

**SHORT-TERM WILDLIFE RESPONSES TO
PONDEROSA PINE FOREST RESTORATION TREATMENTS
IN THE MOUNT TRUMBULL AREA, ARIZONA**

Annual Progress Report
October 1, 1998 – September 30, 1999

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EXECUTIVE SUMMARY

This report details progress through our third field season investigating the effects of restoration treatments on herpetofauna, Abert's squirrels (*Sciurus aberti*), mule deer (*Odocoileus hemionus*), turkeys (*Meleagris gallopavo*), migrant songbirds, and western bluebirds (*Sialia mexicana*). All data collected to date on the herpetofauna, Abert's squirrels and migrant songbirds are in pre-restored forests. Pre- and post-restoration data have been collected on the remainder of the wildlife groups under investigation.

Sagebrush lizards (*Sceloporus graciosus*) were the most abundant lizard caught in the pitfall arrays, comprising 84.6% of all lizards sampled, and occurring at 44 of 56 arrays. Great Basin skinks (*Eumeces skiltonianus*) comprised 12.3% of lizards and occurred at 22 arrays. The plateau striped whiptail (*Cnemidophorus velox*) and the eastern fence lizard (*S. undulatus*) each occurred at 3 arrays and comprised 1.6% and 1.2% of all lizards sampled, respectively. A fifth species, the short-horned lizard (*Phrynosoma douglassii*) was present at one array in the Control. Lizards were never encountered at 3 of the arrays.

Consistent with previous years, snakes were poorly represented throughout the study area during the entire sampling period. Two Sonoran mountain kingsnakes (*Lampropeltis pyromelana*), one Mojave rattlesnake (*Crotalus scutulatus*), a few gopher snakes (*Pituophis melanoleucus*), and two unidentified rattlesnakes were seen during research activities.

Track plate and feeding sign data were collected from 5 of 6 squirrel grids installed on the Mt. Trumbull Restoration Conservation Area (RCA). The sixth grid was not sampled this year because it was being treated. Data was collected at 3 control and 2 pre-restoration sampling grids.

We successfully captured and telemetered 3 additional female mule deer this summer. However, 4 does died during winter 1988-1999 leaving our telemetered deer population at 13 does. Six of the 13 does produced 11 fawns with fawn survival through September very high. Day-bedding and foraging habitat data were collected at 60 and 53 sites, respectively. Telemetered deer were observed feeding and bedding in both restored and unrestored areas. Winter aerial tracking of deer showed that all deer moved to lower elevations and off the Mt. Trumbull RCA by December 15. Deer moved off the study area in all directions, but primarily south of Mt. Logan. Most marked deer that survived the winter returned to the study area the following summer.

We conducted 11 turkey surveys averaging 2.2 hours per survey. An average of 0.55 turkeys were observed per survey.

Seventy-eight bird species were recorded on the Mt. Trumbull RCA during both spring and fall migrant surveys. A total of 861 surveys were conducted at 135 non-restored grid-points during the two seasons.

We documented hatching dates, number of nestlings, fledging dates, and success rates for 20 western bluebird nests by monitoring the nests with videography. Nests were located in both restored and unrestored forests. Nests contained between 3-7 nestlings and all except for 5 nests in unrestored forests successfully fledged young. After nestlings fledged, we collected nest material from all nests to be tested for the presence of *Protocalliphora* larva.

Polygons demarcating the different vegetative cover types occurring on the Mt. Trumbull RCA have been drawn on mylar over-lays. The polygons will be digitized into a GIS system this winter. Polygons will then be classified into appropriate cover types using existing vegetation data and ground truthing.

INTRODUCTION

This third annual progress report summarizes the progress of our research in evaluating the effects of ponderosa pine restoration treatments on selected wildlife taxa in the Mt. Trumbull area from October 1, 1998 – September 30, 1999. Formal analysis of all data collected will be conducted in winter/spring 1999-2000. Study objectives, collection methods and protocols are consistent with the previous 2 years data collection unless otherwise noted. For detailed descriptions of this information, refer to the Second Annual Progress Report for 1997-1998.

REPTILES

Objective: To document the effects of forest restoration on reptile abundance and demographics on the Mt. Trumbull RCA.

