Targeted Point Counts – In the spring of 2005, a targeted effort began in order to document the presence or absence of three species, Le Conte's, Bendire's, and Crissal thrashers. The object was to understand the distributions, relative abundances, and to determine specific habitat characteristics that define the presence of these upland species. A Geographical Information System (GIS) was used to randomly select survey points for these species within habitat types documented to be used by these birds and within some habitats types in which these species were thought to be rare visitors or to not occur at all.

The NPS employed the call-broadcast method for these counts (Glahn 1974), because these species are considered rare and elusive, and therefore historically the standard point count method has not been adequate for documenting the presence of these birds. The focus for the 2005 effort was to acquire preliminary data to build and refine conceptual models for further research. Using the call-broadcast method, song recordings of the targeted species were played in order to elicit a response from these birds, if present. Each call was played twice for approximately 30 seconds with a one minute break between calls. If there was a response to the call-broadcasts, the type of response was noted (audio versus visual) and the bird was identified to species.

Southwestern Willow Flycatcher – Suitable habitat within LMNRA for southwest willow flycatchers was evaluated on a yearly basis in order to locate areas likely to contain active territories. Willow flycatcher surveys were conducted by the NPS on two sites within LMNRA (Fig. 8) determined to fit the characteristic habitat that the southwestern willow flycatcher uses for breeding (i.e., riparian stands of mixed or monotypic broadleaf native or exotic trees ranging in height from 3 to 15 m). All surveys were performed by kayak along the habitat patch by at least one surveyor (AGFD certified), using the established protocol required by the USFWS (Sogge et al. 1997). A minimum of one call-broadcast survey was performed at each site in each of the following periods: May 15 – May 31, June 1–June 21, and June 22 – July 10. Surveys were performed at least five days apart and during the period of one hour before sunrise to 10:00 am.

At each site, a call-broadcast of the willow flycatcher song was played for 15-30 seconds, followed by a 1-2 minute listening period. The process was repeated every 20-30 m along the site. Willow flycatchers were considered a potential breeder if they were detected between June 15 and July 25, regardless of whether a possible mate was detected. Birds detected prior to June 15, but not on subsequent surveys, were considered migrants, or possibly a separate willow flycatcher subspecies, and were assumed to be en route to separate breeding grounds.

RESULTS

Point Counts –For the 2004 field season, NPS performed eight point count surveys between early April and late June (Fig. 1), in which surveyors documented a total of 1115 birds of 73 different species. During the 2005 breeding season, NPS performed 13 point count surveys in which surveyors documented a total of 921 birds of 72 different species. During these surveys biologists documented several 'covered' and 'evaluation species. These included observations on 4 phainopepla, 6 blue grosbeaks, 7 Arizona bell's vireos, 7 crissal thrashers, and 4 Le Conte's thrashers.

Intensive Area Surveys – During the 2004 breeding season, the NPS established 3 intensive area sites (Sacatone Wash, Fire Wash Cove, and Grapevine Canyon), which were visited 8 to 10 times each during the breeding season. Sacatone Wash and Grapevine Canyon plots were located in the Newberry Mountains at elevations of approximately 670 m and 660 m, respectively. Plot areas were about 4.5 ha at Sacatone and 2.8 ha at Grapevine. These areas consisted predominately of relatively high elevation riparian habitat. At the time the surveys were conducted, Sacatone had already undergone tamarisk removal in a previous habitat restoration project. In December 2005, after the intensive area surveys were conducted, NPS crews also removed tamarisk from Grapevine canyon. The Fire Wash Cove plot was located along the Overton Arm of Lake Mead at an elevation 380 m within relatively lowland desert riparian. This plot covered 2.464 ha and is scheduled for future tamarisk control efforts by NPS crews.

During intensive areas surveys (site visits) surveyors recorded all birds present, their locations within the survey plot, and evidence of breeding (Figs. 2-4). During 2004, 972 birds of 67 different species were identified within these three plots. At the Firewash Cove plot 10 breeding territories of 9 different species were identified. At Grapevine Canyon 19 breeding territories of 15 different species were observed, and in Sacatone Wash 18 breeding bird territories of 16 different species were counted. At these sites biologists saw two 'covered' species, comprising 3 pairs of phainopepla and 2 Arizona bell's vireos, as well as 2 pairs of crissal thrashers, an evaluation species. Additionally, two pairs of a watch listed species, the cactus wren (*Campylorhynchus brunneicapillus)* were documented. These sites have continued to be monitored on a monthly basis to determine seasonal use of these habitats by various species.

In 2005 intensive area survey plots were established in Mojave upland scrub, based on a need for bird monitoring data within that habitat type. The Cottonwood plot was established at an elevation of about 707 m on an east facing bajada in an area vegetatively dominated by teddy bear cholla (*Opuntia bigelovii*). This site was approximately 14.96 ha in area. The Loran plot was at an elevation of approximately 902 m in a region dominated by Mojave yucca (*Yucca schidigera*) and was approximately 11.46 ha. in size. These areas were visited a total of 10 times each during the breeding season. At these two sites, 528 birds were seen of 20 different species. A total of 15 breeding territories of 7 different species were documented at the Cottonwood site. The Loran site contained 13 breeding territories of 6 different species (Fig. 5 and 6). For reporting purposes, all partial territories on the data sheets are rounded up to the nearest whole number.

