THE GLASS MOUNTAIN BREEDING BIRD ATLAS PROJECT
PRELIMINARY RESULTS, 1991 TO 1995

A Report to the U.S. Forest Service
Inyo National Forest

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SUMMARY

In 1995 we completed the fifth year of a six-year study to document the distribution, relative abundance, elevational breeding limits, and general habitat requirements of all the species of birds that breed within the Glass Mountain region of Mono County, California. Observers spent about 359 daytime hours (1803 hrs to date) conducting field surveys for all species and 56 nighttime hours surveying for owls and nightjars. To date field surveys have recorded 152 taxa (151 species and 1 additional subspecies) of birds that have bred or likely breed in the study area. From historical sources we have identified 6 additional species that have bred or may have bred in the study area. Of the 152 taxa, 72 had very local distributions in the study area. A high proportion of all species, including those with localized distributions, tended to occur in wetland, riparian, or meadow habitats. Analysis is needed of the relative vulnerability to extirpation of all species in the study area. In the meantime, we recommend that management efforts focus on maintaining, enhancing, and restoring wetland, riparian, meadow, and old-growth forest habitats. Work in 1996 will focus on (1) refining our knowledge of the distribution, abundance, and habitat requirements of owls, (2) searching for localized breeding species, (3) obtaining confirmed breeding evidence for species lacking such confirmation, and (4) refining our knowledge of the elevational breeding limits of various species.

INTRODUCTION

Avifaunal surveys in east central California have been conducted in the White-Inyo Range (Johnson and Cicero 1986, 1991) and in the Yosemite region and adjacent east slope of the Sierra Nevada (Gaines 1988). But little prior field work has been conducted in the area that lies between these mountain ranges. After preliminary exploration of the area in 1990, in 1991 we initiated a breeding bird atlas project in the Glass Mountain region of Mono County, California. Avian atlas projects are currently considered the best way to systematically survey the distribution of breeding birds in a given geographic area (Laughlin et al. 1982). The main goals of the current project are to document the (1) distribution, (2) elevational breeding limits, (3) relative abundance, and (4) general habitat requirements of all the species of birds that breed in the Glass Mountain region. Here we report the preliminary findings of the first five years of this atlas project which will be completed in the summer of 1996.

STUDY AREA

The study area centers on Glass Mountain and its spur ridges and stretches from the Mono Craters and Cowtrack Mountain (just S of Mono Lake) on the north to the upper Owens Gorge on the south, and from Highway 395 on the west to the east slope of the Benton Range on the east. Elevations in the study area range from a low of about 5800 ft in the upper Owens Gorge below the Upper Power Plant to 11,140 ft on the south peak of Glass Mountain. Major terrestrial habitats include desert scrub, pinon pine woodland, mountain mahogany woodland, Jeffrey pine forest, lodgepole pine forest, lodgepole-limber pine forest, whitebark pine forest, mixed conifer forest, riparian forest (willow, quaking aspen, water birch, black cottonwood, wild rose), rocky cliffs and earthen bluffs, alpine fell fields, sedge meadow, and alkali meadow. Important wetland areas -- open water of lakes, ponds, and streams and associated marshes and wet meadows -- are found in Adobe Valley to the north of Glass Mountain and to the west and south in the Owens River/Crowley Lake drainage of Long Valley and the Owens Gorge. Lands in the study area are managed primarily by the U. S. Forest Service/Inyo National Forest, Bureau of Land Management, and Los Angeles Department of Water and Power, and, on a few small parcels, by private landowners.

METHODS

Data Collection

Atlas grid. In a manner similar to other atlas projects, the study area was divided by a grid of 5-km squares or blocks based on the Universal Transverse Mercator grid tick marks on 15 minute USGS topographic maps. The study area is thus comprised of 64 complete and 10 partial blocks (Figure 1). These blocks were the basic units of field work and the units for mapping the distribution of all species of breeding birds (Appendix).

Coverage. In 1995 observers spent about 359 daylight hours in the field collecting atlas data, making a total of about 1803 hours since the project began in 1991. Observers

were assigned a block(s) to survey and were provided with (1) topographic maps of their block(s), (2) instructions on how to cover the block(s), (3) a list of standardized breeding criteria codes, and (4) atlas data forms. Observers were informed of the necessity of obtaining adequate coverage of each block by visiting all habitats present in the block and recording the highest code of breeding evidence observed for each species of bird recorded. We tried to survey each block for a minimum of two 8-hour days total, whether over one or more years. Blocks with many habitats, difficult access, or rugged topographic relief usually required more time to survey. Blocks were considered adequately covered when knowledge of the habitats in each block and the breeding species associated with them suggested that further field work was unlikely to add much to the list of species breeding in the block. Nevertheless, all atlas projects, no matter how thorough, must assume that a few breeding species likely were missed in many blocks. Likewise, because habitat, climate, or other conditions change over time, species recorded in a block during the atlas period may not necessarily be found there in subsequent years.

Breeding criteria codes. Breeding codes followed those suggested by Laughlin et al. (1990) with minor modifications (Table 1). Observers were asked to study the codes and to carefully apply them to each observation of breeding evidence.

Other information collected. On each visit to their block(s) observers also were asked to keep records of (1) the elevational breeding limits (to the nearest 100 ft) of all species encountered, (2) the number of hours spent in the field (to the nearest 1/4 hr) as a measure of observer effort, (3) an estimate (or count) of the number of each species observed or heard as a measure of relative abundance, (4) all the major habitats in the block and the ones surveyed, and (5) details of all confirmed breeding records. For confirmed breeding records, observers were asked to record (1) the geographic location (distance to major landmark), (2) habitat where each confirmation was observed, (3) the physical placement of the nests (e.g., type of tree or bush where found, height above ground, distance from trunk, etc.), and (4) elevation above sea level to nearest 100 ft as estimated in the field from a topo map or an altimeter.

Nocturnal surveys. Because in earlier years of the project we obtained very limited information on the distribution and abundance of nocturnal birds, such as owls and nightjars, in 1995 we initiated nocturnal surveys targeting these species. Observers spent a total of 56 nighttime hours surveying assigned routes that covered multiple blocks by road. Along these routes they stopped at irregular intervals in seemingly suitable habitat and listened for spontaneous vocalizations of owls or nightjars or tried to elicit such calls by vocally imitating them or playing prerecorded tapes. The locations and numbers of owls or nightjars were recorded regardless of the method used. As in prior years, a few records of nocturnal species were obtained by fortuitous encounters at night at camp sites or during the day in the course of our regular surveys.

Incidental sightings. We also accepted any sightings of breeding evidence obtained while not in the course of regular atlas surveys, as long as the location of a sighting could be accurately assigned to a specific block. Such information was obtained by atlas participants while traveling between blocks or by other reliable observers who transmitted their observations to atlas participants.

Data summary. Data from atlas data forms were entered on a computer in DBASE files that will allow for mapping the data on a GIS system at a future date.

Table 1 Standardized breeding criteria codes from Laughlin et al. (1990) with minor modifications

Code	Evidence
OBSERVED:	
O	Species (male or female) observed in a block during its breeding season, but no evidence of breeding. Not in suitable nesting habitat. Particularly appropriate for wideranging species, colonial nesting species not at the nesting colony, migrant individuals out of breeding habitat, or post-breeding wanderers.
POSSIBLE:	
Z	Species (male or female) observed in suitable nesting habitat during its breeding season.
X	Singing male present in suitable nesting habitat during its breeding season.
PROBABLE:	
P	Pair observed in suitable habitat during its breeding season.
S	Permanent territory presumed through song at same location on at least two occasions seven days or more apart.
T	Permanent territory presumed through defense of territory (chasing individuals of the same species).
C	Courtship behavior or copulation.
N	Visiting probable nest-site.
A	Agitated behavior or anxiety calls from adults.
B	Nest building by wrens or excavation of holes by woodpeckers.
CONFIRMED:	
CN	Carrying nesting material, such as sticks or other material.
NB	Nest building at the actual nest-site.
DD	Distraction display or injury feigning.
UN	Used nests or eggshells found. Must be carefully identified to be acceptable.
PY	Precocial young. Flightless young of precocial species restricted to the natal area by dependence on adults or limited mobility.
FL	Recently fledged young (either precocial or altricial) incapable of sustained flight, restricted to natal area by dependence on adults or limited mobility.
ON	Occupied nest: adults entering or leaving a nest site in circumstances indicating occupied nest. To be used for nests which are too high (e.g., the tops of trees) or enclosed (e.g., chimneys) for the contents to be seen.
CF	Carrying food: adult carrying food for the young.
FY	Adult feeding recently fledged young.
FS	Adult carrying fecal sac.
NE[1]	Nest with egg(s).
NY[1]	Nest with young seen or heard.

[1] Presence of cowbird eggs or young is confirmation of both cowbird and host species.

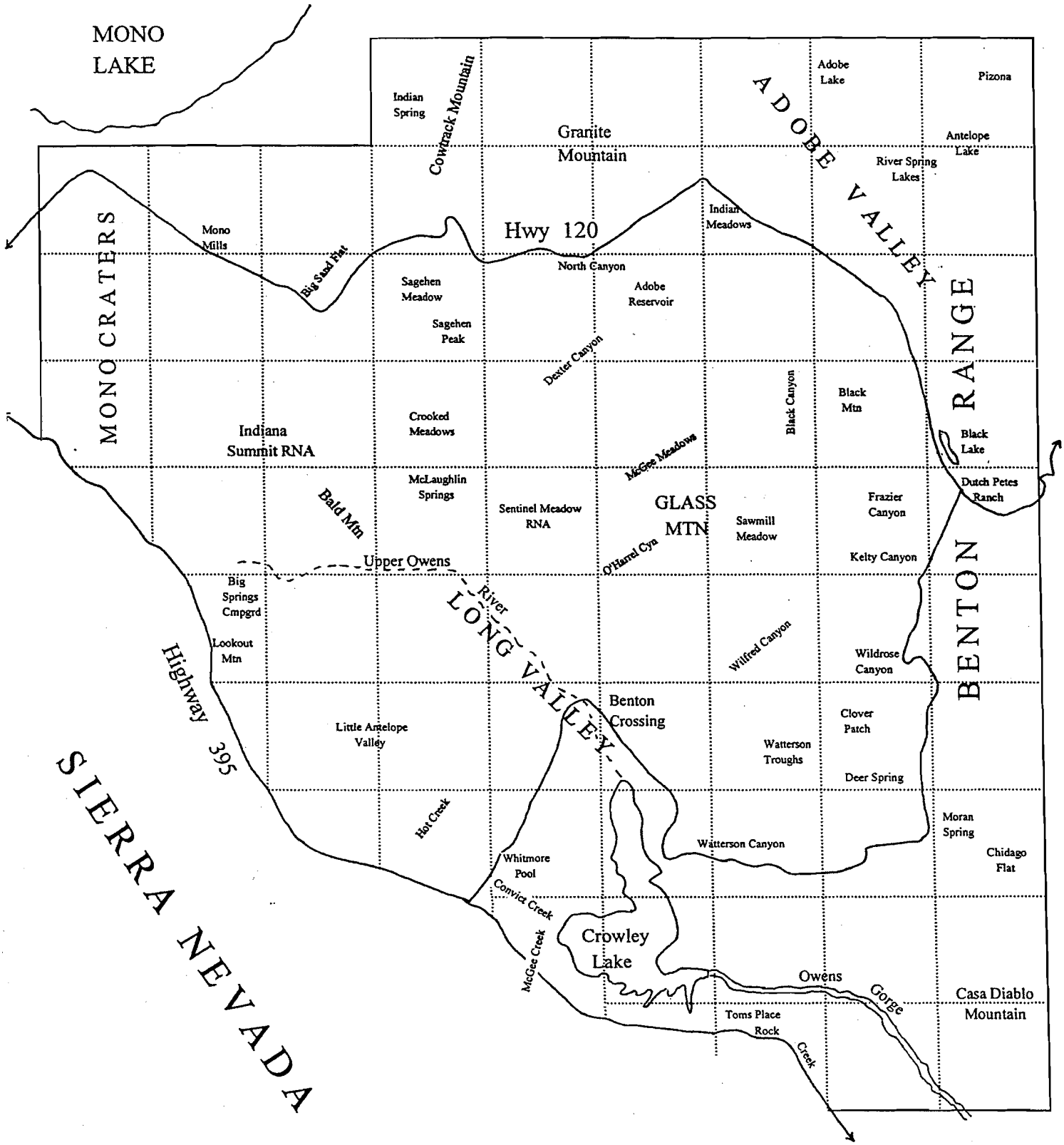

Figure 1. Map of the Glass Mountain region with the 5-km atlas grid. Place names follow those on USGS topgographic maps and the Inyo National Forest Map.

RESULTS AND DISCUSSION

Species Richness

Our work found 152 taxa (151 species and 1 additional subspecies) of birds that bred our likely bred in the atlas study area. For 134 of these we found confirmed evidence of breeding. Of the remaining 18 taxa, most occurred in very small numbers, making confirmation of breeding difficult; a few may not have bred in the atlas area or may do so only sporadically. Two of the 18 -- Sora and Barn Swallow -- have prior confirmed breeding records from the Long Valley area. Also, from other sources we identified 6 additional species that have bred or may have bred in the study area historically. Canvasback and Yellow Rail both formerly were confirmed breeding in Long Valley within the study area; Short-eared Owl was also confirmed breeding in Long Valley, apparently within the study area. The Sharp-shinned Hawk is thought to have been a breeding bird on Glass Mountain but remains unconfirmed. Although the Peregrine Falcon may never actually have bred within the study area, birds that historically bred nearby in the eastern Sierra undoubtedly foraged in wetlands in Long Valley. Finally, although there are no definitive breeding records of the Willow Flycatcher in the study area, the presence of birds in the breeding season along Convict Creek, in the era before the species declined drastically as a breeder in California, suggests the species likely bred at least locally in the study area in former times.

Patterns of distribution

Although the pattern of distribution in the study area of each species is unique, there were several general patterns of distribution that stood out (see maps in Appendix):

(1) concentration in Adobe and Long valleys -- almost all the wetland-dependent species showed this pattern of distribution simply because virtually all the wetland habitat occurred in these two valleys. A few of the wetland-dependent species, such as Western and Clark's grebes and Forster's Tern, bred only in Long Valley at Crowley Lake. Species that preferred low elevation mesic meadow systems, such as Black-billed Magpie, European Starling, Savannah Sparrow, and Western Meadowlark, also showed this pattern of concentration in these two valleys.

(2) concentration in the eastern portion of the study area -- a number of species that bred primarily in desert scrub or pinon woodland tended to concentrate on the east side of the study area even though their preferred habitat(s) occurred at relatively low elevations throughout the study area. Examples of such species were Ash-throated Flycatcher, Scrub Jay, Plain Titmouse, Bushtit, Bewick's Wren, Blue-gray Gnatcatcher, Black-throated Gray Warbler, Rufous-sided Towhee, and Black-throated Sparrow. Although the Sage Sparrow was widespread in the study area it too also tended to increase in abundance from west to east. The Virginia's Warbler, although associated with riparian thickets, also occurred only in the eastern portion of the study area. We suspect these patterns may in some manner reflect the gradient of generally decreasing precipitation from west to east in the study area.

(3) concentration in the central portion of the study area -- many species that favored *relatively* moister terrestrial habitats, such as conifer forests or aspen groves, exhibited this

very local	1-15 blocks
local	15-30 blocks
fairly widespread	31-45 blocks
widespread	46-60 blocks
nearly ubiquitous	61-74 blocks

In the Warbling Vireo example, the numerical expression of distribution, "recorded in 27 (36.5%) of 74 atlas blocks (3 O, 4 PO, 8 PR, 15 CO)," means that the species was recorded in 27 blocks (36.5% of the 74 total blocks) and that it was recorded in 3 blocks as observed, in 4 as Possible, in 8 as Probable, and 15 as Confirmed. Note that the total, in this case 27, excludes the number of blocks in which the species was recorded as observed and, hence, *not* breeding.

Descriptions of Distribution and Distribution Maps

The verbal description of distribution -- in the case of Warbling Vireo noted as "primarily in the central portion of the study area," -- provides some indication, beyond a numerical tally of blocks of breeding occurrence, of the geographic *pattern* of distribution within the study area. These verbal descriptions are expressions of the distribution documented by atlas maps of each species. These distribution maps, based on data from 1991 to 1995 (also including a few records from the exploration phase in 1990), are in the Appendix.