Summary of Research Progress

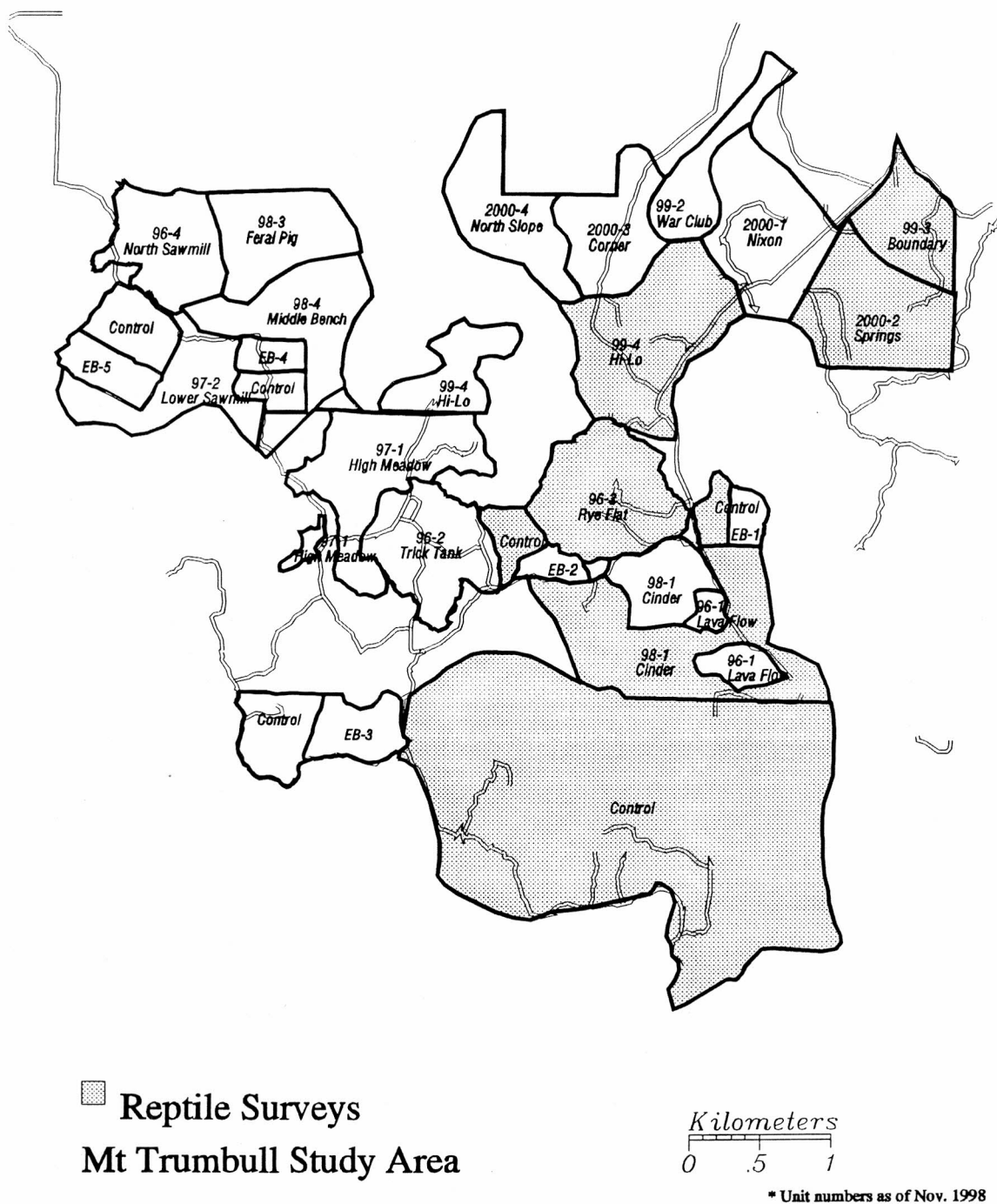
Year 3 (1999)

We continued to sample reptile data using pitfall trapping consistent with previous years. Data were collected at 56 of 70 pitfall arrays; 15 arrays were in units undergoing treatment. The arrays sampled included 27 in Turkey Track (Control), 5 in the unit originally designated as 96-5 east of the lava flow, 6 in the Spring and Boundary units, 11 in the Nixon and Hi-Lo units, 2 in the control portion of EB 1, 3 in the Cinder unit, and 1 in the EB 2 control (Figure 1).

Arrays were open from May 26 – September 13, totaling 1,809 sampling days. Trap success (% of days an open array caught a target animal) ranged from 0-60.6%, with a mean of 14% ($\pm 1.8\%$ SE). Five lizard species were captured during trapping. The sagebrush lizard (*Sceloporus graciosus*) comprised 84.6% ($n = 215$) of individuals, and occurred at 44 arrays. The eastern fence lizard (*S. undulatus*), the second species of spiny lizards inhabiting the Mt. Trumbull RCA, comprised 1.2% ($n = 3$) of lizards sampled, and occurred at 3 arrays. The presence of both species of *Sceloporus* was confirmed at only one array. Unidentifiable *Sceloporus* occurred at an additional 4 arrays. Lizards at these arrays escaped from under plywood shaders before identification could be made.