Targeted Point Counts – In 2005 researchers visited 162 survey points throughout Clark County that were targeted on Le Conte's, Bendire's and Crissal thrashers (Fig. 6). During these surveys biologists recorded the presence of 30 Le Conte's thrashers at 20 survey points; these were generally located within Mojave mixed scrub habitat. A total of 8 Bendire's thrashers were observed at 5 survey points, and 11 Crissal thrashers at 7 survey points were documented. These latter two species were mostly seen in habitats dominated by Joshua, Catclaw, or Mesquite trees.

Southwestern Willow Flycatcher – The NPS performed two monthly southwestern willow flycatcher surveys in 2004 at Pot Cove and Cottonwood Valley Cove. These sites were historically monitored by USBR as part of a larger area they surveyed called, Waterwheel Cove. An oversight by the NPS resulted in the abbreviated survey in 2004. No willow flycatchers were detected during the breeding period but the presence of numerous brown-headed cowbirds was noted.

In 2005 the NPS conducted surveys throughout the survey period (May 15–July 10) at two sites, Rockefeller Cove and Waterwheel Cove (Fig. 6). At Rockefeller Cove only one transient willow flycatcher was detected during a survey on May 16, while brown-headed cowbirds were detected during all three survey periods. The 3 surveys at Waterwheel Cove resulted in 4 adult willow flycatcher detections. Brown-headed cowbirds were present on all visits (Fig. 6). A probable pair of willow flycatchers was observed during the May 17 survey and two willow flycatcher territories were detected late in the breeding season during the July 7 survey. According to the protocol established by Sogge et al. (1997) the two territories detected during the July 2005 survey represent probable breeders.

DISCUSSION

Point Counts and Intensive Area Surveys – Logistical challenges had to be overcome in 2004 because this was the first year point count and intensive area surveys were performed by personnel at LMNRA. Researchers spent the first several weeks of the 2004 field season learning and refining the new methods. Point count surveys required surveyors to accurately and proficiently recognize birds by sight and by song or call. Intensive area plot sizes had to be determined through trial and error, based on how much area could be covered in a day. Another difficulty was that within desert canyons, riparian areas were often not long enough to comply with the 2.5 km long point count transects called for by the GBBO methods. By the beginning of the 2005 field season, however, these difficulties had either been dealt with or mitigated through actions incorporated into work plans.

Target Point Counts – Point counts targeted on the three thrashers species presented additional challenges. All three of the thrasher species are similar in appearance; therefore they can be easily misidentified if not singing or if not seen in good light. Surveyors documented spending well over an hour on a single survey point in order to obtain a positive species identification. Although, using the call-broadcast method did typically elicit a response from the thrashers, the response was elusive. Experience has

shown that these birds may not respond vocally, but instead may stealthily approach until revealing themselves at close range. Thrashers are in the Mimidae family of birds, which refers to their ability to mimic calls of other species including other thrashers. This required the observers to listen carefully to nuances of the calls in order to avoid misidentifying the species. Surveyors are now fully aware of these difficulties and have successfully responded to these challenges.

Southwestern Willow Flycatcher – Surveying and identifying southwestern willow flycatchers in the field can be difficult. Since these birds are rare and occupy dense riparian habitat they have a low detectability in general bird surveys (such as point counts). Males may often sing for hours but substantially lower their song rates during mid-day and throughout the day later in the breeding season. Females, although they too may engage in singing bouts, are usually rather quiet and secretive, which, coupled with their nondescript brownish/gray plumage makes them very difficult to detect. Females are also hard to distinguish from the other flycatcher subspecies and species. Furthermore, willow flycatchers often sing during migration and these birds can be confused with local breeders. For these reasons it is necessary to survey specifically for willow flycatchers, outside of general bird surveys, soliciting a response using a repeating call-broadcast method throughout their breeding season (Sogge et al. 1997).

The abbreviated field season in 2004 resulted from personnel changes at the park and the challenge faced in locating suitable habitat to survey. By retaining qualified staff, the NPS will be able to attain better site selection continuity and potential habitat patches will be more readily identified and surveyed. While only two sites were surveyed in 2005, NPS staff will evaluate potential sites in the future and additional sites may be added as needed.

Currently there is a limited amount of habitat suitable for breeding southwestern willow flycatchers within LMNRA. Depending on future water levels of Lake Mead, however, there is a possibility that available habitat could increase within the park and so a monitoring effort should be continued to determine occupancy. Southwestern willow flycatchers currently appear to rely minimally on LMNRA as a breeding area and they appear to have a low, sporadic population size in the park. However future degradation of breeding sites along the Virgin River or other areas in Nevada and Arizona, coupled with more favorable conditions at LMNRA, could increase the importance of NPS land to the species.