Representative Breeding Records

Although the distribution maps provide excellent information on overall patterns of distribution in the study area, we have also listed for each species a number of "representative" breeding records. These records document actual locations for breeding with (1) the elevation of the sighting to the nearest 100 ft, (2) the evidence of breeding observed expressed by the codes in Table 1, (3) the date(s) of the observation(s), and (4) the initials of the observer(s) making the observation(s). Initials of observers match those of individuals cited in the Acknowledgments. Records were picked to document actual instances of breeding scattered throughout the geographic distribution and elevational breeding limits within the study area. In some cases, they document the only confirmed records for particular species. Records were selected to best serve these ends, and were not selected by observer. The number of citations per observer is largely a reflection of the number of hours they spent in the field collecting atlas data. These records are important for documenting the basis of our determinations of the elevational limits of breeding for each species, and they will provide other researchers with specific data against which they can make direct comparisons to future conditions in the Glass Mountain region or to other regions where they or others have conducted similar research. They will also allow others to contact the actual observers for more details if that is needed. Representative records were not listed for a few species, such as hawks, to protect them from the possibility of unnecessary disturbance at their nesting sites.

Elevational Breeding Limits

Elevational breeding limits for each species are not stated specifically but can be found easily by scanning the representative breeding records for the high and low elevations where breeding evidence was recorded. It was not always possible to find confirmed evidence of breeding at the high or low elevations of each species' breeding limits, but in such cases we have only included records in the representative breeding records that we felt very likely represented actual breeding locations. Otherwise, we have stated when we thought high elevation records pertained to post-breeding wanderers rather than breeders. Comparisons are made in the species accounts to the high elevation breeding limits for the same species in the White-Inyo Range (Johnson and Cicero 1986, 1991) and the eastern Sierra (Gaines 1988). The prime reason for documenting the elevational breeding limits of each species is that it might give us some clue as to what are the key ecological factors that are limiting them.

Habitat

In each account we describe the breeding habitats in which the species was found and any particular habitat features that may be important to the species. Although these habitat descriptions are limited by the fact we were dealing with about 150 species and hence are not quantitative, they have the distinct advantage of having been gathered by covering a very broad array of habitats over a wide range of area and elevations -- something that is often lacking in quantitative studies.

Comments

Occasionally within the accounts we have made comments that do not fall conveniently under the topics described above. These may include comments on limitations of our methods to adequately document the breeding range and elevations for certain early-nesting species (e.g., many corvids) or the need to conduct more work on certain species (e.g., owls).

Literature Citations

Literature citations follow the usual format of scientific publications except that those from *American Birds* are cited AB vol:page(s).

SPECIES ACCOUNTS

Pied-billed Grebe *(Podilymbus podiceps)* (map: Appendix, p. 1)

An uncommon and very local breeder recorded in 5 (6.8%) of 74 atlas blocks (2 PO, 1 PR, 2 CO). Confirmed breeding only at Crowley Lake (6800', NE--6/25/92, PY--7/22/92, PJM), where these grebes built nests attached to emergent vegetation close to shore. Elsewhere in the study area they were seen only at Black Lake (6400', Z, 7/15/93, DS). The high elevation nesting limit in the eastern Sierra is 7600 ft at June Lake (Gaines 1988).

Eared Grebe *(Podiceps nigricollis)* (map: Appendix, p. 1)

A very common and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (3 PO, 0 PR, 4 CO). Hundreds of Eared Grebes bred at Crowley Lake (6800'), primarily in the cove near the Owens River mouth and in McGee Bay (Table 3), in loose mixed colonies with Western *(Aechmophorus occidentalis)* and Clark's grebes *(A. clarkii)*. From 1990 to 1995, numbers of nesting pairs of Eared Grebes at Crowley Lake ranged from 1422 in 1994 to 0 in 1995 (Table 3). They were not recorded nesting at Crowley prior to 1990 (Gaines 1988). A smaller population that bred at Black Lake (6400') numbered about 267 adults on 15 July 1993 (DS). Eared Grebes also may occasionally nest at River Spring Lakes (6500') in the Adobe Valley, where 72 adults were seen on 9 June 1995 (PJM, AD); in other years, June tallies ranged from 0-3. Grebes breeding at Crowley waited for the annual growth of floating mats of water-milfoil *(Myriophyllum spp.)* and algae with which to build their nests, and, consequently, their young did not usually begin to appear until late July. At Black Lake the grebes attached their floating nests to residual stands of tules *(Scirpus spp.)*, and young were first seen in early June (DS).

Western Grebe *(Aechmophorus occidentalis)* (map: Appendix, p. 1)

An uncommon and very local breeder recorded in 4 (5.4%) of 74 atlas blocks (1 PO, 1 PR, 2 CO). Western Grebes bred in the study area only at Crowley Lake (6800') in the locations and conditions described above for Eared Grebes. From 1990 to 1995, the number of breeding pairs of Western Grebes at Crowley ranged from 154 in 1991 to 0 in 1995 (Table 3).

Clark's Grebe *(Aechmophorus clarkii)* (map: Appendix, p. 1)

An uncommon and very local breeder recorded in 3 (4.0%) of 74 atlas blocks (1 O, 0 PO, 1 PR, 2 CO). Clark's Grebes nested only at Crowley Lake (6800') in the locations and conditions described above for Eared Grebes. From 1990 to 1995, the number of breeding pairs of Clark's Grebes at Crowley ranged from 32 in 1991 to 0 in 1995 (Table 3). Clark's Grebes were not known to breed at Crowley Lake before 1990 (Gaines 1988).

Table 3 Estimated pairs of nesting grebes at Crowley Lake reservoir, 1990 to 1995, derived from highest counts of occupied nests and/or broods

Year	Species	Locations			
		Owens R. mouth	McGee Bay	West Shore	TOTALS
1990	Eared Grebe	59	0	0	59
	Western Grebe	47	0	0	47
1991	Eared Grebe	385	nb[1]	nb[1]	385+
	Western Grebe	52	102	0	154
	Clark's Grebe	28	4	0	32
	Aechmophorus spp.	6	0	0	6
1992	Eared Grebe	288	520	0	808
	Western Grebe	58	0	0	58
	Clark's Grebe	7	0	0	7
	Aechmophorus spp.	0	18	0	18
1993	Eared Grebe	884	180	16	1080
	Western Grebe	48	5	16	69
	Clark's Grebe	13	1	7	21
1994	Eared Grebe	855	567	0	1422
	Western Grebe	21	9	0	30
	Clark's Grebe	0	0	0	0
1995[2]	all grebes	0	0	0	0

[1] nest building observed but no count taken.

[2] high water levels in reservoir and a late, cool spring may have been responsible for no grebe nesting this year.

American Bittern *(Botaurus lentiginosus)* (map: Appendix, p. 2)

A very rare and very local breeder recorded in 1 (1.4%) of 74 atlas blocks (1 PO, 0 PR, 0 CO). During our surveys the only records of this species were of single birds at 6500 ft at River Spring Lakes: a bird heard repeatedly giving breeding calls on 9 June 1995 (ES, MMc) was perhaps the same one sighted on 31 July 1995 (PJM, AD). The habitat in the area of the calling bird was shallow ponds in a matrix of saltgrass, rabbitbrush, and greasewood; the bird seen in July was in a dense stand of rushes 3-4 ft high in a few inches of water. The high elevation breeding limit in the eastern Sierra formerly was near June Lake (7600') (Grinnell and Miller 1944). A historical record of two American Bittern nests "within a 20 mile radius of June Lake" (Dixon 1934) may have been within the boundaries of our atlas area. Likewise, a sighting of an American Bittern in a large meadow about three miles downstream from the 7980 ft elevation marker on Convict Creek on 16 July 1922 (J. Grinnell, field notes on file at Museum of Vertebrate Zoology, Berkeley) was close to the present boundary of our atlas area. In the 1970s, a few American Bitterns were seen each spring at 7000 ft in the Owens River marshes (Gaines 1988). A bittern was calling at River Spring Lakes on 3 June 1987 (PJM).

Least Bittern *(Ixobrychus exilis)* (map: Appendix, p. 2)

A very rare and very local breeder recorded in 1 (1.4%) of 74 atlas blocks (1 PO, 0 PR, 0 CO). The only sighting was of a single adult flushed from a reed bed at 6900 ft on the south side of Little Alkali Lake on 15 June 1994 (DS). The high elevation sighting for the eastern Sierra is 7600 ft at June Lake (Gaines 1988).

Great Blue Heron *(Ardea herodias)* (map: Appendix, p. 2)

A rare and very local breeder. Although Great Blue Herons were present in wetlands in 13 atlas blocks, breeding was suspected or confirmed in only 2 (2.7%) of 74 (11 O, 1 PO, 0 PR, 1 CO). A colony with 5 nests was located on 7 June 1995 in a grove of Jeffrey pines near the Upper Owens River (PJM). Most sightings were from about 6500 to 7100 ft; a heron at 8800 ft at Crooked Meadows on 29 June 1995 (DS) likely represented a post-breeding dispersant. Great Blue Herons were seen on the borders of slow-moving streams and rivers, ponds, reservoirs, and in wet sedge meadows.

Canada Goose *(Branta canadensis moffitti)* (map: Appendix, p. 2)

An uncommon and very local breeder recorded in 2 (2.7%) of 74 atlas blocks (1 O, 0 PO, 0 PR, 2 CO). Canada Geese of the Great Basin race *moffitti* bred in the study area only at Crowley Lake (6800', PY, 6/11/91, PJM). Gaines (1988) reported that about 15 pairs nest at Crowley Lake. On 7 May 1994 during a shorebird survey, 64 adult geese plus two broods were recorded at Crowley Lake (DS). Canada Geese at Crowley Lake spent most of their time in the low sedge marshes on the west shore of the lake and, to a lesser degree, near the mouth of the Owens River.

Green-winged Teal *(Anas crecca)* (map: Appendix, p. 3)

An uncommon and local breeder recorded in 18 (24.3%) of 74 atlas blocks (10 PO, 5 PR, 3 CO). Representative nesting locations were Adobe Creek (6500', PY, 6/26/92, PJM), Black Lake (6400', Z, 6/25/93; DS, BB), Upper Owens River area (6900', PY, 7/01/94, DS), Hot Creek Fish Hatchery (7100', Z, 6/24/92, PJM), and west side of Crowley Lake (6800', PY, 7/21/91, PJM). The high elevation breeding limit in the eastern Sierra is 8200 ft (Gaines 1988). Green-winged Teal were found on fresh water, particularly in streams or marshes with overhanging or secluding vegetation.

Mallard *(Anas platyrhynchos)* (map: Appendix, p. 3)

A fairly common and local breeder recorded in 24 (32.4%) of 74 atlas blocks (4 PO, 10 PR, 10 CO). The Mallard was the most widespread of all the breeding waterbirds in the study area. Representative breeding locations were River Spring Lakes (6500', PY, 6/14/91; PJM, DS), Upper Owens River (6800', DD, 7/01/94, DS), near Mammoth Creek (7200', P, 6/14/94, PJM), and the Owens Gorge below the Upper Power Plant (5800', DD, 6/22/95, DS). The high elevation breeding limit in the eastern Sierra is 10,000 ft (Gaines 1988). Mallards were found on fresh or alkali lakes, reservoirs, marshes, and slow-moving stretches of streams and rivers.

Northern Pintail *(Anas acuta)* (map: Appendix, p. 3)

An uncommon and local breeder recorded in 12 (16.2%) of 74 atlas blocks (2 PO, 5 PR, 5 CO). Representative nesting locations were Black Lake (6400', PY, 7/15/93, DS), Hot Creek Fish Hatchery (7100', P, 5/31/92, PJM), Big Alkali Lake (6900', DD, 07/01/94, DS), and west side of Crowley Lake (6800', PY, 7/21/91, PJM). Northern Pintail were found on reservoirs, freshwater and alkali ponds, and marshes with open water. Gaines (1988) reported nests in Long Valley in sagebrush scrub over a mile from water.

Blue-winged Teal *(Anas discors)* (map: Appendix, p. 3)

A rare and presumably very local breeder recorded in 6 (8.1%) of 74 atlas blocks (5 PO, 1 PR, 0 CO). Although we did not find confirming evidence, observations in June and July, primarily of males, suggest that small numbers of Blue-winged Teal may occasionally, or even regularly, nest in the study area. Locations of representative sightings were Adobe Lake (6500', male, 7/01/93, DS), River Spring Lakes (6500', male, 6/14/92; ES, MMc), Hot Creek Fish Hatchery (7100', male, 6/20/91, ES), and south end of Crowley Lake (6800', P, 7/21/91, PJM). A former nesting record for 6900 ft in Long Valley is uncertain because a female (possibly a Cinnamon Teal) with a nest was identified by its association with a drake Blue-winged Teal (Gaines 1988). Blue-winged Teal were found in the same range of habitats as described for the Northern Pintail.

Cinnamon Teal *(Anas cyanoptera)* (map: Appendix, p. 4)

An uncommon and local breeder recorded in 17 (23.0%) of 74 atlas blocks (2 PO, 6 PR, 9 CO). Representative nesting locations were near River Spring Lakes (6500', PY, 7/31/95; PJM, AD), Adobe Reservoir (6700', PY, 6/30/93, DS), Black Lake (6400', PY, 6/27/92, DS), near Mammoth Creek (7200', P, 6/14/94, PJM), and Owens River mouth at

Crowley Lake (6800', PY, 7/22/94, DS). Habitat requirements were similar to those for Northern Pintail described above.

Northern Shoveler *(Anas clypeata)* (map: Appendix, p. 4)

A rare and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (1 PO, 3 PR, 2 CO). Representative nesting locations were River Spring Lakes (6500', P, 6/14/91; PJM, DS), Little Alkali Lake (6900', P, 6/8/95, DS), and west side of Crowley Lake (6800', NE--5/30/92, PY--7/21/91, PJM). Although generally found in habitats used by other dabbling ducks, the limited distribution of Northern Shovelers in the study area indicated they had more stringent nesting requirements than other species.

Gadwall *(Anas strepera)* (map: Appendix, p. 4)

A fairly common and very local breeder recorded in 14 (18.9%) of 74 atlas blocks (1 PO, 6 PR, 7 CO). Representative nesting locations were unnamed alkali lake in Adobe Valley (6500', PY, 7/31/95; PJM, AD), Adobe Reservoir (6700', PY, 6/30/93, DS), Hot Creek Fish Hatchery (7100', PY, 7/23/92, PJM), and west side of Crowley Lake (6800', NE, 5/30/92, PJM). Habitat requirements similar to those of other dabbling ducks, though Gawalls were more tolerant of alkali lakes than were the other species. Nests east of the Sierra may be placed "some distance" from water (Gaines 1988).

American Wigeon *(Anas americana)* (map: Appendix, p. 4)

A fairly common and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (1 PO, 7 PR, 3 CO). Representative nesting locations were Adobe Valley (6500', P, 6/9/95; PJM, AD), Hot Creek Fish Hatchery (7100', PY, 6/24/92, PJM), and Crowley Lake (6800', PY, 7/22/91, PJM). Breeding was first confirmed at Crowley Lake on 22 August 1989 by the observation of a female with young (PJM). Since then multiple confirmed records from Crowley Lake extend the breeding range in California well to the south of the known breeding range east of the Sierra-Cascade axis (Grinnell and Miller 1944, Zeiner et al. 1990). A high count of 128 adults at the north end of Crowley Lake on 22 July 1991 (PJM) reflected the relative magnitude of the breeding population in recent years. Nesting also has been confirmed north of the study area at Bridgeport Reservoir, Mono County, on 23 July 1990 (AB 44:1181, PJM). This range extension may have been aided by the growth of extensive algae and other aquatic plants (key wigeon foods) in the shallow waters of reservoirs during an extended drought in the late 1980s and early 1990s. American Wigeon used freshwater reservoirs, ponds, and marshes with suitable vegetation on which to forage.