For the third straight year, Great Basin skinks (*Eumeces skiltonianus*) were the second most abundant species captured, comprising 12.3% ($n = 31$) of all lizards, and present at 22 arrays. Plateau striped whiptails (*Cnemidophorus velox*) occurred at 3 arrays and accounted for 1.6% ($n = 4$) of sampled lizards. One short-horned lizard (*Phrynosoma douglassii*) was captured in a bucket at array 1289, in the Control. No other lizard species were encountered on the study area during any activity. Lizards were never encountered at 3 of the arrays. Three Great Basin spadefoot toads (*Scaphiopus intermontanus*) were encountered on the study area between August 9 and September 13. Two were in buckets at arrays 1278 and 1279 and the third one was found under a plywood shader at array 1328 (all in the Hi-Lo unit).

Consistent with the past 2 years, snakes were poorly represented throughout the study area during the entire sampling period. A Sonoran mountain kingsnake (*Lampropeltis pyromelana*) was found under a plywood shader at array 1139 in the Control, and a gopher snake (*Pituophis melanoleucus*) habitually used a burrow under a plywood shader at array 1279 in Rye Flat. Several incidental sightings were made of other gopher snakes, a Mojave rattlesnake (*Crotalus scutulatus*) was seen in Trick Tank unit in July, a Sonoran mountain kingsnake was seen near array 1327 in Hi-Lo in May, and 2 unidentified rattlesnakes were seen. One was in the unit originally designated 96-5 and the second was at the Nixon administration site.



During the summers of 1997 and 1998, we collected detailed habitat data at each of the 70 arrays that described characteristics of both the woody component and the herbaceous understory. Because of the dynamic nature of the understory, we remeasured the herbaceous component at each of the 56 arrays used this summer.

DISCUSSION

Reptile sampling efforts will be minimal in 2000; most units in which arrays are located will not yet be restored, and a fourth year of pre-treatment sampling is unnecessary. Potentially, 5 arrays in EB units 1 and 2, and Rye Flat may be restored; if so, we will begin collecting post-treatment data at these arrays. We will remeasure all vegetative characteristics in any treated arrays used. This winter we will analyze the habitat relationships of *S. graciosus* and *E. skiltonianus* as was done with the first 2 years of data.

ABERT'S SQUIRRELS

Objective: To document the effects of Mt. Trumbull restoration treatments on Abert's squirrel feeding frequency and abundance estimates.

Summary of Research Progress

Year 3 (1999)

We collected track plate and feeding sign from 5 of the 6 squirrel grids that we have installed on Mt. Trumbull over the last two summers (Figure 2). Data collection was conducted from May 26-28 and included 3 control and 2 pre-restoration sampling grids. The sixth grid, located in the Cinder unit, was not sampled this year because it was being treated.

DISCUSSION

Regression transformations of track plate and feeding sign data will be performed this winter to determine squirrel population densities. We will again collect track plate and feeding sign data from the 3 control grids and from any grids located in restored areas next summer. As with lizards, a fourth year of pre-treatment sampling is unnecessary; therefore, grids outside of the control will not be sampled again until restoration treatments have been applied.