CONCLUSIONS AND RECOMMENDATIONS

The management objectives for this project were to help quantify the current population size and habitat occupancy for covered/evaluation species under the MSHCP within LMNRA and Clark County, and to determine whether population sizes of these species reflect natural distributions and abundances or whether current patterns reflect regional population declines. The point count method employed this biennium does provide data for most species covered under the MSHCP and therefore should be continued as an effective long-term monitoring tool for populations of these birds. Through the landbird monitoring techniques, the NPS has begun to evaluate bird

populations and habitat specific relative abundances within LMNRA. This type of monitoring, however, requires numerous years of data in order to understand species-specific population variability and to be useful for informing management decisions. We also recommend continuing to conduct call-broadcast surveys in effort to capture data on rare and elusive species which have not been adequately sampled through point count surveys, including gray vireo, southwest willow flycatchers and some upland species (e.g., thrashers).

Figure 1. Locations of point count transects conducted by the National Park Service during 2004 and 2005. Some locations were surveyed during both years.

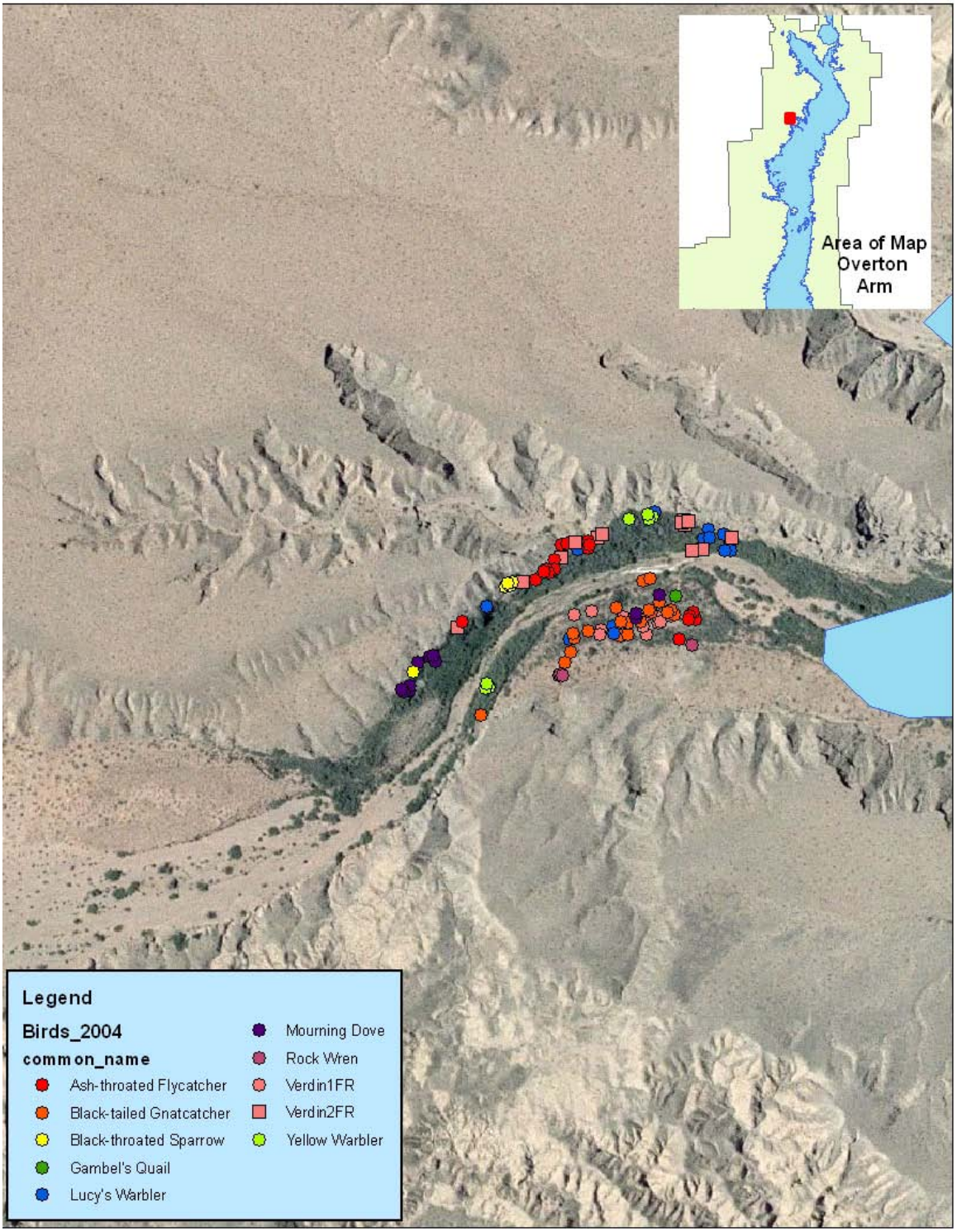

Figure 2. Birding breeding territories in 2004 within Fire Wash Cove along the Overton Arm of Lake Mead, Lake Mead National Recreation Area. Species are color coded. Square represent a second territory of the same species.