Canvasback *(Aythya valisineria)*

A record of a female Canvasback with 9 chicks on Big Alkali Lake in Long Valley north of Crowley Lake on 13 July 1977 (D. Winkler pers. comm.) represents the only breeding record for this region (see Gaines 1988). We did not record this species in the study area at all during surveys from 1991 to 1995.

Redhead *(Aythya americana)* (map: Appendix, p. 5)

A rare and very local breeder recorded in 8 (10.8%) of 74 atlas blocks (6 PO, 1 PR, 1

CO). Representative breeding locations were Adobe Lake (6500', P, 6/7/93, DS), Black Lake (6400', PY, 6/14/91; PJM, DS), and west side of Crowley Lake (6800', Z, 5/30/92, PJM). Found on freshwater reservoirs, ponds, and marshes and on alkali lakes. The limited distribution of Redheads in the study area suggested they had stringent nesting requirements.

Ring-necked Duck *(Aythya collaris)* (map: Appendix, p. 5)

A rare and very local breeder recorded in 4 (5.4%) of 74 blocks (3 PO, 0 PR, 1 CO). Except for the sighting of a male at River Spring Lakes in the Adobe Valley on 31 July 1995 (PJM, AD), all other records were from Crowley Lake (6800', PY, 7/21/91, PJM), where up to 11-12 adults were seen on 11 June and 21 July 1991 (PJM). Crowley Lake is an isolated breeding site well to the south of the normal breeding range in California in the Cascades and northern Sierra (Grinnell and Miller 1944, Zeiner et al. 1990).

Lesser Scaup *(Aythya affinis)* (map: Appendix, p. 5)

A rare and presumably very local breeder recorded in 4 (5.4%) of 74 atlas blocks (3 PO, 1 PR, 0 CO). Although we lacked confirmed breeding evidence, observations in June and July suggested this species may occasionally nest in the study area. Representative records were from River Spring Lakes (6500', male, 6/14/91; PJM, DS), Big Alkali Lake (6900', P, 6/14/94, MJM) and Crowley Lake (6800', 15 adults, 6/11/91, PJM). Lesser Scaup used reservoirs, freshwater ponds, and alkali lakes.

Ruddy Duck *(Oxyura jamaicensis)* (map: Appendix, p. 5)

An uncommon and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (3 PO, 3 PR, 1 CO). Representative breeding locations were Black Lake (6400', PY, 6/25/93; DS, BB) and Crowley Lake (6800', C, 7/21/91, PJM). Found on the few freshwater reservoirs and lakes with emergent vegetation needed for attachment of their floating nests.

Turkey Vulture *(Cathartes aura)* (map: Appendix, p. 6)

An uncommon and fairly widespread breeder recorded in 38 (51.4%) of 74 atlas blocks (1 O, 37 PO, 1 PR, 0 CO), though nesting probably quite local even in suitable habitat. Foraging birds soared over virtually all habitats, but particularly over open areas where they were likely to detect carrion. Birds in flight were seen from 6500 to 11,100 ft at the top of Glass Mountain. Although breeding has yet to be confirmed, most nest sites were probably located in rocky cliffs, which are most prevalent from about 6500 to 8000 ft; large hollow trees or downed logs may also be used as nest sites.

Bald Eagle *(Haliaeetus leucocephalus)* (map: Appendix, p. 6)

A very rare and potentially very local breeder recorded in 1 (1.4%) of 74 atlas blocks (1 PO, 0 PR, 0 CO). Up to 16 Bald Eagles have a winter roost along the Upper Owens River, but since at least 1992 one to two adults have been seen there during the nesting season (E. Smith pers. comm.). Our only record was of an adult at Alpers Owens River Ranch on 7 June 1994 (E. Smith, DS). Efforts by the Forest Service and their volunteers to locate an active nest have not yet been successful.

Northern Harrier *(Circus cyaneus)* (map: Appendix, p. 6)

A rare and local breeder recorded in 18 (24.3%) of 74 atlas blocks (12 PO, 3 PR, 3 CO). Representative nesting locations were River Spring Lakes (6500', P, 6/15/93, PJM), west slope of Sagehen Peak (9000', NE/NY, 6/30/95, DS), south slope of south peak Bald Mountain (8800', NY, 7/15/95, DS), and Little Alkali Lake (6900', dead FL, 7/29/95; PJM, AD). We initially expected that most harriers in the study area would be nesting and foraging in the marshlands and open brushlands of Adobe and Long valleys, but we later found harriers breeding on sagebrush-covered slopes up to 9000 ft. This appears to be the highest nesting elevation reported for this species in California (Grinnell and Miller 1944). The breeding status was uncertain of a female at 9700 ft flying over the saddle of Glass Mountain Ridge above Wilfred Canyon on 19 July 1992 (DS) or of a bird at 10,100 ft at Sentinel Meadow Research Natural Area on 19 July 1993 (PJM, DJK). These high elevation breeders foraged in open sagebrush scrub and in wet meadows such as Sagehen and Johnny meadows. The high elevation breeding limit for the eastern Sierra was formerly 8000 ft near June Lake (Grinnell and Miller 1944).

Sharp-shinned Hawk *(Accipiter striatus)*

Although Gaines (1988) reported suspected nesting of Sharp-shinned Hawks from about 8000 to 9000 ft at Glass Mountain, we did not observe this species during the course of our field work from 1991 to 1995. Limited evidence suggests high elevation breeding limits may be about 8200 ft in the White-Inyo Range (Johnson and Cicero 1986) and 7900 ft in the eastern Sierra (Gaines 1988).

Cooper's Hawk *(Accipiter cooperii)* (map: Appendix, p. 6)

A rare and very local breeder recorded in 10 (13.5%) of 74 atlas blocks (1 O, 1 PO, 1 PR, 8 CO) from about 6800 to 7700 ft. Nevertheless, single breeding pairs were found in or near most large tracts of riparian habitat in the lower stretches of canyons providing a high concentration of bird and small mammal prey. Most nests were placed high within the canopy of large quaking aspens or black cottonwooods in narrow riparian corridors; one nest was in a pinyon pine on a slope above a stretch of willow riparian lacking large trees. High elevation breeding limits are about 9500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988).

Northern Goshawk *(Accipiter gentilis)* (map: Appendix, p. 7)

A rare and very local breeder recorded in 9 (12.2%) of 74 atlas blocks (8 PO, 0 PR, 1 CO) from about 7300 to 9200 ft. A rare and very local breeder in relatively dense stands of large Jeffrey or lodgepole pines, particularly near wet meadows. We undoubtedly would have found more goshawks if we had done more intensive surveys and used playbacks of recorded territorial calls as has been done by local Forest Service biologists. Although not all of or our study area has been surveyed, Forest Service biologists estimate that in the last 5 years this region has held at least 7 nesting pairs of goshawks (G. O'Connor pers. comm.). The high elevation breeding limit in the eastern Sierra is about 9000 ft (Gaines 1988).

Swainson's Hawk *(Buteo swainsoni)* (map: Appendix, p. 7)

A rare and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (2 O, 4 PO, 1 PR, 1 CO). Most records were from Long Valley north of Crowley Lake. Representative nesting locations were open Jeffrey pine forest above Alpers Owens River Ranch (7300', ON, 6/7/94, DS) and Jeffrey pine slopes SW of Inaja Ranch (7500', A, 7/10/94, ES). Adults were seen foraging over wet and dry meadows from 6800 ft to 7200 ft. A Swainson's Hawk flying over Sagehen Peak at 9200 ft on 7/30/95 (PJM, AD) likely represented a post-breeding wanderer. The high elevation breeding limit in the eastern Sierra is about 8500 ft (Gaines 1988).

Red-tailed Hawk *(Buteo jamaicensis)* (map: Appendix, p. 7)

An uncommon and widespread breeder recorded in 58 (78.4%) of 74 atlas blocks (2 O, 36 PO, 14 PR, 8 CO). Representative breeding locations were the vicinity of Big Sand Flat (7900', NY, 6/25/95, DS), North Canyon (6900', NY, 6/24/91, DS), south end of Mono Craters (7500', NY, 6/11/95, RSc), Black Canyon (8100', FL, 7/17/93; DJK, PJM), and Alpers Canyon (7400', NY, 5/28/92, DS). Gaines (1988) reported that Red-tailed Hawks are not known to breed over 8000 ft in the eastern Sierra. Our observations of adults of this species in the vicinity of McGee Meadows (8600') on 13 June 1991 (PJM, DS) and near Sawmill Meadow (9200') on 28 June 1991 (DS) may be of upslope wanderers or of individuals nesting at somewhat higher elevations in this region than was previously known. Foraging birds were found soaring over most habitats in the region, but particularly dry meadows, open sagebrush, and open Jeffrey pine forest; an immature was seen on 21 July 1993 flying over the south peak of Glass Mountain at 11,100 ft (DS). Nests located were high up in large Jeffrey pines or on ledges of cliffs.

Golden Eagle *(Aquila chrysaetos)* (map: Appendix, p. 7)

A rare and local breeder recorded in 17 (23.0%) of 74 atlas blocks (6 O, 14 PO, 2 PR, 1 CO). We found Golden Eagles soaring widely over open habitats in the sagebrush, pinyon, and Jeffrey pine zones (6400' to 8500'). One eagle was seen to fly from the Long Valley area over the top of Glass Mountain at about 11,000 ft. The one nest located was on a ledge on a steep rock cliff at about 7200 ft. We suspect most other nests will likely be found on cliffs or high in tall conifers. Although more work is needed to accurately determine population size, we estimated that there were roughly five pairs of Golden Eagles nesting in the study area. The high elevation breeding limit in the eastern Sierra is about 9500 ft (Gaines 1988).

American Kestrel *(Falco sparverius)* (map: Appendix, p. 8)

An uncommon and widespread breeder recorded in 57 (77.0%) of 74 atlas blocks (38 PO, 12 PR, 7 CO) from 6500 to 9700 ft. Representative nesting locations were E of Indian Spring (7600', NY, 6/24/93, DS), vicinity of River Spring Lakes (6500', Z, 6/14/91; DS, PJM), south of Alpers Owens River Ranch (7100', FL, 7/10/94, DS), about 1 mi E of Wilfred Canyon (9400', NY, 7/05/95, DS), and Glass Mountain Ridge above Wilfred Canyon (9700', A and T, 7/19/92, DS). High elevation breeding limits are about "timberline" in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988).

Kestrels inhabited open forests of pinon, Jeffrey, lodgepole, and limber pine; birds foraged widely over open ground. The few nests found in the study area were in cavities in trees, particularly those excavated by Northern Flickers. May also use nest boxes, cavities in buildings or cliffs, and old magpie nests (Gaines 1988).

Peregrine Falcon *(Falco peregrinus)*

From 1988 to 1992, 22 young Peregrine Falcons were released at a hack site at Crowley Lake, of which at least 15 reached independence (B. Walton in litt.). Although no Peregrines are currently known to be breeding at Crowley Lake, observations suggest they may be breeding at more than one site in the eastern Sierra between Crowley and the Mono Lake area (B. Walton pers. comm.). Our only sighting was of an adult at North Landing of Crowley Lake on 20 July 1993 carrying a prey item to cliffs in the Sierra between Convict and McGee canyons (PJM). The high elevation breeding limit in the eastern Sierra is below 8500 ft (Gaines 1988).

Prairie Falcon *(Falco mexicanus)* (map: Appendix, p. 8)

A rare and local breeder recorded in 16 (21.6%) of 74 atlas blocks (3 O, 9 PO, 1 PR, 6 CO) from about 6500 to 8900 ft. Prairie Falcons occupied the sagebrush, pinon pine, and Jeffrey pine zones where the six nest sites located were on shelves or in cavities in rocky cliffs from about 6500 to 7800 ft. Gaines (1988) reported a nesting record for 8000 ft at McLaughlin Cliffs, east of Bald Mountain, and a high elevation breeding limit of 8500 ft in the eastern Sierra. Foraging birds searched for prey over sand flats, meadows, marshes, burned or open scrublands and other open areas.

Chukar *(Alectoris chukar)* (map: Appendix, p. 8)

A very rare and very local breeder recorded in 1 (1.4%) of 74 atlas blocks (0 PO, 0 PR, 1 CO). The only record was of 5 adults, 1 of which was accompanied by 3 small young, on 4 July 1994 at 5900 ft on the rocky slopes of the Owens Gorge below the Upper Power Plant (DS). Local residents from the town of Benton reported that Chukars occur in rocky canyons with water sources in the Benton Range (fide DS), and Gaines (1988) reported that Chukars were established at Cowtrack and Granite mountains. Despite many hours spent in seemingly appropriate habitat, we have yet to detect this species at any of these sites. High elevation breeding limits are about 13,400 ft in the White Mountains (Johnson and Cicero 1986) and 8500 ft east of the Sierran escarpment (Gaines 1988).

Blue Grouse *(Dendragapus obscurus)* (map: Appendix, p. 8)

A rare and very local breeder recorded in 2 (2.7%) of 74 atlas blocks (1 O, 0 PO, 0 PR, 2 CO); all sightings were from the southwest flank of Glass Mountain. Representative breeding records were south of Ford Spring (7200', FL, 7/9/94, DS) and Wilfred Canyon (8600', FL, 7/19/92, DS). In Wilfred Canyon, males were calling from groves of quaking aspen or Jeffrey pine adjacent to a large wet meadow where females with broods were foraging. On 5 July 1995, a male was boomimg from a mixed mountain mahogany-limber pine-Jeffrey pine woodland at 9200 ft about 1 mi E of Wilfred Canyon and upslope from sagebrush-covered slopes and a canyon to the east with a spring (DS). Near Ford Spring, a

female with one small young was flushed from the edge of a stream bordered by low willows with open brush and a sedge meadow nearby (DS). On 5 July 1994, a male was boomimg at 7900 ft in a mixed Jeffrey pine-white fir-juniper forest upslope from a westerly fork of lower McLaughlin Creek with aspen riparian and wet sedge meadow (DS). Gaines (1988) reported a breeding record (unclear if possible or confirmed) from 9300 ft at Sentinel Meadow. Elevational breeding limits are about 8000 to 10,200 ft in the White Mountains (Johnson and Cicero 1986) and 7800 to 9700 ft in the eastern Sierra (Gaines 1988).

Sage Grouse *(Centrocercus urophasianus)* (map: Appendix, p. 9)

An uncommon and very local breeder recorded in 12 (16.2%) of 74 atlas blocks (8 PO, 0 PR, 4 CO), primarily in Long and Adobe valleys. Representative locations of brood activities were the vicinity of Adobe Creek (6500', FL, 6/26/92, PJM), about 1.5 miles N of Watterson Troughs (8700', FL, 6/13/94, DS), Clover Patch (7800', FL, 7/18/92, DS), and *on* the Benton Crossing Rd. south of Little Alkali Lake (7000', PY, 6/13/94, DS). Our high elevation sighting was of one adult at 9200 ft about 1 mi SE of McLaughlin Springs on 16 July 1994 (DS). This and other records listed above probably represent birds moving upslope from key breeding areas. Long-term surveys of Sage Grouse in the Glass Mountain region by Bureau of Land Management biologists and others have located single courtship leks near the Big Sand Flat (8300') and in Adobe Valley (6500') and 9 to 14 leks, depending on the year, in Long Valley (6800'-7000') (T. Russi pers. comm.). Females may establish nests from a few hundred yards to several miles from leks and after hatching will lead broods miles from nest sites. In the Bodie Hills, Sage Grouse perform courtship and brood rearing activities at up to 10,000 ft (T. Russi pers. comm.). Johnson and Cicero (1986) reported upper elevational occurrence as 12,000 ft in the White Mountains, but did not indicate if courtship leks or nesting occurred at this elevation. Although many activities occurred in sagebrush scrub, males displayed to females on leks in dry open meadows. Adults and young were often found in the vicinity of fresh water sources.