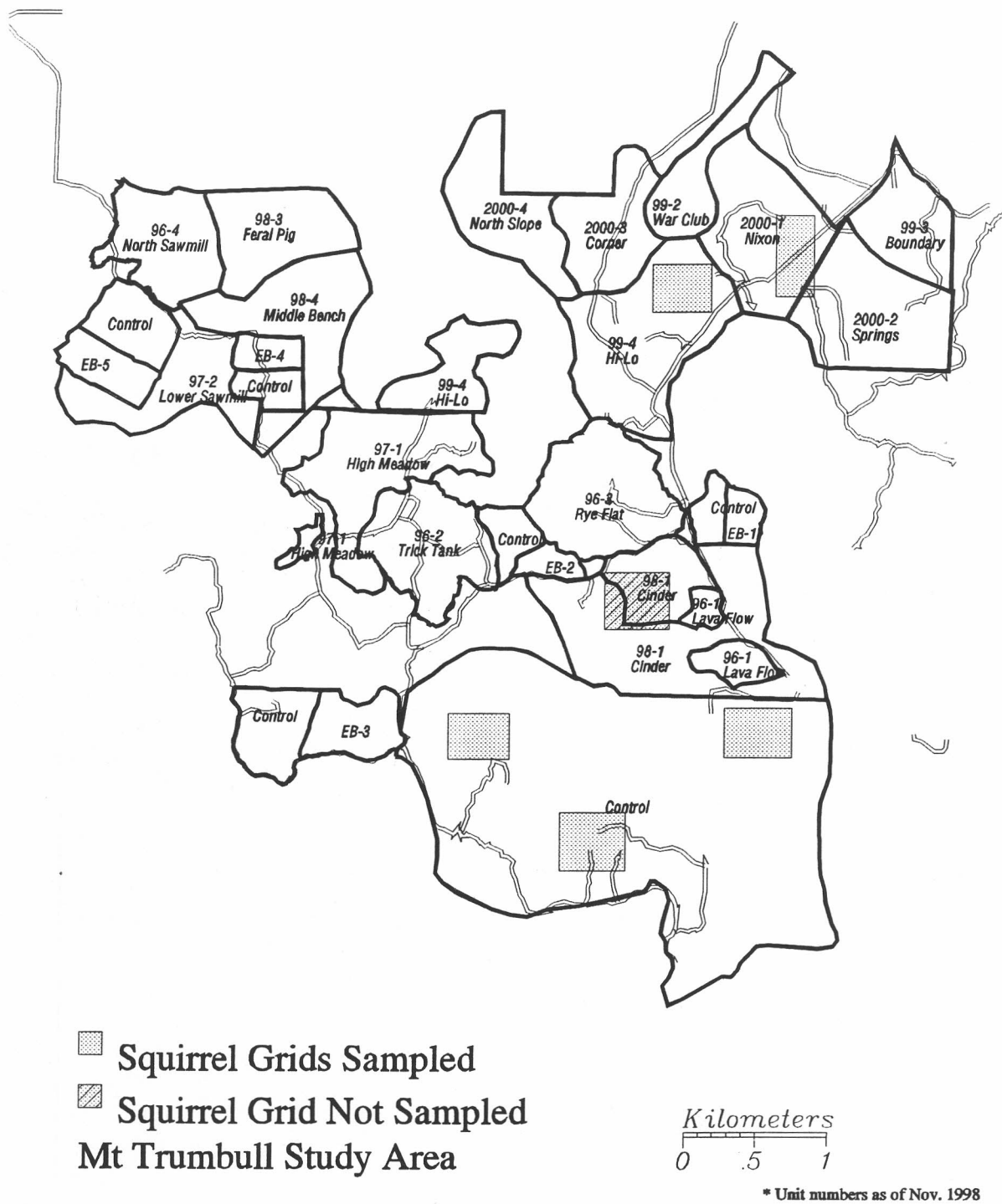


Figure 2. Treatment and control units containing squirrel grids on the Mt. Trumbull Restoration Conservation Area.

MULE DEER

LANDSCAPE SCALE HABITAT SELECTION

Objective a: To determine 3rd order macro-habitat selection patterns of mule deer on the Mt. Trumbull RCA.

Objective b: To determine whether a dynamic relationship exists between habitat restoration treatments and 3rd order mule deer macro-habitat selection on the Mt. Trumbull RCA.

Summary of Research Progress

Year 3 (1999)

We captured and successfully telemetered 3 female mule deer between May 27 and September 24, with no capture-related mortality. Five collared mule deer (4 does and 1 buck) died during the winter of 1998-1999, and one doe seldom returned to the RCA, leaving our effective telemetered deer population at 13 females.

Three deer collars were on mortality signal on a December 15 overflight. All 3 collars were within the study area and were retrieved in early January. Two months had elapsed between this flight the last time deer were monitored; therefore, determination of the cause of death was difficult. One collar was in the Twain unit, a second in the treatment side of EB 2, and the third was backed up against the lava in the Hi-Lo unit. The collar found up against the lava had the most “evidence” remaining. The carcass had been drug up under a tree, suggesting a lion kill. Cause of death was impossible to determine for the other 2 animals. Little remains were found near these collars.

Two more deer collars (1 doe and 1 buck) were on mortality signal on the January 15 overflight. The collar from the female mule deer was located about 10 km south of the study area and was not retrieved. The male mule deer was located approximately 3 km north/northwest of the study area and was recovered in mid-July with the cause of death unable to be determined.

We collected 142 GPS location records (Figure 3). Of these, 60 observations were of day-bed sites and 53 observations were of foraging events. The remaining 29 observations were “general” observations with no specific activity associated.