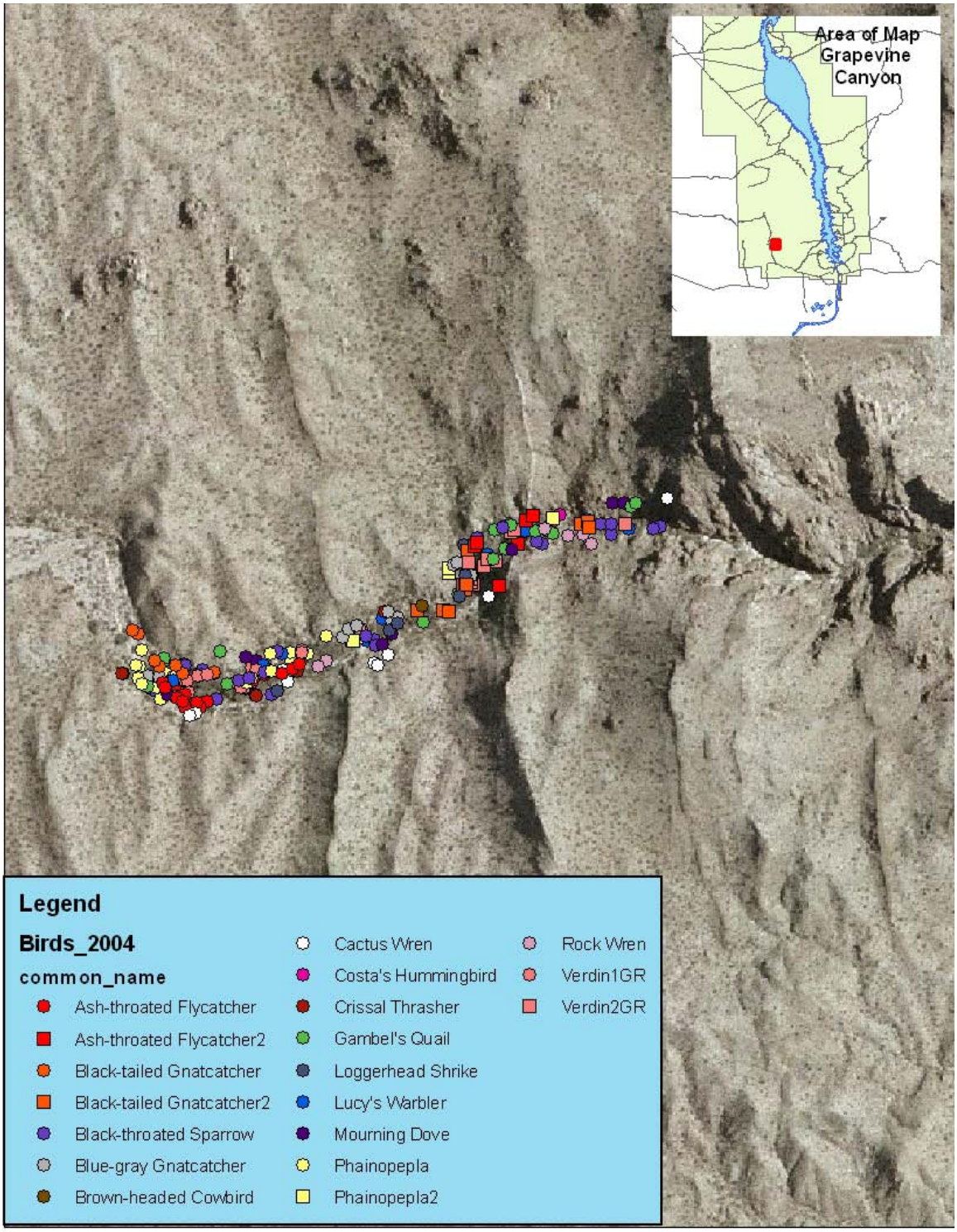

Figure 3. Breeding bird territories in 2004 within Lower Grapevine Canyon, Newberry Mountains, Lake Mead National Recreation Area. Species are color coded. Squares represent second territories of the same species.