California Quail *(Callipepla californica)* (map: Appendix, p. 9)

A rare and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (3 PO, 1 PR, 2 CO). Representative breeding locations were North Canyon (7300', X, 6/28/91, DS), lower Dexter Canyon (6900', X, 6/12/91; PJM, DS), Dutch Petes Ranch, Adobe Valley (6400', P, 6/01/92, DS), W of Owens Gorge (6900', FL, 7/04/94, DS), and along Rock Creek east of Toms Place (6800', PY, 5/31 and 6/25/92, PJM). Found in the lower sagebrush zone usually in wet meadows and bordering sagebrush and riparian thickets. The high elevation breeding limit in the White-Inyo Range is about 8400 ft (Johnson and Cicero 1986)

Mountain Quail *(Oreortyx pictus)* (map: Appendix, p. 9)

An uncommon and very local breeder recorded in 13 (17.6%) of 74 atlas blocks (5 PO, 2 PR, 6 CO). Representative breeding locations were North Canyon (7700', FL, 7/20/92, DS), Benton Range 2 mi SSW of Benton Hot Springs (6200', FL, 6/27/92, DS), mouth of Wilfred Canyon (7300', FL, 7/14/92, DS), Kings Mill (site) N of Chidago Flat (7100', FL, 6/29/92, DS), and NE of Wildhorse Meadow (9000', X, 6/26/95, DS). High elevation breeding limits are at least 8000 ft in the White-Inyo Range (Johnson and Cicero 1986) and

10,200 in the eastern Sierra (Gaines 1988). Advertising males were seen perched on rock outcrops, and adults with broods were usually found in brush or riparian growth along streams and at springs. One male with a brood of tiny young was seen far from water in sagebrush scrub at 7100 ft along Dry Creek northeast of Mono Mills on 12 July 1993 (DS). Adults were occasionally flushed in dry sagebrush scrub, pinyon pine woodland, and mountain mahogany thickets.

Yellow Rail *(Coturnicops noveboracensis)*

Yellow Rails formerly bred at 7000 ft in Long Valley (Dawson 1923) and at 6500 ft in Bridgeport Valley (Grinnell and Miller 1944). These are the only sites where this species was known to breed in California. We did not record this species on our surveys, but more work is needed to see if this rare and secretive species still inhabits Long Valley marshes.

Virginia Rail *(Rallus limicola)* (map: Appendix, p. 9)

An uncommon and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (3 PO, 1 PR, 2 CO). Representative breeding locations were Black Lake (6400', S, 6/25 & 7/15/93; DS, BB), Little Alkali Lake (6900', X, 6/16/94, PJM), Crowley Lake near mouth of Convict Creek (6800', FL, 7/22/92, PJM), and upper Owens Gorge (6600', DD--5/30/92, FL--6/23/92, PJM). The high elevation breeding limit in the eastern Sierra is about 7600 ft (Gaines 1988). Virginia Rails were found in freshwater marshes and sedge meadows on the edges of lakes, reservoirs, ponds, and slow-moving streams.

Sora *(Porzana carolina)* (map: Appendix, p. 10)

An uncommon and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (7 PO, 0 PR, 0 CO). Representative breeding locations were wetlands N of stone corral N of Adobe Ranch (6500', Z, 6/4/93, DS), River Spring Lakes (6500', X, 5/27/92, PJM), Upper Owens River flood plain (6800', Z, 7/01/94, DS), Little Alkali Lake (6900', X, 7/02/94, DS), and west side of Crowley Lake (6800', Z, 7/21/91, PJM). Although we did not find any evidence of confirmed breeding for this species, Dawson (1923, p. 1547) reported a Sora nest from 7000 ft in Long Valley. Habitat requirements similar to Virginia Rail, though Sora appeared to be more partial to wet sedge meadows than was Virginia.

American Coot *(Fulica americana)* (map: Appendix, p. 10)

A fairly common and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (1 PO, 0 PR, 6 CO). Representative breeding locations were River Spring Lakes (6500', PY, 5/27/92, PJM), Black Lake (6400', PY, 6/25/93; DS, BB), Owens River mouth at Crowley Lake (6800', PY, 7/22/94, DS), and west shore of Crowley Lake (6800', NE, 7/21/91, PJM). The high elevation breeding limit in the eastern Sierra is about 7900 ft (Gaines 1986). Coots were found in freshwater ponds, lakes, and reservoirs with emergent vegetation to which they attached their nests.

Snowy Plover *(Charadrius alexandrinus)* (map: Appendix, p. 10)

A rare and very local breeder recorded in 4 (5.4%) of 74 atlas blocks (0 PO, 1 PR, 3 CO). Representative breeding locations were alkali lakes N of Antelope Lake (6500', ON

and DD, 6/09/95; PJM, AD), Little Alkali Lake (6900', PY, 8/13/92, ES), north end of Crowley Lake (6800', A, 6/11/91, PJM), and vicinity of Convict Creek mouth at Crowley Lake (6800', FL and DD, 7/22/92, PJM). Our high count was of 16 adults at Little Alkali Lake on 2 July 1994 (DS), though no breeding behavior was noted at the time. Snowy Plovers nested on alkaline flats found at alkali lakes, or locally at Crowley Lake, and foraged on the flats, along lakeshore edges, or at freshwater seeps. A statewide survey first documented breeding at Crowley Lake in 1988 (Page et al. 1991), and nesting was first confirmed in Adobe Valley when a nest was found at an unnamed alkali lake between River Spring Lakes and Antelope Lake on 7 June 1990 (AB 44:1182, DS). Confirmation of nesting at Little Alkali Lake is the first for that site, and it appears to be at the altitudinal limit of breeding in California.

Killdeer *(Charadrius vociferus)* (map: Appendix, p. 10)

An uncommon and local breeder recorded in 20 (27.0%) of 74 atlas blocks (1 O, 4 PO, 2 PR, 14 CO). Representative breeding locations were Adobe Lake (6500', PY, 7/01/93, DS), Adobe Reservoir (6700', PY, 6/30/93, DS), Little Hot Creek (7000', PY, 7/12/94, PJM), Hot Creek Fish Hatchery (7100', DD, 6/14/94, PJM), and Owens River mouth at Crowley Lake (6800', DD, 7/22/94, DS). A Killdeer at Sawmill Meadow (9200') on 14 July 1995 (DS) likely represented a post-breeding wanderer, though the species has bred at 8600 ft in the Yosemite Sierra (Gaines 1988). Killdeer were found on the margins of reservoirs, freshwater and alkali lakes and ponds, streams and rivers, and sedge meadows.

Black-necked Stilt *(Himantopus mexicanus)* (map: Appendix, p. 11)

A rare and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (1 O, 2 PO, 2 PR, 3 CO). Representative nesting records were Black Lake (6400', PY, 7/14/92, DS), Little Alkali Lake (6900', P, 6/08/95, DS), north end of Crowley Lake (6800', NE, 6/25/92, PJM), and west side of Crowley Lake (6800', FL, 7/22/92, PJM). Stilts were usually found along the margins of reservoirs and freshwater lakes and ponds; occurrence at alkali lakes was usually at a source of freshwater inflow.

American Avocet *(Recurvirostra americana)* (map: Appendix, p. 11)

An uncommon and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (1 O, 1 PO, 2 PR, 8 CO). Representative breeding locations were Adobe Lake (6500', NE, 6/07/93, DS), River Spring Lakes (6500', ON, 6/14/91; PJM, DS), Black Lake (6400', NE, 6/02/92 and 7/15/93, DS), Little Alkali Lake (6900', DD, 6/08/95, DS), and west side of Crowley Lake (6800', PY, 7/22/92, PJM). Avocets were found on reservoirs and freshwater and alkali lakes and ponds. The slightly wider distribution of avocets than stilts in the study area likely was a result of the former species' greater tolerance for alkaline conditions.

Willet *(Catoptrophorus semipalmatus)* (map: Appendix, p. 11)

An uncommon and very local breeder recorded in 12 (16.2%) of 74 atlas blocks (1 PO, 4 PR, 7 CO). Representative breeding locations were Adobe Lake (6500', PY, 7/01/93, DS), River Spring Lakes (6500', DD, 6/12/94, H&PG), Black Lake (6400', A, 6/02/92, DS), Upper Owens River (6800', PY, 7/01/94, DS), Little Hot Creek (7000', DD, 7/12/94, PJM),

Big Alkali Lake (6900', DD, 7/02/94, DS), and north end of Crowley Lake (6800', DD, 6/25/92, PJM). The populations of Willets breeding in Adobe and Long valleys are at the southern end of their regular breeding range in California (Grinnell and Miller 1944, Zeiner et al. 1990); small numbers may occasionally breed to the south in the Owens Valley (Garrett and Dunn 1981). The study area is also at the altitudinal limit of the species' breeding range in California. Willets were usually found in and around wet sedge meadows and low-stature marshes on the margins of reservoirs, freshwater and alkali lakes and ponds, and streams and rivers. In Long Valley, Willets usually place their nests on the ground in dry, upland sagebrush scrub (Gaines 1988).

Spotted Sandpiper *(Actitis macularia)* (map: Appendix, p. 11)

An uncommon and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (4 O, 6 PO, 1 PR, 4 CO). Representative breeding locations were Upper Owens River (6800', NE, 7/01/94, DS), Mammoth Creek (7200', Z, 6/14/94, PJM), north end of Crowley Lake (6800', DD, 7/22/91, PJM), and west side of Crowley Lake (6800', PY, 7/21/91, PJM). The high elevation breeding limit in the eastern Sierra is about 10,200 ft (Gaines 1988). Spotted Sandpipers were found on creek and river margins and along the shores of Crowley Lake.

Long-billed Curlew *(Numenius americanus)* (map: Appendix, p. 12)

A rare and questionably very local breeder recorded in 4 (5.4%) of 74 atlas blocks (1 O, 4 PO, 0 PR, 0 CO). Breeding status unclear, as all sightings may possibly pertain to nonbreeders or migrants; rarely, breeding has occurred to the south in the Owens Valley (Garrett and Dunn 1981). Representative locations of potential breeding were River Spring Lakes (6500', Z, 6/14/91; PJM, DS), vicinity of Little Hot Creek (7000', Z, 6/15/94, PJM), near Benton Crossing (6900', Z, 6/14/94, MJM), and north end of Crowley Lake (6800', Z, 6/11/91, PJM). Curlews were seen in sedge meadows and along the margins of reservoirs and alkali lakes.

Common Snipe *(Gallinago gallinago)* (map: Appendix, p. 12)

An uncommon and very local breeder recorded in 8 (10.8%) of 74 atlas blocks (2 PO, 3 PR, 3 CO). Representative nesting locations were wetlands N of stone corral N of Adobe Ranch (6500', DD, 6/04/93, DS), Hot Creek near Cashbaugh Ranch (6900', C, 7/17/94, DS), marsh near Whitmore Pool (7000', C, 6/15/94, DS), and west side of Crowley Lake (6800', PY, 7/21/91, PJM). Snipe were found in wet sedge meadows. The high elevation breeding limit in the eastern Sierra is about 7400 ft (Gaines 1988).

Wilson's Phalarope *(Phalaropus tricolor)* (map: Appendix, p. 12)

An uncommon and very local breeder recorded in 13 (17.6%) of 74 atlas blocks (3 PO, 1 PR, 9 CO). Representative nesting locations were wetlands N of stone corral N of Adobe Ranch (6500', NE, 6/04/93, DS), River Spring Lakes (6500', NE, 5/27/92, PJM), Black Lake (6400', FL, 7/15/93, DS), Little Alkali Lake (6900', DD, 7/02/94, DS), marsh by Whitmore Pool (7000', DD, 7/02/94, DS), and west side of Crowley Lake (6800', NE, 6/11/91, PJM). Wilson's Phalaropes were almost invariably found nesting in wet sedge meadows, but also foraged on reservoirs and freshwater and alkali ponds and lakes.

Forster's Tern *(Sterna forsteri)* (map: Appendix, p. 12)

An uncommon and very local breeder recorded in 2 (2.7%) of 74 blocks (5 O, 1 PO, 0 PR, 1 CO). Forster's Terns were found breeding only at Crowley Lake (6800'), where 16 active nests were observed in the cove by the Owens River mouth on 22 July 1991 (PJM). Other sightings of birds foraging away from potential nesting areas were from elsewhere on Crowley Lake and along the Owens River to the north.

Mourning Dove *(Zenaida macroura)* (map: Appendix, p. 13)

A fairly common and nearly ubiquitous breeder recorded in 63 (85.1%) of 74 atlas blocks (36 PO, 24 PR, 3 CO). Representative breeding locations were the east slope of the Benton Range (6500', NE, 6/11/93, DS), E of Mono Craters (7100', FL, 7/31/95, RSc), Dexter Creek and Crooked Meadows (8700-8800', 6/23/92, H&PG), and upper Owens Gorge (6600', NE, 6/13/93, PJM; 5900', P, 6/22/95, DS). High elevation breeding limits are about 10,000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 7000 ft in the eastern Sierra (Gaines 1988). Mourning Doves appeared to breed in all major terrestrial habitats up through the lodgepole zone. Within and among habitats, though, birds sometimes were very patchily distributed, probably with respect to the seed sources upon which they depend. Birds were most numerous where they concentrated at water sources of streams and springs. Of two nests found, one was on a rock on the ground overhung by sagebrush and the other was 6 ft up in a scrubby willow.

Flammulated Owl *(Otus flammeolus)* (map: Appendix, p. 13)

A rare and very local breeder recorded in 3 (4.0%) of 74 atlas blocks (1 PO, 2 PR, 0 CO). Representative breeding locations were about 1.5 mi NE of Indiana Summit (8300', X, 6/25/95, DS), Sagehen Spring (8400', S, 6/25 & 7/10/95; DS, DLS), and about 1 mi N of Sawmill Meadow (8600', A/T, 7/11/95; AD, DLS). Our encounters with vocalizing Flammulated Owls were in aspen groves bordered by Jeffrey pine forest or in pure Jeffrey pine forest. More work needs to be done to better establish the distribution, abundance, and habitat needs of this owl in the study area. Field work in 1995 found Flammulated Owls at five locations, which surpasses the number of all previous records for the study area and the nearby eastern Sierra. Grinnell and Miller (1944) reported records for 9 mi W of Benton (on 20 & 22 June 1942), which would place them somewhere on the northeast flank of Glass Mountain, perhaps near Black Mountain. Gaines (1988) listed three records for the eastern Sierra from Parker Lake (8200') north to Twin Lakes.

Great Horned Owl *(Bubo virginianus)* (map: Appendix, p. 13)

An uncommon and local breeder recorded in 28 (37.8%) of 74 atlas blocks (19 PO, 2 PR, 7 CO). Because Great Horned Owls breed early and were not very vocal at the time of our surveys, we likely underestimated their abundance and distribution. Representative breeding locations were cliff near Punch Bowl in Mono Craters (7900', NY, 6/11/95, RSc), canyon in Benton Range above Benton Hot Springs (5800', FL, 6/02/92, DS), Chidago Flat (6800', UN, 6/03/92, DS), near Crooked Meadows (8800', X, 7/01/95, SF), and Hot Creek Gorge (7000', NY, spring 1991, Glenn Sibbald fide ES). High elevation breeding limits are about 9500 ft in the White-Inyo Range (Johnson and Cicero 1986) and, perhaps, 10,000 ft in

the eastern Sierra (Gaines 1988). Great Horned Owls were found in almost all terrestrial habitats up into the lodgepole zone. Nests were located in cavities of rocky cliffs and in old nests of other raptors in large Jeffrey pine trees.

Northern Pygmy-Owl *(Glaucidium gnoma)* (map: Appendix, p. 13)

A very rare and presumably very local breeder recorded in 2 (2.7%) of 74 atlas blocks (2 PO, 0 PR, 0 CO). Representative breeding sites were Taylor Canyon (7300', X, 6/23-24/94, DS) and Wildrose Canyon (7700', X, 6/12/95; DLS, AD). The two records of this owl were from aspen groves bordered either by pinon pine woodland or a mixed woodland of Jeffrey and pinon pine. We suspect that more field work in the study area will turn up few additional Pygmy-Owls. Gaines (1988) considered this species rare on the east slope of the Sierra to 8000 ft and cited a suspected nesting location, in our study area, at 7800 ft at O'Harrel Canyon. Johnson and Cicero (1986) had only one record for the nearby White-Inyo Range at 7700 ft.