We confirmed successful reproduction for 6 of the 13 collared does this spring; all except 1 were 2-fawn births. We took special care to track the fates of fawns while collecting visual observations, and as of late September had documented no fawn mortalities.



Figure 3. GPS locations of telemetered mule deer on the Mt. Trumbull Restoration Conservation Area.

MICRO-SCALE HABITAT SELECTION

Objective c: To identify 3rd order micro-scale habitat selection by mule deer at foraging and bed site locations on the Mt. Trumbull RCA.

Objective d: To determine whether a dynamic relationship exists between habitat restoration treatments and 3rd order mule deer micro-habitat selection on the Mt. Trumbull RCA.

Summary of Research Progress

Year 3 (1999)

We collected vegetative data at 60 observed day-bed sites, 53 foraging sites, and 113 associated random plots. This brings our 3-year total to 194 and 162 bed and foraging sites, respectively. These data have been collected from 19 telemetered, and an unknown number of non-telemetered mule deer.

Winter Deer Locations 1998-1999

We aerially located collared mule deer on December 15, 1998, January 15, and February 17, 1999 (Figure 4). On December 15 all deer had left the study area or died. Deer again moved off the study area in all directions with 75% moving south of Mt. Logan. Distance moved off the study area ranged from 5-17 kilometers. Deer locations were relatively similar on the January 15 and the February 17 flights.

DISCUSSION

Detailed analyses of mule deer micro-site habitat selection for both foraging and day-bedding will be conducted this winter. We will again examine sample size requirements and data collection methods to streamline our efforts. Habitat relationship dynamics will be evaluated once aerial photo interpretation and ground truthing have been completed, and GIS vegetation cover maps have been created.

We will continue monitoring foraging and day-bed site selection of mule deer; maintaining a collared population of at least 12 does. Since we now have an understanding of where the deer over-winter, aerial telemetry will be minimal.