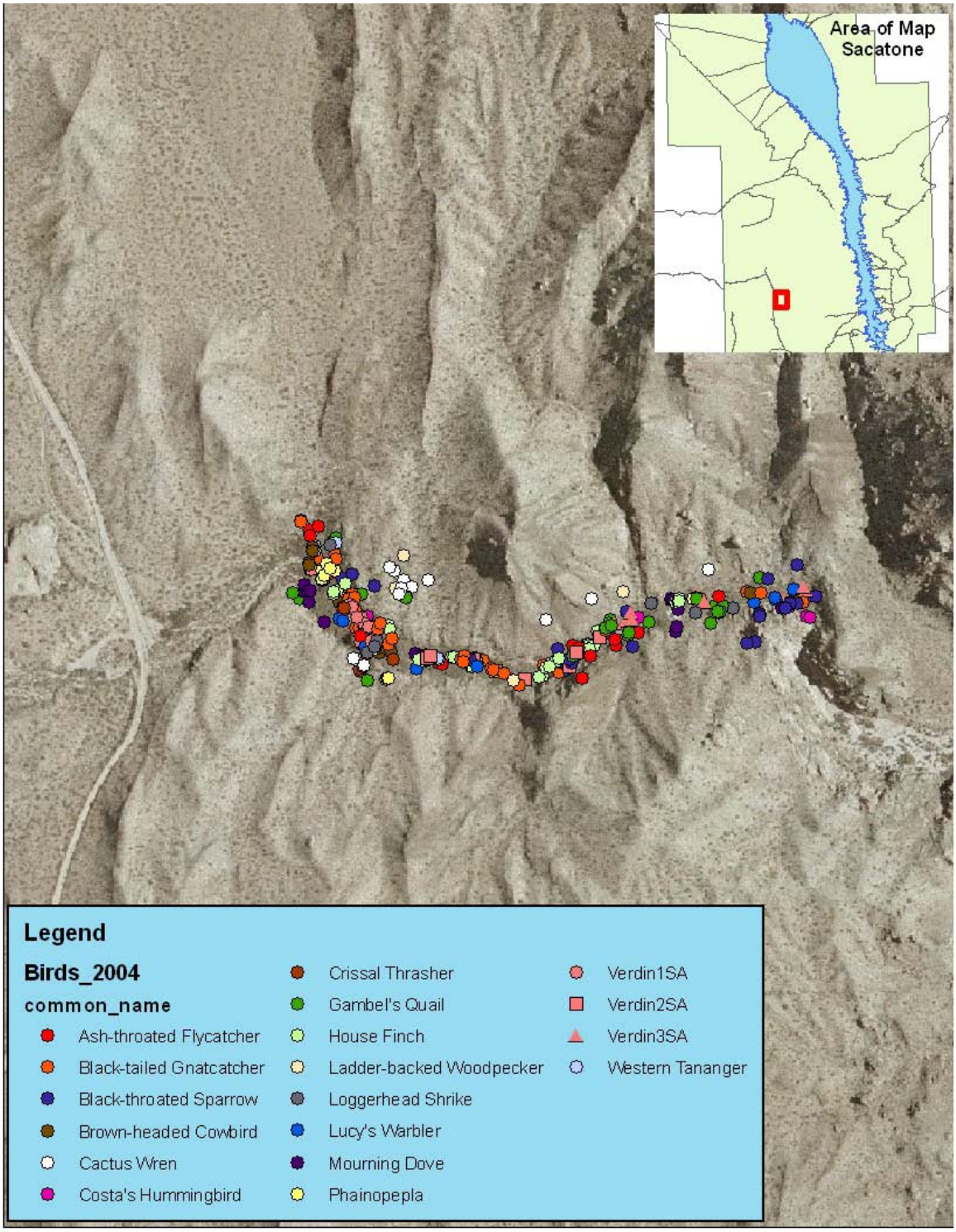

Figure 4. Breeding bird territories in 2004 within Lower Sacatone Wash, Newberry Mountains, Lake Mead National Recreation Area. Species are color coded. Squares and triangles represent different territories of the same species.