Long-eared Owl *(Asio otus)* (map: Appendix, p. 14)

An uncommon and local breeder recorded in 29 (39.2%) of 74 atlas blocks (15 PO, 1 PR, 13 CO). Representative breeding locations were Antelope Spring (6500', FL, 6/12/94, H&PG), Sagehen Peak (9100', Z, 6/29/95, DS), Crooked Spring (8800', NY, 6/24/92, HG), 0.5 mi E of Johnny Meadow (8400', FL, 7/11/95, DS), Sawmill Meadow (9100', family group, 7/30/92, J. Blanchard fide DP), and Convict Creek (7000', NY, 6/16/94, PJM). High elevation breeding limits are about 8000 ft in the eastern Sierra (Gaines 1988) and 9500 ft in the White-Inyo Range (Johnson and Cicero 1986). Dawson (1923) lists a record for an unspecified location at 10,500 ft in the White Mountains on 26 May 1919; the timing suggests possible nesting at this elevation. Breeding Long-eared Owls were most numerous in lowland riparian thickets that bordered on wet or dry meadows supporting a good prey base of small mammals. We also found them in relatively dense lodgepole pine forests or aspen groves adjacent to meadows, in open lodgepole and Jeffrey pine forests, and in pinon pine and mountain mahogany woodlands. In lowland willow and buffalo-berry riparian thickets, nests were almost invariably placed in old nests of Black-billed Magpies; nests at higher elevations were probably the former nests of various raptors or squirrels or suitable platforms of tree deformities.

Short-eared Owl *(Asio flammeus)*

Dixon (1934) reported on various records from "within a twenty mile radius of June Lake, " including a nest of a Short-eared Owl found on 15 June 1933. Although the exact location of this sighting is uncertain it may have been within the western boundary of our study area. In addition, Rowley (1939) reported a Short-eared Owl nest found on 19 May 1927 in a meadow near McGee Creek, which apparently was within the boundaries of our present day study area. We did not observe any of these owls in Long Valley or in other seemingly suitable habitat in Adobe Valley.

Northern Saw-whet Owl *(Aegolius acadicus)* (map: Appendix, p. 14)

A fairly common and fairly widespread breeder recorded in 34 (45.9%) of 74 atlas blocks (25 PO, 8 PR, 1 CO). Representative breeding locations were near Hwy 120 N of Mono Craters (6800', P, 6/30/95, SF), McGee Canyon (7800', ON & NY, 6/8&12/95; DLS, AD), near Sentinel Meadows (9100', X, 6/29/95, DS), Banner Ridge (7600', P, 6/10/95, SF), near Big Springs Campground (7200', P, 6/09/95, SF), and about 1.5 mi NW of Casa Diablo Mountain (7000', X, 6/7/95; DLS, AD). Gaines (1988) reported a record of a family group at 9500 ft. on Glass Mountain in 1963, but cautioned it may have drifted upslope after nesting at a lower elevation. The high elevation breeding limit in the White Mountains is about 9000 ft (Johnson and Cicero 1991). Saw-whets bred in pinyon pine woodland, Jeffrey pine forest, lodgepole pine forest, and aspen groves. Although this was by far the most numerous and widespread owl in the Glass Mountain region, more work needs to be done to better understand its distribution in the study area. In particular, it would be valuable to conduct nighttime surveys in the lodgepole and limber pine forests above the upper limit of the road system at 9200 ft.

Common Nighthawk *(Chordeiles minor)* (map: Appendix, p. 14)

An uncommon and widespread breeder recorded in 51 (68.9%) of 74 atlas blocks (1 O, 29 PO, 18 PR, 4 CO). Representative breeding locations were near Adobe Lake (6500', Z, 6/07/93, DS), edge of Benton Range near Antelope Lake (6700', DD, 6/16/93, PJM), vicinity of McGee Meadows (8600', Z, 7/29/95; PJM, AD), 1.25 mi NNW of Hot Creek Fish Hatchery (7700', NE, 7/13/95, DS), and 0.5 mi SW of Clover Patch (8100', NE, 7/06/95, DS). High elevation breeding limits are about 6800 ft in the White Mountains (Johnson and Cicero 1986) and, perhaps, 9500 ft in the Bodie Hills just east of the Sierra (Gaines 1988). Nesting birds were found in openings in sagebrush scrub, pinon pine woodland, mountain mahogany woodland, and Jeffrey pine forest. Probably restricted altitudinally by nighttime temperatures that limit the availability of flying insects. Although birds foraged far and wide over open terrain, loose flocks frequently concentrated in daytime over marshlands and reservoirs (particularly Crowley Lake), where emerging aquatic insects were numerous.

Common Poorwill *(Phalaenoptilus nuttallii)* (map: Appendix, p. 14)

A fairly common and fairly widespread breeder recorded in 35 (47.3%) of 74 atlas blocks (29 PO, 3 PR, 3 CO). Representative breeding locations were west side of Mono Craters (7200', S, 6/26 & 7/10/93; BB, DS), Indian Meadows (6600', Z, 6/23/91, DS), east slope of Benton Range (6800', X, 6/09/93, DS), south slope of Glass Mountain west of O'Harrel Canyon (7300', PY, 6/27/94, DS), just E of Sawmill Meadow (9300', X, 7/13/95, DS), and north slope of Wilfred Canyon (8100', FL, 7/19/92, DS). High elevation breeding limits are about 9500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Poorwills occupied sagebrush scrub, pinon pine woodland, mountain mahogany woodland, and open Jeffrey pine forest. They perhaps were restricted altitudinally by the same factors that limited the Common Nighthawk, but occurred at higher elevations than that species. Although we occasionally found poorwills foraging in openings on valley floors, calling birds, and presumably most breeding activities, were concentrated on the slopes above.

White-throated Swift *(Aeronautes saxatalis)* (map: Appendix, p. 15)

An uncommon and local breeder recorded in 21 (28.4%) of 74 atlas blocks (15 PO, 4 PR, 2 CO). Representative breeding locations were cliff near Punch Bowl in Mono Craters (7900', ON, 6/11/95, RSc) and Owens Gorge below Upper Power Plant (6100', ON, 6/01/95, DS). Elevational limits of breeding poorly known but birds were recorded from 5900 to 9400 ft. Our two breeding confirmations were based on birds flying into and staying in cracks in cliffs, which are concentrated in the region mostly from 6500 to 8000 ft. White-throated Swifts were numerous in the study area only in the Owens Gorge. These swifts reach 14,200 ft in the White-Inyo Range (Johnson and Cicero 1986) and 13,100 ft in the eastern Sierra (Gaines 1988), but elevational limits of breeding remain poorly known.

Black-chinned Hummingbird *(Archilochus alexandri)* (map: Appendix, p. 15)

A very rare and questionably very local breeder recorded in 1 (1.4%) of 74 atlas blocks (1 PO, 0 PR, 0 CO). The only sighting of this species was of a male at about 7100 ft about 1.5 mi SW of Moran Spring on 7 June 1995 (ES, MMc). This individual might have been a migrant, as most of the study area is above the elevational breeding limits of this species. High elevation breeding limits are about 7000 ft in both the White Mountains (Johnson and Cicero 1986) and the eastern Sierra (Gaines 1988).

Costa's Hummingbird *(Calypte costae)* (map: Appendix, p. 15)

A common but very local breeder recorded in 8 (10.8%) of 74 atlas blocks (3 PO, 3 PR, 2 CO) from about 5800 to 7100 ft. Observations were primarily from the vicinity of the riparian zone of the Owens Gorge. Observations of up to 26 individuals along about a 1.5 mi stretch of the Owens Gorge on 13 June 1993 (PJM) showed how numerous this species is in this area. Breeding was documented there with the location of two nests (6600', NE, 6/13/93, PJM). Observations from elsewhere in the study area were from about 1.5 mi W of the mouth of O'Harrel Canyon (7100', T, 6/06/94, DS) and at Frazier Canyon (7000', Z, 6/12/95; PJM, AD, DLS), but it was unclear if these represented breeding birds. Exact habitat requirements unclear, but males were frequently seen using the upper spires of willows or bushes as lookout perches, and the two nests found were in shrubbery adjacent to the riparian zone. Costa's Hummingbirds breed up to about 6000 ft. and as far north as Silver Creek on the west slope of the White Mountains (Johnson and Cicero 1986, and Gaines (1988) reported no evidence of nesting in the eastern Sierra. Hence our records document breeding at the northern, western, and elevational limit of the species' range in California.

Calliope Hummingbird *(Stellula calliope)* (map: Appendix, p. 15)

An uncommon and local breeder recorded in 23 (31.1%) of 74 atlas blocks (1 O, 17 PO, 3 PR, 3 CO), primarily in the moister drainages in the central portion of the study area. Representative breeding locations were Alpers Owens River Ranch (7100', CN, 6/07/94, DS), Dexter Creek (8700', T, 6/29/95, DS), near Sawmill Meadow (8900', Z, 6/28/91, DS), lower Kelty Canyon/Watterson Meadow (6800', Z, 6/25/91, DS), mouth of Wilfred Canyon (7400', ON [nest 15 ft up in aspen], 7/14/92, DS), and Rock Creek (6800', Z, 6/25/92, PJM). High elevation breeding limits are about 9600 ft in the White Mountains, where rare, (Johnson and Cicero 1986) and 9900 ft in the eastern Sierra (Gaines 1988). Found along riparian strips and

meadow edges from the pinon zone up to the lodgepole zone. Males were often seen on lookout perches at the tops of bare branches in willows or other riparian trees.

Broad-tailed Hummingbird *(Selasphorus platycercus)* (map: Appendix, p. 16)

A very rare and very local breeder recorded in 3 (4.0%) of 74 atlas blocks (2 PO, 0 PR, 1 CO). The only confirmed breeding record was of a female attending a nest with young about 16 ft. up in a pinyon pine at about 7800 ft near Wildrose Canyon on 11 June 1990 (PJM, DS). Other records were of a female at 6900 ft along lower Dexter Creek on 12 June 1991 (PJM), a female at 8900 ft about 0.5 mi S of Pilot Springs on 18 June 1991 (HG), a male at 8700 ft along upper Dexter Creek on 23 June 1992 (HG), a female at 7400 ft at Wildrose Canyon on 7 June 1995 (PJM), and a female at 8800 ft at Crooked Springs on 23 June 1992 (HG). Broad-tailed Hummingbirds have been recorded dependably at a feeder at 7200 ft at Tom's Place, but evidence of breeding there has not been established (Gaines 1988). High elevation breeding limits are about 9000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8500 (9000?) ft in the eastern Sierra (Gaines 1988). Although riparian vegetation may be important, the limited number of observations restricted our ability to describe habitat requirements.

Belted Kingfisher *(Ceryle alcyon)* (map: Appendix, p. 16)

A rare and presumably very local breeder recorded in 7 (9.4%) of 74 atlas blocks (2 O, 7 PO, 0 PR, 0 CO). Except for a sighting of one bird along Adobe Creek near the Symons Ranch (6700') on 11 May 1995 (DS), all records were from the Owens River or its tributary streams that drain from the Sierra Nevada into the west side of Long Valley. Representative potential breeding locations were Big Springs Campground (7200', Z, 5/28/92, PJM), Convict Creek (6900', Z, 6/15/94, DS), and Owens River Gorge (6600', Z, 5/30/92, PJM). Kingfishers were found along permanent streams with good fish populations and bluffs for nest sites.

Lewis' Woodpecker *(Melanerpes lewis)* (map: Appendix, p. 16)

A rare and very local breeder recorded in 9 (12.2%) of 74 atlas blocks (4 PO, 2 PR, 3 CO). Almost all sightings were in the western portion of the study area. Representative breeding locations were near Hwy 395 N of Mono Craters (6700', ON, 6/10/95, DS; NY--7/10/95, AD, DLS), west side of Mono Craters (7300', P, 7/09/93, DS), S of Alpers Owens River Ranch (7100', C, 6/08/94, DS), and about 1.5 mi NNE of Hot Creek Ranch (7800', NY, 6/24/92, PJM). High elevation breeding limits are about 8000 ft in the eastern Sierra (Gaines 1988). Lewis' Woodpeckers were very patchily distributed in open stands of large Jeffrey pines with a sparse to moderate understory of bitterbrush and sagebrush and suitable snags for nesting. Also found in burned-over areas with remaining scattered snags, live pines, and an open brushy understory.

Red-naped Sapsucker *(Sphyrapicus nuchalis)* (map: Appendix, p. 16)

A very rare and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (5 PO, 0 PR, 1 CO). Representative breeding areas were North Canyon (7300', Z, 6/28/91, DS), lower Dexter Canyon (6800', Z, 6/12/91; PJM, DS), and Dry Fork of Black Canyon (7100', NY,

6/26/92, PJM). High elevation breeding limits are about 9600 ft in the White Mountains (Johnson and Cicero 1986) and 8800 ft in the eastern Sierra (Gaines 1988). Habitat needs seem to be very similar to those of Red-breasted Sapsucker described below.

Red-breasted Sapsucker *(Sphyrapicus ruber)* (map: Appendix, p. 17)

An uncommon and local breeder recorded in 25 (33.8%) of 74 atlas blocks (9 PO, 2 PR, 14 CO), primarily in the moister drainages in the central portion of the study area. Representative breeding locations were Sagehen Spring (8300', ON, 6/17/91, H&PG), near Johnny Meadow (8300', NY, 07/11/95, DS), Sawmill Meadow (9100', CF, 07/17/93; PJM, DJK), W of Glass Mountain Ridge (9600', Z, 7/03/94, DS), Alpers Owens River Ranch (7100', 6/07/94, DS), and Owens Gorge (6200', Z, 6/24/95, DS). The high elevation breeding limit in the eastern Sierra is about 10,600 ft (Gaines 1988). On 28 June 1991 a Red-breasted was mated to a bird showing characteristics of a Red-breasted X Red-naped sapsucker at a nest at 7300 ft along North Canyon near where a female Red-naped was seen the same day (DS). Mixed pairs of these two species have been found nearby in the eastern Sierra (Gaines 1988). Red-breasted Sapsuckers bred locally in aspen stands near streams or wet meadows with willows and were absent from dry stands of aspens lacking associated willows. They also bred locally in lodgepole pine forests.

Williamson's Sapsucker *(Sphyrapicus thyroideus)* (map: Appendix, p. 17)

An uncommon and local breeder recorded in 22 (29.7%) of 74 atlas blocks (1 O, 11 PO, 2 PR, 9 CO). This woodpecker was found throughout much of the central and western portion of the study area, reflecting the distribution of lodgepole pine forests. Representative breeding locations were 1.5 mi S of Big Sand Flat (8200', NY, 6/25/95, DS), north side of Lookout Mountain (7200', Z, 6/08/94, DS), near Crooked Meadows (8900', NY, 7/01/95, DS), 1 mi N of head of Alpers Canyon (8000', NY, 5/28/92, DS), ridge NNE of Glass Mountain Ridge (9700' [also seen at 9800'], NY, 7/12/95; AD, DLS), and 1.5 mi NW of Casa Diablo Hot Springs (7700', NY, 6/21/95, JH). Our confirmation of nesting at 9700 ft appears to be at the upper elevational breeding limit of this species in California, as Gaines (1988) knew of no breeding records above 9200 ft. Williamson's Sapsuckers were closely wedded to open stands of large lodgepole pines; smaller numbers inhabited mixed stands of lodgepole and Jeffrey pine or pure stands of large Jeffrey pines.

Hairy Woodpecker *(Picoides villosus)* (map: Appendix, p. 17)

An uncommon and fairly widespread breeder recorded in 45 (60.8%) of 74 atlas blocks (21 PO, 4 PR, 20 CO). Found throughout most of the study area except in treeless lowland areas, such as Adobe and Long valleys, and many arid pinon forests, such as in the Adobe Hills and on the east flank of the Benton Range. Representative breeding locations were near Crater Mountain (7600, ON, 6/12/95, RSc), Sagehen Spring (8300', ON, 6/17/91, H&PG), Wet Meadow (8700', CF, 7/21/92; PJM, DS), Alpers Canyon (7200', NY, 5/28/92, DS), Glass Mountain SW of McGee Meadows (10,100', FL, 7/19/93; DJK, PJM), Deer Spring (7800', ON, 6/07/95; ES, MMc), and Owens Gorge above Upper Power Plant (6300', FY, 6/23/95, DS). An adult and juvenile in whitebark pines at 10,800 ft near the south peak of Glass Mountain on 21 July 1993 may have wandered upslope from their nest site. High

elevation breeding limits are about 9600 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,200 ft in the eastern Sierra (Gaines 1988). Hairy Woodpeckers bred primarily in Jeffrey, lodgepole, and limber pine forests and aspen groves, but small numbers used stands of large-boled pinyon pines.