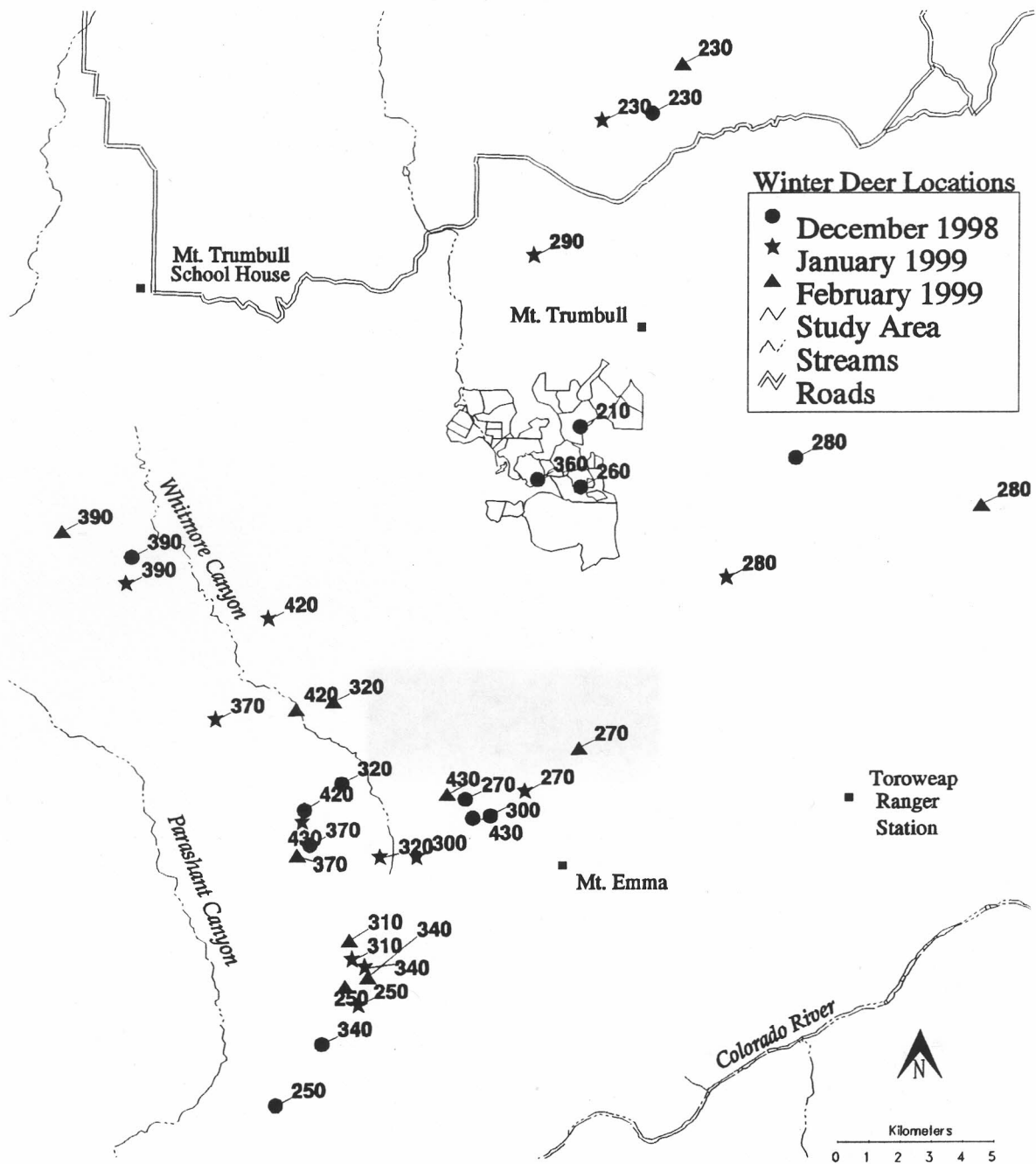


Figure 4. GPS locations of aerially located mule deer on 3 winter overflights near Mt. Trumbull.

TURKEYS

Objective: To establish long-term surveys to monitor turkey population trends on the Mt. Trumbull RCA.

Summary of Research Progress

Year 3 (1999)

We conducted 11 turkey surveys between July 9 and August 9. Average survey duration was 2.2 hrs, and an average of 0.55 turkeys per survey were observed. Only 6 turkeys were observed during surveys; therefore, no hen:poult ratios were generated.

DISCUSSION

A comparison of relative turkey numbers over years of effort will be included in the next data report. Locations of all birds seen will be added to our GIS database, which will allow a crude estimate of locations relative to habitat cover type and restored status. Turkey surveys will continue next summer.

MIGRANT SONGBIRDS

Objective: To document the effects of forest restoration on migrant songbird abundance, diversity, and habitat use on the Mt. Trumbull RCA.

Summary of Research Progress

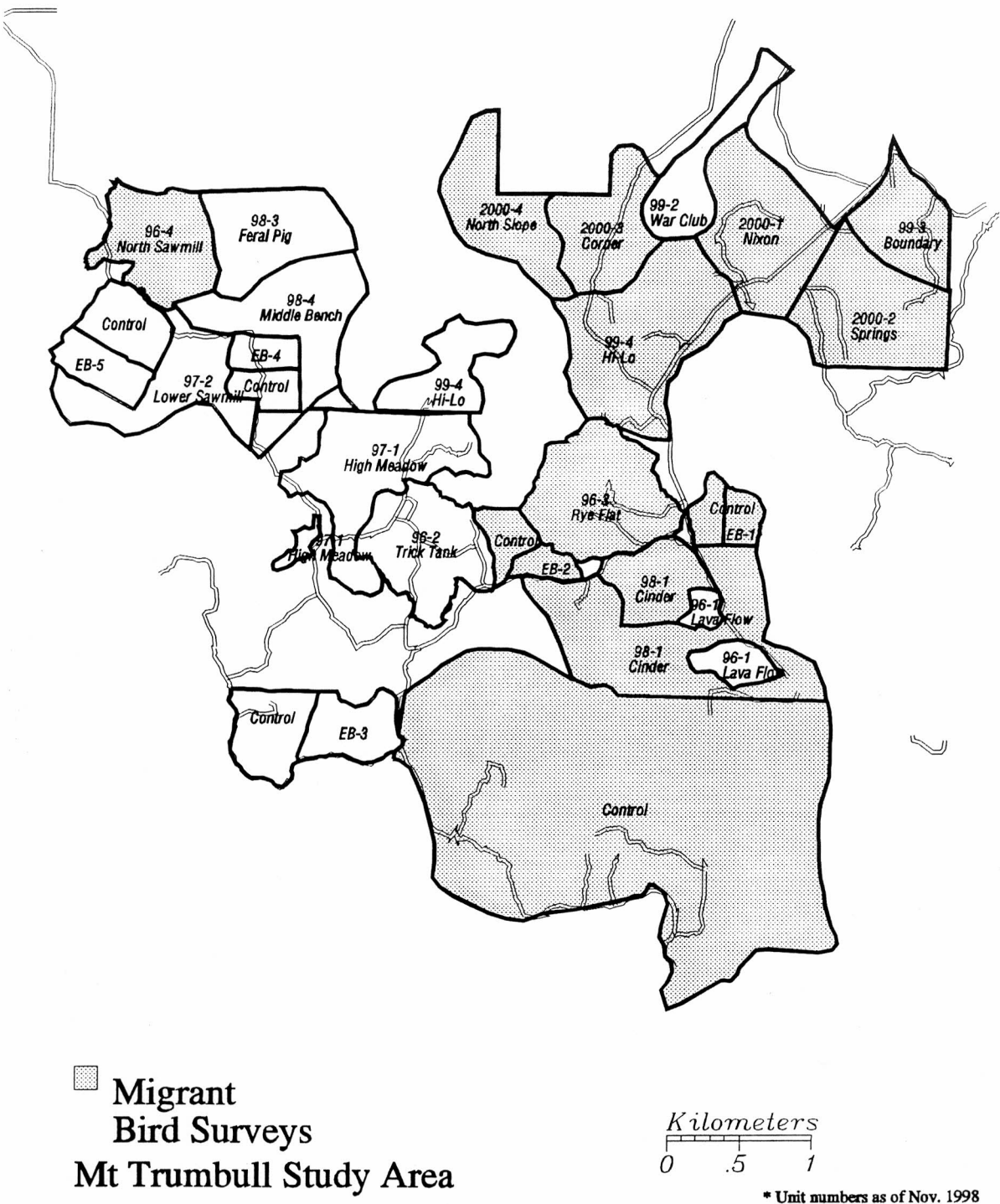
Year 2 (1999)