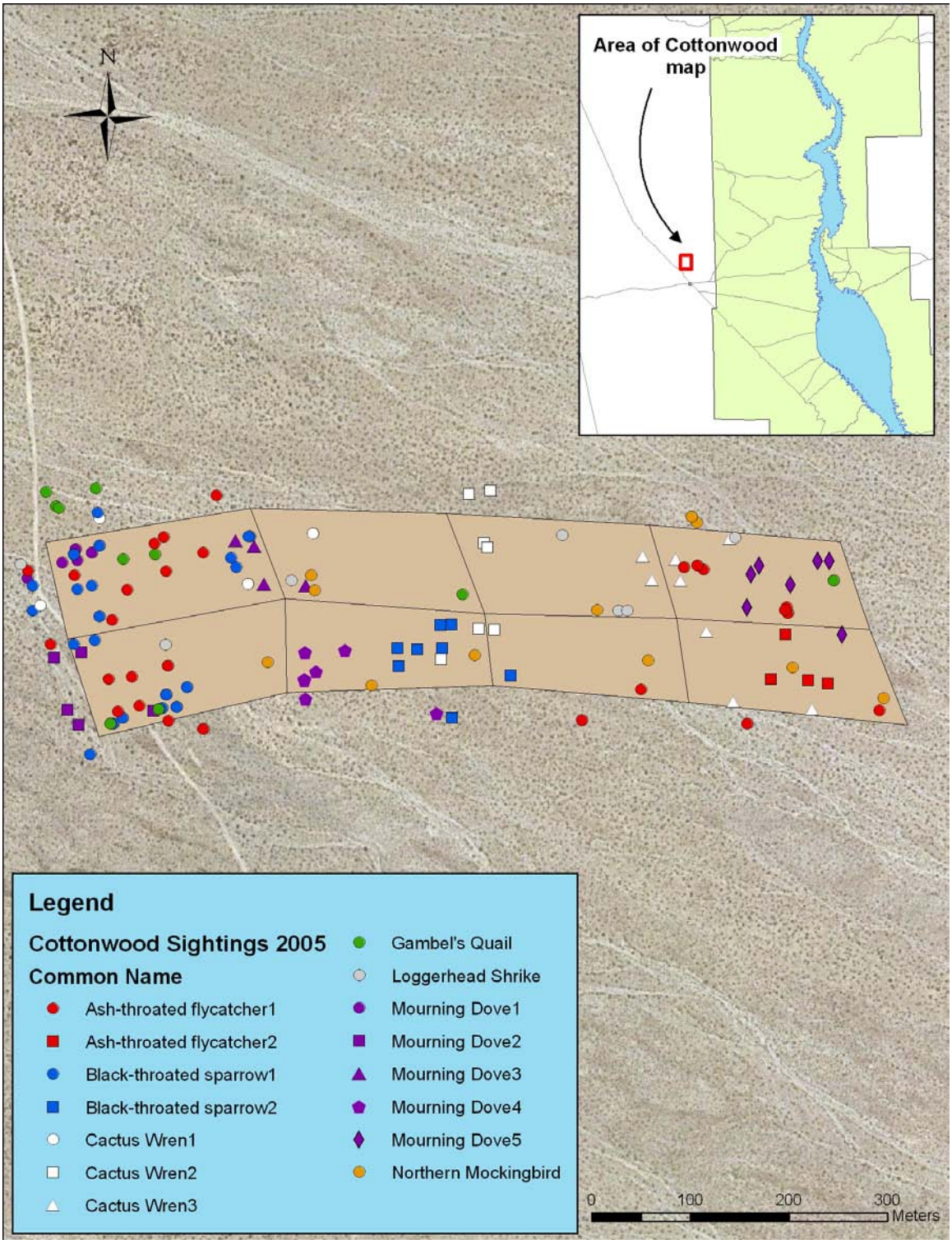

Figure 5. Breeding bird territories in 2005 within the Cottonwood site. The shaded polygons represent the survey area. Species are color coded. Squares, triangles, diamonds, and pentagons represent different territories of the same species.