White-headed Woodpecker *(Picoides albolarvatus)* (map: Appendix, p. 17)

A very rare and very local breeder recorded in 5 (6.8%) of 74 atlas blocks (4 PO, 0 PR, 1 CO); restricted to the extreme western edge of the study area. Representative breeding locations were south end of Mono Craters (8300', Z [juv], 7/14/93, DS), Indiana Summit Research Natural Area (8200', Z, 6/11/94, RSc et al.), Big Springs Campground (7300', NY, 6/27/94, DS), N of Smokey Bear Flat (7700', Z, 7/23/93, JH), and about 1 mi W of Little Antelope Valley (7900', Z, 7/13/94, PJM). High elevation breeding limits are (rarely) about 9000 ft in the eastern Sierra (Gaines 1988). White-headed Woodpeckers were usually found in stands of large-diameter Jeffrey pines.

Northern (Red-shafted) Flicker *(Colaptes auratus)* (map: Appendix, p. 18)

A fairly common and nearly ubiquitous breeder recorded in 67 (90.5%) of 74 atlas blocks (44 PO, 7 PR, 16 CO). Representative breeding locations were Granite Mountain (7800', NY, 6/03/93, DS), North Canyon (7300', NY, 6/28/91, DS), Bald Mountain Spring (8200', FY, 7/16/94, ES), E flank of Glass Mountain (10,400', Z, 7/21/93, DS), 1 mi E of Wilfred Canyon (9200', NY, 7/05/95, DS). High elevation breeding limits are about 10,400 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,200 ft in the eastern Sierra (Gaines 1988). Flickers were found in pinyon pine woodlands; aspen groves; and Jeffrey pine, lodgepole, and limber pine forests where open ground, soft substrate foraging areas were available below the canopy or in nearby meadows or in openings in sagebrush scrub.

Olive-sided Flycatcher *(Contopus borealis)* (map: Appendix, p. 18)

A rare and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (2 O, 7 PO, 3 PR, 1 CO). Representative breeding locations were near Wet Meadow (8800', P, 7/18/93; PJM, DJK), Sentinel Meadow Research Natural Area (9600', ON, 7/12/95, DS), upper Alpers Canyon (7400', S, 5/28 & 7/15/92, DS), and near Big Springs Campground (7300', P, 7/21/93; PJM, DJK). Elevational breeding limits are about 8200 to 10,500 ft in the White Mountains (Johnson and Cicero 1986) and 8000 to 9500 ft in the eastern Sierra (Gaines 1988). Olive-sided Flycatchers were found primarily in the central and western portion of the study area where they were sparingly distributed in open mixed conifer and lodgepole pine forests. The nest at Sentinel Meadow RNA was in an area of open live lodgepoles and numerous fire-burned snags. The species' patchy distribution is not easily explained and needs further study.

Western Wood-Pewee *(Contopus sordidulus)* (map: Appendix, p. 18)

A common and fairly widespread breeder recorded in 43 (58.1%) of 74 atlas blocks (10 O, 9 PO, 11 PR, 23 CO). Pewees were found throughout much of the study area except in sagebrush-dominated valleys and pinon-dominated hills. Representative breeding locations were near Hwy 395 N of Mono Craters (6700', NB, 6/20/93, DS), Indiana Summit Research

Natural Area (8000', NB, 6/11/94, ES), McLaughlin Springs (8700', NY, 7/23/93, DS), Sentinel Meadow Research Natural Area (9400', NE, 7/12/95, DS), 0.5 mi NNW of Clover Patch (8500', ON, 7/18/92), and 1 mi NE of Casa Diablo Hot Springs (7800', ON, 7/13/95, DS). Pewees used riparian aspen and black cottonwood groves and open Jeffrey pine forest for nesting. The nest in an open lodgepole pine forest at 9400 ft at Sentinel Meadow RNA represented not only our highest nesting recorded but also our only sighting of this species in this habitat. High elevation breeding limits are about 9000 ft in both the White Mountains (Johnson and Cicero 1986) and the eastern Sierra (rarely to 10,000'; Gaines 1988).

Willow Flycatcher *(Empidonax traillii)* (map: Appendix, p. 18)

From 10 to 17 July 1922, J. Grinnell (field notes on file with MVZ, Berkeley) recorded up to three Willow Flycatchers along Convict Creek from the 7980 ft elevation marker to a large meadow three miles downstream. The lower location is close to the western boundary of our study area. Although there are no specific records of breeding birds from the study area, we suspect that before the species declined greatly in California that Willow Flycatchers probably bred along lower McGee and Convict creeks and perhaps elsewhere in the study area. On 7 June 1994, at least 7 Willow Flycatchers were along the upper Owens River at Alpers Ranch (DS). Although some males were singing and acting territorial, no Willow Flycatchers were seen on a repeat visit on 28 June 1994, suggesting the birds seen were migrants. It is unlikely that a stable population of Willow Flycatchers will become reestablished in the eastern Sierra or the study area unless grazing is greatly curtailed in riparian-meadow systems.

Dusky Flycatcher *(Empidonax oberholseri)* (map: Appendix, p. 18)

A fairly common and fairly widespread breeder recorded in 37 (50.0%) of 74 atlas blocks (2 O, 12 PO, 8 PR, 17 CO). The Dusky Flycatcher's distribution in the study area closely matched that of the Western Wood-Pewee, except that Duskies also occurred at higher elevations. Representative breeding locations were Indian Spring (7200', NE, 7/06/93, DS), Dexter Creek (8700', NE, 6/23/92, H&PG), Clark Canyon (7400', FY, 7/14/94, ES), McLaughlin Springs (8700', NY, 7/23/93, DS), below south peak Glass Mountain (10,800', X, 7/21/93, DS), Sawmill Meadow (9100', NY, 7/16/92, DS), Sentinel Meadow Research Natural Area (10,000', FY, 7/19/94, DS), and north Wildrose Canyon (7600', FY, 7/30/95; PJM, AD). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) 10,600 ft in the eastern Sierra (Gaines 1988). Dusky Flycatchers used tall willow riparian; aspen groves; good stands of mountain mahogany woodland; the upper elevation, cooler reaches of Jeffrey pine forest; and lodgepole, limber, and whitebark pine forests. Where available, Duskies made extensive use of the understory or bordering bitterbrush and sagebrush scrub. See comments under Gray Flycatcher about overlap of habitat use with that species.

Gray Flycatcher *(Empidonax wrightii)* (map: Appendix, p. 19)

A common and widespread breeder recorded in 55 (74.3%) of 74 atlas blocks (1 O, 23 PO, 5 PR, 27 CO). Representative breeding locations were near Panum Crater (6500, NY, 6/12/93, DS), E of Mono Craters and SW of Mono Mills (7500', ON, 6/13/93, RSc),

Cowtrack Mountain (8800', NE, 6/29/93, DS), Black Mountain (8400', CF, 6/28/92, DS), 0.5 mi W of Big Springs Campground (7300', ON, 7/21/93; DJK, PJM), and near Deer Spring (7500', NY, 7/02/93, DS). The high elevation breeding limit in the White-Inyo Range is about 10,500 ft (Johnson and Cicero 1986). Gray Flycatchers inhabited fairly tall to tall (3-6 ft) sagebrush-bitterbrush scrub, pinon woodland, mountain mahogany woodland, and open Jeffrey pine forest. Gray Flycatcher territories sometimes abutted or overlapped those of Dusky Flycatchers on the sagebrush-bitterbrush scrub edge of willow or aspen riparian groves, in mountain mahogany groves, the upper elevation reaches of Jeffrey pine stands, and the interface of Jeffrey and lodgepole pine forests.

Western Flycatcher complex (Cordilleran Flycatcher *[Empidonax occidentalis]* and Pacific-slope Flycatcher *[E. difficilis]*) (map: Appendix, p. 19)

The breeding status in the study area of these very similar, closely related species is unclear. Recorded in 6 (8.1%) of 74 atlas blocks (1 O, 4 PO, 2 PR, 0 CO), but, because most birds were silent, in all but one case we were unable to distinguish between the species. Although Cordilleran Flycatcher is the expected species east of the Sierra Nevada, the one individual identified by call was a Pacific-slope Flycatcher. The latter bird was acting territorial in Frazier Canyon (7200') on 12 June 1995 but could not be relocated there on 31 July 1995 (PJM, AD, DLS). Other representative sightings were McGee Meadow (8600', Z, 6/13/91, DS), Taylor Canyon (7400', Z, 7/16/93, DS), and Owens Gorge (6600', Z, 6/15/94, PJM). Further evidence is needed to establish whether either of these two species breed in the study area or in the eastern Sierra (Gaines 1988).

Black Phoebe *(Sayornis nigricans)* (map: Appendix, p. 19)

A rare and very local breeder recorded in 2 (2.7%) of 74 atlas blocks (0 PO, 0 PR, 2 CO), both in the upper Owens Gorge. The two nests found were on shelfs with an overhang on: (1) a cliff just below the Upper Power Plant (6000', NY, 7/04/94, DS) and on (2) a boulder in mid-stream about 1 mi downstream from the first (5800', NE--7/04/94, NY--6/01 & 6/22/95, DS). These records appear to represent the upper elevational limit of the species' breeding range in California and the most northerly breeding location in the state east of the Sierra Nevada.

Say's Phoebe *(Sayornis saya)* (map: Appendix, p. 19)

An uncommon and local breeder recorded in 20 (27.0%) of 74 atlas blocks (11 PO, 0 PR, 9 CO). Found primarily in the Adobe Valley area, the Benton Range, around the southern end of Crowley Lake, and in the Owens Gorge. Representative breeding locations were Big Sand Flat (7800', CN, 6/19/91, H&PG), Adobe Hills E of Adobe Lake (6500', NE/NY, 6/07/93, DS), Symons Ranch at Dexter Canyon mouth (6700', NE, 6/12/91; PJM, DS), cliffs E of McGee Canyon Rd. (7200', NY, 6/24/94, DS), and Owens Gorge below Upper Power Plant (5900', FY, 7/04/94, DS). High elevation breeding limits are about 6800 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8400 ft in Bodie east of the Sierra (Gaines 1988). Say's Phoebe's were confined to the lower sagebrush and pinon pine zones, where they selected nest sites on shelfs in the shady recesses of clefts in rock cliffs or on human edifices, usually inside or outside abandoned or little used buildings.

Ash-throated Flycatcher *(Myiarchus cinerascens)* (map: Appendix, p. 20)

A rare and very local breeder recorded in 13 (17.6%) of 74 atlas blocks (11 PO, 1 PR, 1 CO), mostly in the Adobe Valley area, the Adobe Hills, and the Benton Range. Representative breeding locations were north side of Granite Mountain (7200', FY, 6/29/93, BB), south side of Granite Mountain (7600', X, 7/04/93, DS), Adobe Hills near Pizona (7100', X, 6/15/92, PJM), Benton Range E of Black Lake (7600', Z, 6/02/92, DS), and Benton Range 2.5 mi SW of Benton Hot Springs (6500', X, 5/27 & 6/26/92, DS). The high elevation breeding limit in the White-Inyo Range is about 7500 ft (Johnson and Cicero 1986). Ash-throated Flycatchers were inexplicably scarce breeders in open pinon pine woodland, often in canyon draws. A lack of suitable nesting cavities may be a limiting factor.

Horned Lark *(Eremophila alpestris)* (map: Appendix, p. 20)

A fairly common and fairly widespread breeder recorded in 32 (43.2%) of 74 atlas blocks (2 O, 11 PO, 11 PR, 10 CO), primarily at pumice flats near the Mono Craters and in Adobe and Long valleys. Representative breeding locations were W of Mono Craters (7200', CF, 7/09/93, DS), Big Sand Flat (7900', DD, 6/19/91, H&PG), near River Spring Lakes (6500', NE, 6/15/93, PJM), Bald Mountain (9100, X, 7/15/95, DS), Upper Owens River area S of Inaja Ranch (7000', CF, 7/10/94, ES), and N end of Crowley Lake (6800', NE, 6/11/91, PJM). Horned Larks bred in sparsely vegetated pumice sand flats, alkali meadows, open overgrazed sagebrush scrub, and the open and grassy serial stages that follow the removal of sagebrush scrub by fire. Gaines (1988) reported that Horned Larks nest above treeline on Glass Mountain, but explorations of the alpine fell fields and pumice flats on the top of Glass Mountain in the summers of 1991, 1993, and 1995 failed to record this species (DS). High elevation breeding limits are about 13,000 ft in the White Mountains (Johnson and Cicero 1986) and 12,000 ft in the eastern Sierra (Gaines 1988).

Tree Swallow *(Tachycineta bicolor)* (map: Appendix, p. 20)

A rare and very local breeder recorded in 5 (6.8%) of 74 blocks (8 O, 2 PO, 0 PR, 3 CO), primarily along the Upper Owens River or its tributary creeks. Representative nesting locations were Alpers Owens River Ranch (7100', NY, 5/28/92, PJM), Hot Creek Fish Hatchery (7100', Z, 5/31/92, PJM), and McGee Creek E of Hwy 395 (6900', CN, 5/30/92, PJM). The high elevation breeding limit in the eastern Sierra is about 8000 ft (Gaines 1988). These swallows typically foraged over or near water, and nests were in woodpecker-drilled cavities in aspens, buildings, and telephone poles near streams.

Violet-green Swallow *(Tachycineta thalassina)* (map: Appendix, p. 20)

A fairly common and widespread breeder recorded in 58 (78.4%) of 74 atlas blocks (1 O, 32 PO, 12 PR, 14 CO). Representative nesting records were near Indian Spring (7500', ON, 7/06/93, DS), Dry Creek SE of Mono Mills (7200', NY, 7/12/93, DS), North Canyon (8000', ON, 7/20/92, DS), cliff near Punch Bowl (7900', ON, 6/11/95, RSc), Sawmill Meadow (9000', FL, 7/17/93; PJM, DJK), and Owens Gorge below Upper Power Plant (5900', ON, 7/04/94, DS). Violet-green Swallows were most numerous in the sagebrush, pinon, and Jeffrey pine zones where they nested in cavities in cliffs and, secondarily, in conifers (mostly Jeffrey pines) and in deciduous trees in riparian groves. Birds have been

seen flying around the summit of Glass Mountain (11,100'), but it is unclear if they breed at this elevation. High elevation breeding limits are about 10,300 ft in the White-Inyo Range (Johnson and Cicero 1986) and 9700 ft in the eastern Sierra (Gaines 1988).

Northern Rough-winged Swallow *(Stelgidopteryx serripennis)* (map: Appendix, p. 21)

A rare and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (3 O, 4 PO, 1 PR, 2 CO), primarily in Adobe and Long valleys. Representative breeding records were Adobe Creek (6500', Z, 6/04/93, DS), Alpers Owens River Ranch (7100', ON, 6/07&28/94, DS), Mammoth Creek E of 395 (7200', Z, 6/14/94, PJM), and Convict Creek near Hwy 395 (7000', ON, 6/16/94, PJM). A record of a bird at 9600 ft. about 1 mi SE of Wet Meadow on 18 July 1993 (PJM, DJK) likely represented a transient or post-breeding wanderer. The high elevation breeding limit in the eastern Sierra is about 6800 ft (Gaines 1988). Rough-winged Swallows nested in holes in dirt or rocky banks along streams and foraged along streams or over wet meadows or other open areas nearby.

Bank Swallow *(Riparia riparia)* (map: Appendix, p. 21)

An abundant and very local breeder recorded in 1 (1.4%) of 74 atlas blocks (6 O, 0 PO, 0 PR, 1 CO). We found Bank Swallows nesting in the study area only in sandy bluffs at Crowley Lake along the west side of the cove by the Owens River mouth (6800', ON, 6/25/92, PJM). Birds also foraged over water and wet meadows elsewhere at Crowley and in Long Valley. The Crowley colony has been active since at least the 1950s. A survey on 1 June 1987 found about 2310 burrows in 15-16 subgroups at 4 separate locations; the largest group was 1585 burrows at North Landing (Laymon et al. 1988). Based on a 65% occupancy rate, the colony was estimated to support 1500 pairs. In 1987 this was the fourth largest colony in the state and the largest outside the Sacramento Valley. This colony is at the altitudinal limit of breeding in the state; other nearby colonies at Bridgeport and at Topaz Lake (PJM) were not known in 1987.