Songbird surveys were conducted during both the spring and fall migrations. Spring surveys were initiated on May 4, and continued through June 2. Fall surveys were conducted from August 30 – October 8. Three individuals with expertise in songbird identification conducted 405 surveys at 135 grid-points in the spring, and 456 surveys at 114 grid-points in the fall (Figure 5). Surveys were not conducted at points being treated, hence the difference in number of points surveyed between seasons.

Seventy-eight species of birds were identified in both the spring and fall surveys. Based on the number of detections, the 5 most abundant bird species identified in the spring in decreasing order included; mountain chickadee (*Parus gambeli*), yellow-rumped warbler (*Dendroica coronata*), Grace's warbler (*D. graciae*), steller's jay (*Cyanocitta stelleri*) and white-breasted nuthatch (*Sitta carolinensis*). The 5 most abundant bird species identified in the fall in decreasing order included; steller's jay, white-breasted nuthatch, mountain chickadee, dark-eyed junco (*Junco hyemalis*) and western bluebird (*Sialia mexicana*).

DISCUSSION

Once data are fully entered, we will begin analysis of migrant-habitat relationships in current-condition forests. We will continue to survey migrant songbird abundance and diversity in the coming spring and fall seasons.



NESTLING PROVISIONING RATES AND FLEDGING FATES

Objective: To determine whether parental provisioning rates, prey type, and fledging success differ between unrestored and restored forest on the Mt. Trumbull RCA.

Summary of Research Progress

Year 2 (1999)

We documented hatching dates, number of nestlings, fledging dates, and fledging success rates of 20 western bluebird (*Sialia mexicana*) nests. Nine of the nests were located in restored units (Demo and Trick Tank) and the remaining 11 nests were located in non-restored units (Hi-Lo, Nixon and Springs units; Figure 6).

From June 8 through July 20, 227 2-hour video sessions were recorded at the bluebird nests. Nests contained from 3-7 nestlings with an average of 4.3 nestlings per nest in the unrestored areas and 4.1 nestlings per nest in the restored areas. Of the 11 nests in unrestored areas, 5 failed due to predation. The remaining 6 nests fledged young between June 27 and July 13. All 9 of the nests in restored areas successfully fledged young between June 29 and July 21.

In early October, we collected nest material from all nests. Nesting material was sent to an entomologist in Tacoma, Washington to be analyzed for the presence of *Protocalliphora* (blowfly) larva. Infestations of such larva decreases the overall fitness of nestlings by reducing hematocrit and hemoglobin levels.

Detailed vegetation data was collected at each nest during the month of August. Collection protocol was similar to that from the lizard array vegetation collection with the addition of characteristics specific to nests.

DISCUSSION

Nest provisioning videography will be reviewed and analyzed this winter. We will collect provisioning data, vegetative measurements, and nest material for parasite analysis again next year, in both unrestored and restored areas.