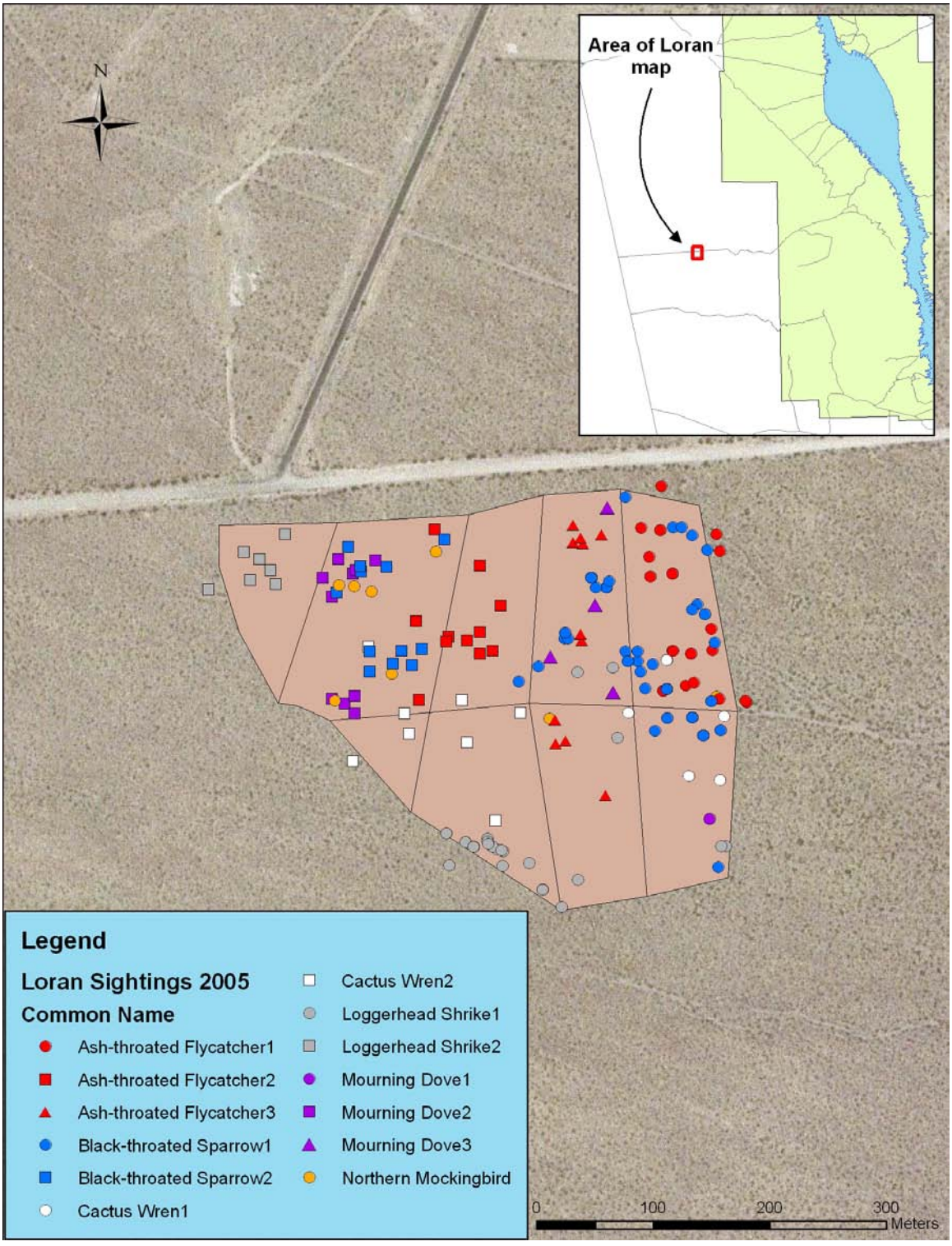

Figure 6. Breeding bird territories in 2005 within the Loran Site on Empire Mine Rd. Species are color coded. The shaded polygons represent the survey area. Squares and triangles represent different territories of the same species.