Cliff Swallow *(Hirundo pyrrhonota)* (map: Appendix, p. 21)

A fairly common and local breeder recorded in 26 (35.1%) of 74 atlas blocks (5 O, 13 PO, 0 PR, 13 CO), primarily in the vicinity of Long Valley and, secondarily, Adobe Valley. Representative breeding locations were Baxter Spring (7700', Z, 6/16/91, H&PG), Symons Ranch in lower Dexter Canyon (6700', ON, 6/12/91; PJM, DS), Alpers Owens River Ranch (7100', ON, 6/07&28/94, DS), Little Hot Creek (7100', ON, 6/15/94, PJM), Benton Crossing bridge (6800', NY, 6/14/94, MJM), Casa Diablo Hot Springs (7300', ON, 6/14/94, PJM), and Owens Gorge below Upper Power Plant (5800', Z, 6/22/95, DS). A Cliff Swallow at 9900 ft E of upper Wilfred Canyon on 17 July 1994 (DS) was likely a transient or post-breeding wanderer. Nests were found on human edifices and rocky cliffs close to water where the swallows gather mud for nest construction. Gaines (1988) noted an increase in nesting Cliff Swallows in the Mono Basin in the 1980s and reported them breeding up to 8400 ft at Bodie.

Barn Swallow *(Hirundo rustica)* (map: Appendix, p. 21)

A very rare and very local breeder recorded in 3 (4.0%) of 74 atlas blocks (2 PO, 1 PR, 0 CO). The only records were from the Arcularius Ranch along the Upper Owens River

(7100', P, 5/28/92, PJM), Hot Creek Fish Hatchery (7100', Z, 5/31/92, PJM), and near the south end of Crowley Lake (7000', Z, 6/06/95, PJM). Gaines (1988) reported a record of a nest found on 11 July 1922 in Long Valley (7000') "on the face of a sandstone bank four feet above the rushing water." Grinnell and Miller (1944) considered the town of Mammoth Lakes (7900') to be at the elevational breeding limit of this species in the state.

Steller's Jay *(Cyanocitta stelleri)* (map: Appendix, p. 22)

An uncommon and widespread breeder recorded in 50 (67.6%) of 74 atlas blocks (33 PO, 7 PR, 10 CO). Representative breeding locations were Wet Meadow (8500', CN, 6/12/91; PJM, DS), slope above fork of lower McLaughlin Creek (8200', FL, 7/05/94, DS), Sentinel Meadow Research Natural Area (10,000', P, 7/19/93; PJM, DJK), Sawmill Meadow (9100', FL, 7/17/93; PJM, DJK), Big Springs Campground (7200', FY, 7/21/93; PJM, DJK), Banner Ridge (8000', FL, 7/05/95; DJK, DoK), Rock Creek (6800', FL, 6/25/92, PJM), and Owens Gorge above Upper Power Plant (6200', Z, 6/23/95, DS). High elevation breeding limits are about 9500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,000 ft in the eastern Sierra (Gaines 1988). Found primarily in dense willow and aspen groves in canyons, in dense stands of pinon pine (especially on north-facing slopes), and locally in dense Jeffrey pine, lodgepole, and lodgepole-limber pine forests. These jays seemed most numerous near streams and wet meadows and around human habitation.

Scrub Jay *(Aphelocoma coerulescens)* (map: Appendix, p. 22)

A uncommon and fairly widespread breeder recorded in 37 (50.0%) of 74 atlas blocks (23 PO, 4 PR, 10 CO), primarily in the northern and eastern portions of the study area. Representative breeding locations were near Panum Crater (6500', UN, 6/12/93, DS), about 1.75 mi N of Big Sand Flat (8000', NY, 6/23/93, DS), Cowtrack Mountain (8700', CF, 6/29/93, DS), Adobe Hills near Antelope Lake (6600', FL, 6/09/95; PJM, AD), Banner Ridge (8000', FL, 7/05/95; DJK, DoK), Watterson Canyon (7200', FL, 6/14/94, DS), and south side of Casa Diablo Mountain (7400', FY, 6/07/95; AD, DLS). Scrub Jays bred in tall bitterbrush-dominated desert scrub, mountain mahogany groves, and pinon pine woodland. Birds also used willow thickets in the pinon zone, but it is unclear whether they bred in this habitat. Scrub Jays reach their upper breeding limits at about 8200 ft (9500' as upslope wanderer) in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft east of the Sierra (Gaines 1988)

Pinyon Jay *(Gymnorhinus cyanocephalus)* (map: Appendix, p. 22)

A fairly common and fairly widespread breeder recorded in 44 (59.4%) of 74 atlas blocks (1 O, 39 PO, 0 PR, 5 CO) from about 6500 to 7600 ft, primarily in the northern and eastern portions of the study area. Because Pinyon Jays are early breeders and had completed most of their nesting activities before we began field work each year, we were unable to define their breeding distribution and elevational limits as well as we would have liked. Nevertheless, representative breeding locations were Adobe Hills near Antelope Lake (6700', FL, 6/09/95; PJM, AD), along McGee Canyon Rd. (7600', FL, 6/08/95, PJM), and 1.5 mi NNE of Casa Diablo Mountain (7100', FL, 6/05/95; DLS, AD). Although Pinyon Jays occurred primarily in pinon pine woodlands, we also observed them in tall, open desert scrub

and in adjacent open stands of Jeffrey pine, although it is unclear whether or not they bred in these habitats. High elevation breeding limits also are uncertain in the White-Inyo Range (Johnson and Cicero 1986) and in the eastern Sierra (Gaines 1988).

Clark's Nutcracker *(Nucifraga columbiana)* (map: Appendix, p. 22)

A fairly common and widespread breeder recorded in 60 (81.1%) of 74 atlas blocks (53 PO, 1 PR, 6 CO). Because Clark's Nutcrackers, like Pinon Jays, are early breeders and had completed most of their nesting activities before we began field work each year, we were unable to define their breeding distribution and elevational limits as well as we would have liked. Nevertheless, representative breeding records were upper McGee Canyon (8000', FL, 6/13/95; DLS, AD), Alpers Owens River Ranch (7100', FL, 6/7/94, DS), upper Wet Fork Black Canyon (8800', 7/11/95; AD, DLS), near top of Glass Mountain (10,800', Z, 7/21/93, DS), Big Springs Campground (7300', FY, 6/15/94, MJM), ridge NW of Little Antelope Valley (7400', FL, 6/16/94, PJM), and Owens Gorge above Upper Power Plant (6100', Z, 6/23/95, DS). We found Clark's Nutcrackers in aspen groves, pinon and mountain mahogany woodlands, and Jeffrey pine, mixed conifer, lodgepole pine, lodgepole-limber pine, and whitebark pine forests. Nutcrackers probably nested in most of these habitats as Gaines (1988) reported nests in the eastern Sierra from pinon pines at 7500 ft to whitebark pines at 10,500 ft.

Black-billed Magpie *(Pica pica)* (map: Appendix, p. 23)

A fairly common but local breeder recorded in 20 (27.0%) of 74 atlas blocks (2 O, 7 PO, 1 PR, 12 CO), primarily in Adobe and Long valleys. Representative breeding records were Indian Spring (7300', UN, 6/24/93, DS), Indian Meadow (6500', UN, 6/08/95, PJM), Black Lake (6400', UN and FL, 6/02/92, DS), about 1.5 mi W of mouth of O'Harrel Canyon (7200', NY, 6/06/94, DS), Casa Diablo Hot Springs (7300', FY and UN, 6/14/94, PJM), and Convict Creek near Whitmore Pool (6900', FL, 6/15/94, DS). Magpies built most nests in willow and buffaloberry thickets and foraged mostly in these trees and, especially, in nearby moist meadows.

Common Raven *(Corvus corax)* (map: Appendix, p. 23)

A fairly common and nearly ubiquitous breeder recorded in 63 (85.1%) of 74 atlas blocks (4 O, 40 PO, 17 PR, 6 CO) from about 5800 to 10,200 ft. Again, early breeding made it difficult to determine elevational breeding limits, but most ravens probably nested in the sagebrush, pinon pine, and Jeffrey pine zones from about 5800 to 8000 ft, where most cliffs are found. Representative breeding locations were south side of Granite Mountain (7800', UN and FL, 6/10/93, DS), Adobe Valley near Antelope Lake (6500', UN, 6/09/95, DS), mouth of O'Harrel Canyon (7600', NY, 6/05/91, DS), vicinity of Owens River Gorge Rd. near Watterson Canyon Rd. (7600', ON, 6/07/95; DJK, RU), and Crooked Creek (6900', FL, 6/07/95, PJM). Johnson and Cicero (1986) were unable to determine elevational breeding limits in the White-Inyo Range, and Gaines (1988) reported confirmed nesting at 8500 ft in the eastern Sierra and likely nesting at 9000 ft on Glass Mountain. Ravens foraged in a variety of open habitats including moist meadows, lakeshores, open desert scrub, pumice flats, and open woodlands and forests.

Mountain Chickadee *(Parus gambeli)* (map: Appendix, p. 23)

A common and nearly ubiquitous breeder recorded in 67 (90.5%) of 74 atlas blocks (9 PO, 5 PR, 53 CO). Representative breeding records were west side of Mono Craters (7500', ON, 6/12/95, RSc), Adobe Hills E of Adobe Lake (6500', CF, 6/07/93, DS), Indiana Summit Research Natural Area (8000', ON, 6/11/94, ES), Sagehen Spring (8300', ON, 6/17/91, H&PG), Wet Meadow (8700', NY, 7/21/92; PJM, DJK), Sentinel Meadow Research Natural Area (10,100', FY, 7/19/93; PJM, DJK), north peak of Glass Mountain (11,000', FY, 7/21/93, DS), ridge NNE of Glass Mountain Ridge (9800', CF, 7/12/95; AD, DLS), Klondike Canyon (7100', NY, 5/29/92, DS), and Banner Ridge area (8000', ON, 6/12/94, DS). High elevation breeding limits are about 10,200 ft in the eastern Sierra (Gaines 1988) and 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986). Mountain Chickadees nested in pinon and mountain mahogany woodlands, aspen groves, thickets of tall willows, and forests of Jeffrey pine, lodgepole pine, lodgepole-limber pine, and whitebark pine.

Plain Titmouse *(Parus inornatus)* (map: Appendix, p. 23)

An uncommon and local breeder recorded in 19 (25.7%) of 74 atlas blocks (1 O, 2 PO, 7 PR, 10 CO), primarily in the eastern portion of the study area. Representative breeding records were Adobe Hills E of Adobe Lake (6500', CF, 6/07/93, DS), slope N of mouth of North Canyon (6900', NY, 6/24/91, DS), slope of lower McGee Canyon (7300', NY, 6/24/94, DS), 2 mi SSW of Benton Hot Springs (6300', CF, 5/27/92, DS), and Benton Range near Banner Ridge (7800', FY, 7/13/94, DS; 8000', P, 7/05/95; DJK, DoK). High elevation breeding limits are about 7900 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra region (Gaines 1988). Plain Titmice bred in pinon woodlands, usually in moderately dense stands of fairly large trees. Nesting cavities may be a limiting factor as few woodpeckers breed in pinon woodland and natural cavities are few and far between.

Bushtit *(Psaltriparus minimus)* (map: Appendix, p. 24)

An uncommon and fairly widespread breeder recorded in 38 (51.4%) of 74 atlas blocks (10 PO, 9 PR, 19 CO), mostly in the eastern portion of the study area. Representative breeding locations were Granite Mountain (7700', FY, 7/04/93, DS; 7400', NY, 6/03/93, DS), Indian Meadows (6500', CF, 6/08/95, PJM), Dexter Creek (8700', Z, 6/23/92, H&PG), 0.25 mi E of Sawmill Meadow (9200', NY, 7/16/92, DS), 2 mi SSW Benton Hot Springs (6300', NB--5/27/92, CF--6/26/92, DS), O'Harrel Canyon (8800', Z, 6/05/91, DS), Wilfred Canyon (7500', CF, 6/04/92, DS), and Owens Gorge above Upper Power Plant (6300', NY, 6/23/95, DS). The high elevation breeding limit in the White-Inyo Range is about 8200 ft (Johnson and Cicero 1986). Gaines (1988) had no records east of the Sierra above 7800 ft, except for a nesting record at Glass Mountain at the "extraordinary" elevation of 9600 ft. While most Bushtits appear to nest below 8000 ft., the records cited above suggest that breeding above that elevation is probably rare but regular. Bushtits bred locally in suitable habitat of pinon and mountain mahogany woodlands and willow-wildrose riparian. The nest cited above for the vicinity of Sawmill Meadow was located in a dwarfed aspen grove, and in the Bodie Hills north of the study area a nest was found in sagebrush scrub adjacent to an aspen grove (DS).

Red-breasted Nuthatch *(Sitta canadensis)* (map: Appendix, p. 24)

An uncommon and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (2 O, 8 PO, 1 PR, 2 CO) in the western-central portion of the study area. Representative breeding locations were W of Indiana Summit Research Natural Area (8000', P, 7/11/94, DJK), small meadow S of Crooked Meadows (8800', FY, 7/30/95; PJM, AD), Wet Meadow (8500', FL, 7/18/93; PJM, DJK), near Sawmill Meadow (9200', Z, 6/07/91, DS), and Lookout Mountain (8400', Z, 5/28/92, PJM). Johnson and Cicero (1986) reported the elevational limits of breeding of this species to be 8900 to 9500 ft in the White-Inyo mountains. Gaines (1988) listed the breeding limits in the eastern Sierra to be about 6000 to 8000 ft, with the exception of one record at 10,100; we suspect the lower limit at 6000 ft is in error because suitable habitat is lacking at that elevation. Red-breasted Nuthatches bred in relatively dense mixed conifer and lodgepole pine forests.

White-breasted Nuthatch *(Sitta carolinensis)* (map: Appendix, p. 24)

A fairly common and nearly ubiquitous breeder recorded in 61 (82.4%) of 74 atlas blocks (19 PO, 7 PR, 35 CO). Representative breeding locations were Adobe Hills about 2.5 mi NW of Adobe Ranch (6800', NY, 6/04/93, DS), E of Mono Craters (8000', ON, 6/13/93, RSc), near Crooked Meadows (8900', NY, 7/01/95, DS), upper McGee Canyon (7800', ON, 6/08/95; DLS, AD), Bald Mountain Spring (8200', NY, 7/16/94, ES), Sentinel Meadow Research Natural Area (9700', FL, 7/19/93; PJM, DJK), south peak of Glass Mountain (11,000', Z, 7/21/93, DS), Wilfred Canyon (9200', CF, 6/04/92, DS), near Deer Spring (7800', NY 6/07/95; ES, MMc), and W of Owens Gorge W of Upper Power Plant (6600', FY, 7/04/94, DS). High elevation breeding limits are about 10,200 ft in the eastern Sierra (Gaines 1988) and 10,600 ft in the White-Inyo Range (Johnson and Cicero 1986). White-breasted Nuthatches bred in pinon pine woodland and Jeffrey pine, lodgepole pine, and lodgepole-limber pine forests. Also may occasionally breed in whitebark pine forest/woodland near the top of Glass Mountain.

Pygmy Nuthatch *(Sitta pygmaea)* (map: Appendix, p. 24)

A fairly common and fairly widespread breeder recorded in 37 (50.0%) of 74 atlas blocks (1 O, 14 PO, 5 PR, 18 CO), primarily in the western and central portions of the study area. Representative breeding locations were N of Mono Craters near Hwy 120 (6900', ON, 6/05/94, DS), near Crooked Meadows (8900', NY, 7/01/95, DS), 0.5 mi S of McGee Meadow (8300', NY, 7/17/93, DS), Sentinel Meadow Research Natural Area (10,000', CF, 7/19/94, DS), ridge NW of Little Antelope Valley (7200', 6/16/94, PJM), and S of Watterson Canyon Rd. E of Crowley Lake (7600', NY, 6/14/94, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Pygmy Nuthatches bred in Jeffrey pine forest, open stands of large-boled lodgepole pines, and aspen groves associated with these conifer forests. Pygmy Nuthatches only rarely foraged in pinon pines but in such cases usually in those near other species of larger pines.