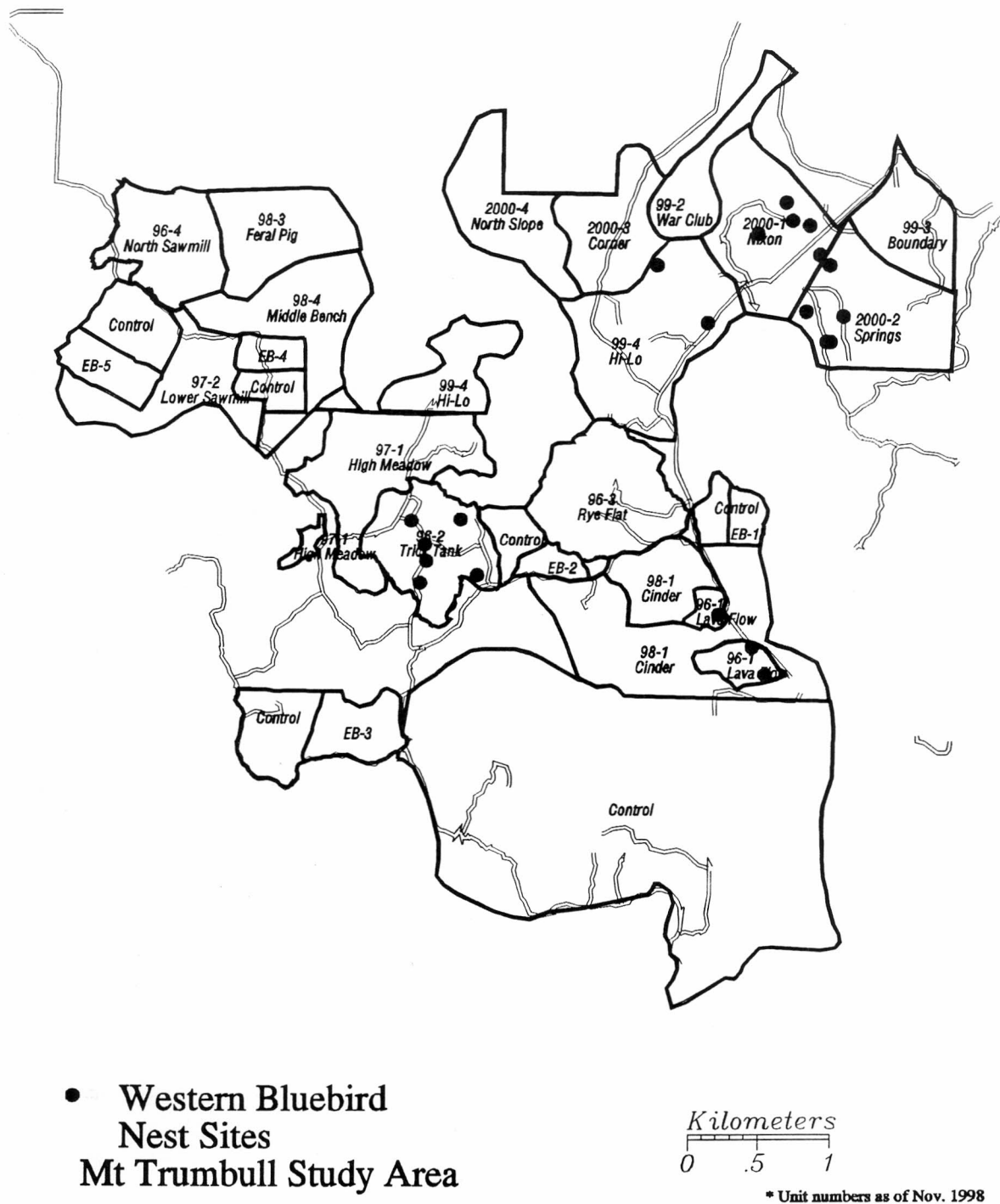


Figure 6. Locations of bluebird nests monitored using videography on the Mt. Trumbull Restoration Conservation Area.

AERIAL PHOTOGRAPHS & GIS VEGETATION COVERS

Summary of Research Progress

Step 1 in creating landscape scale vegetation maps for analysis of landscape scale habitat selection has been completed. Polygons have been drawn demarcating different vegetative cover types (patterns) on mylar over-lays of ortho-photographs of the entire study area. This winter, the polygons will be digitized into a GIS system (Arc/Info). Once digitized, vegetation data collected at known locations will be used to help correctly classify polygons into appropriate vegetative cover types. Intensive ground verification of classifications will begin next summer.