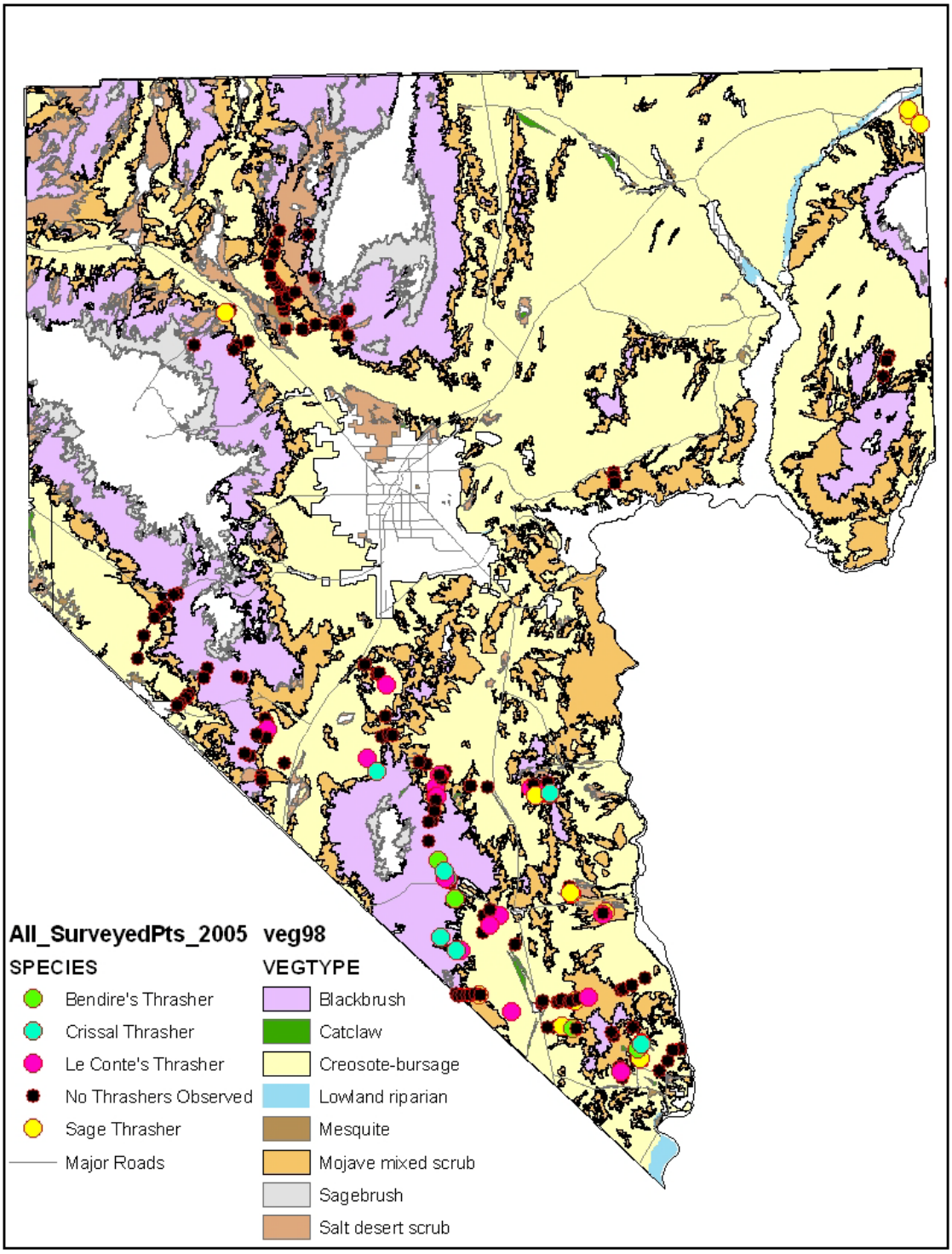

Figure 7. Locations of targeted upland point counts by habitat type conducted by the National Park Service during 2005. These surveys used a call-broadcast method and targeted Le Conte's, Bendire's, and Crissal thrashers.

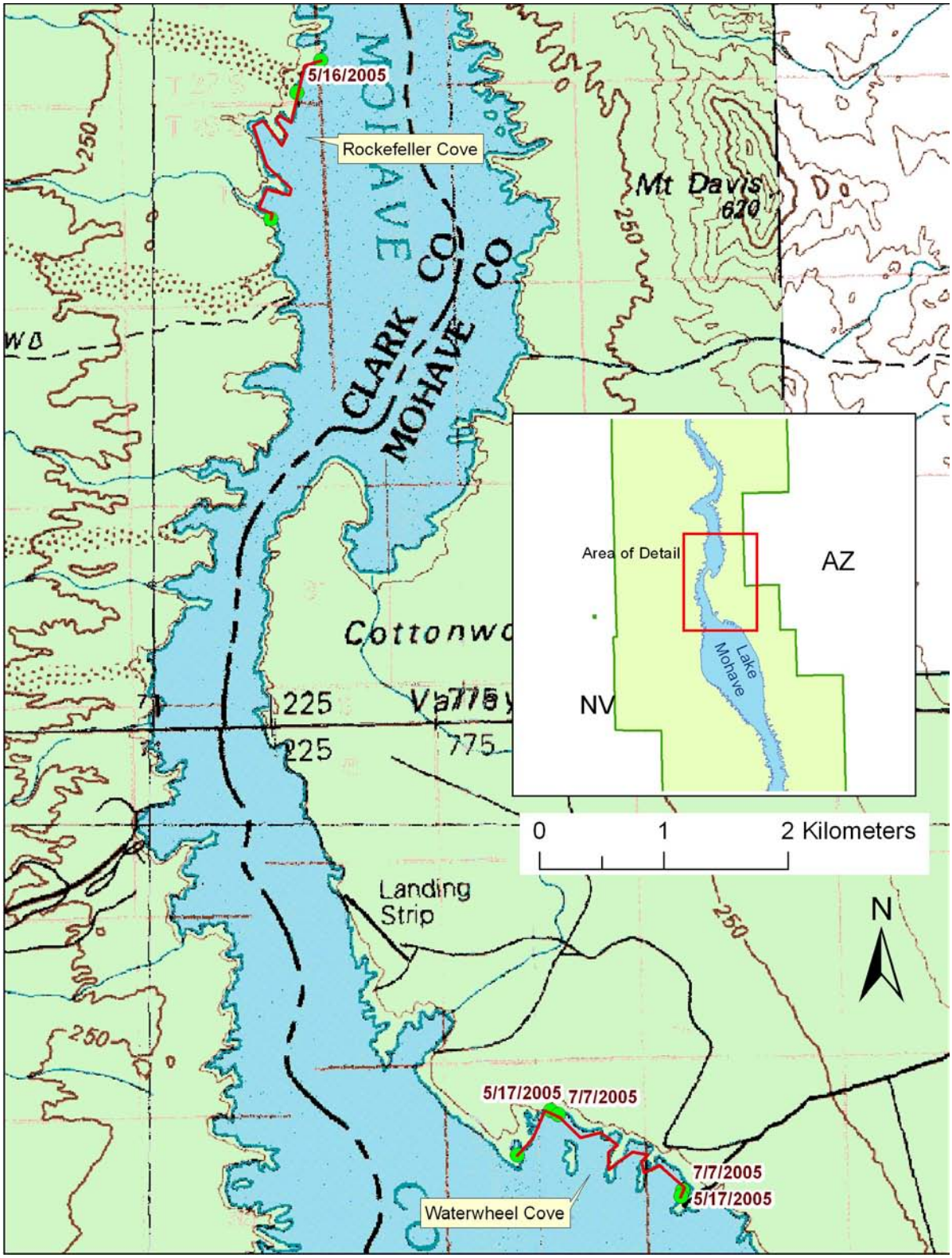

Figure 8. Locations of southwestern willow flycatcher surveys conducted by the National Park Service during 2005. The red lines represent the survey routes at Rockefeller Cove and Waterwheel Cove. Dates indicate detections of southwestern willow flycatcher during call-broadcast surveys.

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