Brown Creeper *(Certhia americana)* (map: Appendix, p. 25)

An uncommon and local breeder recorded in 25 (33.8%) of 74 atlas blocks (15 PO, 4

PR, 6 CO), primarily in the central portion of the study area. Representative breeding records were ridge SE of Wet Meadow (9400', ON, 7/18/93; PJM, DJK), E of Wilson Butte (8000', FY, 7/20/93, DS), Sentinel Meadow Research Natural Area (9600', NY, 7/12/95, DS), east flank of Glass Mountain (10,400', Z, 7/21/93, DS), near Sawmill Meadow (8700', ON, 7/17/93; PJM, DJK), Big Springs Campground (7300', CF, 6/15/94, MJM), and ridge NNE of Glass Mountain Ridge (9800', CF, 7/12/95; DLS, AD). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,000 ft in the eastern Sierra (Gaines 1988). Brown Creepers bred in moderately dense stands of Jeffrey pine, lodgepole pine, and lodgepole-limber pine, and, occasionally, aspen groves.

Rock Wren *(Salpinctes obsoletus)* (map: Appendix, p. 25)

A fairly common and widespread breeder recorded in 56 (75.7%) of 74 atlas blocks (24 PO, 9 PR, 23 CO). Representative breeding locations were near Indian Spring (7500', CF, 6/24/93, DS), Adobe Hills E of Adobe Lake (6500', CF, 6/07/93, DS), vicinity of McLaughlin Creek (7800', CF, 7/05/94, DS), near Sawmill Meadow (9000', FL, 7/17/93; PJM, DJK), south peak of Glass Mountain (11,100', X, 7/14/95, DS), about 0.5 mi E of upper Wilfred Canyon (10,200', X, 7/17/94, DS), west side of Casa Diablo Mountain (7100', CF, 6/05/95; DLS, AD), and Owens Gorge below Upper Power Plant (5900', CF, 7/04/94, DS). High elevational breeding limits are about 14,200 ft in the White-Inyo Range (Johnson and Cicero 1986) and 12,000 ft in the eastern Sierra (Gaines 1988). Breeding Rock Wrens inhabited talus slopes, boulder piles, and rock outcrops.

Canyon Wren *(Catherpes mexicanus)* (map: Appendix, p. 25)

An uncommon and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (7 PO, 0 PR, 4 CO), primarily in the eastern portion of the region. Representative breeding locations were canyon between Dutch Petes Ranch and Benton Hot Springs (5800', NY, 6/02/92, DS), Black Mountain (8500', FY, 6/28/92, DS), Wilfred Canyon (8000', Z, 7/19/92, DS), upper Owens Gorge (6700', FY, 7/22/92; PJM, DS), and Owens Gorge below Upper Power Plant (5800', FY, 6/01/95, DS). High elevation breeding limits are about 7500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Canyon Wrens sought shady canyon walls, talus slopes, and boulder piles for nesting and foraging. They seemed to prefer cooler and less exposed rocky habitats than did Rock Wrens.

Bewick's Wren *(Thryomanes bewickii)* (map: Appendix, p. 25)

An uncommon and local breeder recorded in 24 (32.4%) of 74 atlas blocks (1 O, 7 PO, 10 PR, 7 CO). Representative breeding locations were lower Dexter Canyon (6800', FL, 7/20/92, PJM), Black Mountain (8400', X, 5/29 & 6/28/92, DS), Kelty Canyon (8400', X, 6/25/91, DS), about 1 mi SW of Moran Spring (7100', CF, 6/07/95; ES, MMc), and Long Chance Mine (7000', NY, 6/29/92, DS). Records of Bewick's Wrens at 10,100 ft at Sentinel Meadows Research Natural Area on 19 July 1994 (DS) and at 9800 ft E of upper Wilfred Canyon on 17 July 1994 (DS) likely represented post-breeding wanderers. Exact limit of upper elevation breeding unclear. Gaines (1988) concluded that Bewick's Wrens extended to about 7500 ft east of the Sierra. Johnson and Cicero (1986) recorded this species up to 9500

ft in the White-Inyo Range but gave no dates for specific records thereby not eliminating upslope wanderers. Bewick's Wrens bred in pinon woodland with understory brush, willow-wildrose thickets, mountain mahogany woodland, and tall, arborescent sagebrush and bitterbrush, whether alone or mixed with thick willow clumps. One nest was inside an outhouse of an inactive mining camp.

House Wren *(Troglodytes aedon)* (map: Appendix, p. 26)

A common and fairly widespread breeder recorded in 41 (55.4%) of 74 atlas blocks (3 O, 10 PO, 8 PR, 23 CO). Representative breeding locations were Sagehen Spring (8300', ON, 7/91, H&PG), North Canyon (8000', NY, 7/20/92, DS), Klondike Canyon (7200', ON and CF, 5/29/92, DS), McLaughlin Springs (8700', CF, 7/23/93, DS), aspen grove in Sentinel Meadow Research Natural Area (9700', Z, 7/19/93; PJM, DJK), McGee Meadow (8600', NY, 7/18/92; JH, DS), Sawmill Meadow (9200', CF, 7/16/92, DS), Wildrose Canyon (7600', ON, 7/30/95; PJM, AD), Convict Creek near Whitmore Pool (6900', NY, 7/02/94, DS), and Owens Gorge below Upper Power Plant (5800', NY, 6/22/95, DS). A House Wren at 10,100 ft in the Sentinel Meadow Research Natural Area on 19 July 1994 (DS) may have been an upslope wanderer. High elevation breeding limits are about 10,000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8500 ft in the eastern Sierra (Gaines 1988). House Wrens bred primarily in aspen groves in natural tree cavities, old woodpecker holes, or cavities of human structures adjacent to such groves. They also apparently bred sparingly in Jeffrey pine forests and willow thickets. One nest was in pinon pine woodland above a dry gully. House Wrens occasionally were seen in mountain mahogany woodlands but it is unclear if they actually bred in this habitat.

Marsh Wren *(Cistothorus palustris)* (map: Appendix, p. 26)

An uncommon and very local breeder recorded in 5 (6.8%) of 74 atlas blocks (1 O, 1 PO, 2 PR, 2 CO). Representative breeding locations were River Spring Lakes (6500', X, 6/14/91; PJM, DS), Black Lake (6400', S, 6/2&27/92, DS), Little Alkali Lake (6900', FL, 6/16/94, PJM), and west side of Crowley Lake (6800', FL, 7/21/91, DS). The high elevation breeding limit east of the Sierra is about 6400 ft (Gaines 1988). Marsh Wrens bred in freshwater marshes in tall stands of cattails and tules and in low expanses of sedges and rushes.

American Dipper *(Cinclus mexicanus)* (map: Appendix, p. 26)

A rare and very local breeder recorded in 5 (6.8%) of 74 atlas blocks (1 PO, 0 PR, 4 CO), primarily in the Upper Owens River area and the Owens Gorge. Representative breeding locations were Big Springs Campground (7300', ON--5/28/92, PJM; FY, 6/15/94, MJM), Alpers Owens River Ranch (7100', ON, 6/07/94, DS), Hot Creek (7000', FL, spring 1991, G. Sibbald fide ES), and Owens Gorge below Upper Power Plant (5800', UN, 7/04/94, DS). High elevation breeding limits are about 10,000 ft in the White Mountains (Johnson and Cicero 1986) and 10,200 ft in the eastern Sierra (Gaines 1988). Dippers were found foraging along swift-flowing, rocky streams -- a precious commodity in the study area. Nests were placed over water on suitable ledges on rock faces or boulders or under road culverts.

Ruby-crowned Kinglet *(Regulus calendula)* (map: Appendix, p. 26)

A very rare and very local breeder recorded in 2 (2.7%) of 74 atlas blocks (1 O, 2 PO, 0 PR, 0 CO). Representative potential breeding locations were McGee Meadow (8600', X, 6/13/91; PJM, DS), Crooked Meadows (8800', X, 6/14/94, H&PG et al.; 7/11-12/95, DS), and small meadow about 0.5 mi NNE of McLaughlin Springs (8900', X, 7/01/95, DS). Ruby-crowned Kinglets occupied dense stands of lodgepole pines on the edges of wet meadows. A male singing from a pinon pine on the edge of a willow-wildrose thicket at 6900 ft in lower Kelty Canyon on 25 June 1991 (DS) was out of typical breeding habitat. Elevational breeding limits are about 9500 to 10,600 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 to 10,000 ft in the eastern Sierra (Gaines 1988).

Blue-gray Gnatcatcher *(Polioptila caerulea)* (map: Appendix, p. 27)

A common and widespread breeder recorded in 51 (68.9%) of 74 atlas blocks (11 PO, 15 PR, 25 CO); most numerous in the northern and eastern portions of the study area. Representative breeding locations were near Panum Crater (6600', NB, 6/10/95, DS), Cowtrack Mountain (8800', NE, 6/29/93, DS), Granite Mountain (7300', ON, 6/03/93, DS; 8000', NB, 6/10/93, DS), Rocky Knob (9100', Z, 6/23/92, H&PG), Sagehen Peak (9100', X, 6/26/95, DS), Adobe Hills near Antelope Spring (6800', NE, 6/13/94, H&PG), 2 mi SSW of Benton Hot Springs (6300', FY, 6/26/92, DS), north slope of Wilfred Canyon (8200', CF, 7/19/92, DS), and 0.5 mi NW of Moran Spring (7000', CN, 6/07/95; ES, MMc). High elevation breeding limits are about 9400 ft (perhaps non-breeders) in the White-Inyo Range (Johnson and Cicero 1986) and about 8000 ft east of the Sierra (Gaines 1988). Blue-gray Gnatcatchers bred in tall sagebrush-bitterbrush scrub, tall sagebrush mixed with scattered willow clumps, pinon pine woodland, and, locally, in mountain mahogany woodland and streamside willow thickets. The Blue-gray Gnatcatcher was the most frequently observed host of the parasitic Brown-headed Cowbird.

Western Bluebird *(Sialia mexicana)* (map: Appendix, p. 27)

A very rare and very local breeder recorded in 7 (9.4%) of 74 atlas blocks (3 PO, 2 PR, 2 CO), primarily in the southeastern portion of the atlas area. Representative breeding locations were Black Canyon (7000', FL, 6/26/92, PJM), Sentinel Meadow Research Natural Area (9500', P and N, 7/12/95, DS), south flank of Glass Mountain (8000', NY, 7/03/94, DS), near Banner Ridge (7800', P, 7/13/94, DS), and Moran Spring (6900', Z, 6/29/92, DS). Western Bluebirds bred in pinon pine woodland, open Jeffrey pine forest, and open, fire-ravaged lodgepole pine forest, though birds were absent from many areas of seemingly suitable habitat. Johnson and Cicero (1986) did not record this species in the White Mountains, and Gaines (1988) recorded this species in the eastern Sierra only at 6800 ft in Lee Vining. Although our record at 9500 ft seems unusual, Grinnell and Miller (1944) listed the upper elevation of summer residence in the state as 10,600 ft in the San Bernardino Mountains.

Mountain Bluebird *(Sialia currucoides)* (map: Appendix, p. 27)

A fairly common and nearly ubiquitous breeder recorded in 61 (82.4%) of 74 atlas blocks (9 PO, 8 PR, 44 CO). Representative breeding locations were Adobe Hills E of

Adobe Lake (6500', CF, 6/07/93, DS), Granite Mountain (8000', NY, 6/10/93, DS), Sagehen Spring (8300', ON, 6/23/92, H&PG), McLaughlin Springs (8700', NY, 7/05/94, DS), Sentinel Meadow Research Natural Area (10,100', CF, 7/19/93; DJK, PJM), north peak of Glass Mountain (11,000'[seen at 11,100'], NY, 7/21/93, DS), 1 mi W of surge tank above Owens Gorge (7000', NE, 6/22/95, DS), and Owens Gorge above Upper Power Plant (6200', Z, 6/23/95, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 12,000 ft in the eastern Sierra (Gaines 1988). Mountain Bluebirds foraged in broken sagebrush flats, alkali meadows, pumice flats, openings in forests or woodlands, and alpine fell fields. Nests were placed in natural or woodpecker-excavated cavities in trees or telephone poles, in cavities of rock faces or in buildings, and in nest boxes.

Townsend's Solitaire *(Myadestes townsendi)* (map: Appendix, p. 27)

An uncommon and fairly widespread breeder recorded in 35 (47.3%) of 74 atlas blocks (22 PO, 5 PR, 8 CO). Representative breeding locations were west slope of Taylor Canyon (7400', NY, 7/16/93, DS), Indiana Summit Research Natural Area (8000', NE, 6/11/94, ES), ridge SE of Wet Meadow (9500', P, 7/18/93; PJM, DJK), E flank of Glass Mountain (9900', X, 7/14/95, DS), Moran Spring (6900', FY, 6/29/92, DS), and Owens Gorge above Upper Power Plant (6200'[seen at 6100'], CF, 6/23/95, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,300 ft in the eastern Sierra (Gaines 1988). Townsend's Solitaires bred primarily in open stands of large Jeffrey pines and secondarily in pinon pine woodlands and lodgepole pine forests. One sighting in mountain mahogany woodland suggested they occasionally bred in this habitat. Breeding pairs were often very locally distributed, probably with respect to berry sources, particularly currants (*Ribes* spp.), to which they led their young after fledging. The few cases where solitaires were found breeding in pinon woodland were all upslope from riparian thickets with patches of currants.

Hermit Thrush *(Catharus guttatus)* (map: Appendix, p. 28)

A fairly common and very local breeder recorded in 15 (20.3%) of 74 atlas blocks (10 PO, 2 PR, 3 CO), primarily in the central portions of the study area. Representative breeding locations were upper North Canyon (8000', A, 7/20/92, DS), Black Canyon (7400', X, 6/26/92, PJM), ridge SE of Wet Meadow (9500', CF, 7/18/93; PJM, DJK), McGee Meadow (8600', CF, 7/18/93, DS), near Sawmill Meadow (9000', CF, 6/28/91, DS), and lower Wilfred Canyon (7600', X, 6/04 & 7/14/92, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,100 ft in the eastern Sierra (Gaines 1988). Hermit Thrushes bred in aspen groves and dense stands of mountain mahogany and lodgepole pine, with a substantial leaf litter layer for foraging, found in shady canyons and the upper cooler drainages.

American Robin *(Turdus migratorius)* (map: Appendix, p. 28)

A fairly common and widespread breeder recorded in 55 (74.3%) of 74 atlas blocks (15 PO, 6 PR, 34 CO). Representative nesting areas were Indian Spring (7500', CF, 6/24/93, DS), Dexter Canyon (7000', ON, 6/12/91; PJM, DS), Crooked Meadows (8800', CF, 7/01/95,

DS), near Sentinel Meadow (9200', CF, 7/16/94, DS), Sentinel Meadow Research Natural Area (9600', FL, 7/30/95; PJM, AD), Sawmill Meadow (9100', CF, 7/07/93; PJM, DJK), Alpers Owens River Ranch (7100', NE, 6/07/94, DS), ridge NW of Little Antelope Valley (7400', NE, 6/16/94, PJM), E of upper Wilfred Canyon (9800', Z, 7/14/94, DS), and Owens Gorge (6700', NY, 7/22/92, PJM, DS; 6400', P, 6/23/95, DS). High elevation breeding limits are about 10,500 ft in the White Mountains (Johnson and Cicero 1986) and 10,300 ft in the eastern Sierra (Gaines 1988). American Robins generally required moist foraging grounds and mud for building nests. Consequently, they usually concentrated their activities along streams and in wet meadows and bred locally in pinon pine woodlands, aspen groves, and Jeffrey and lodgepole pine forests adjacent to or within commuting distance of these moist habitats. Robins were seen collecting insects on the edge of a stream surrounded by sagebrush scrub and then flying out of sight in the direction of stands of Jeffrey pines a mile or more away, presumably where they had a nest. The presence of very stub-tailed and poorly flying young in tall bitterbrush scrub accompanied by an adult that probably foraged along a nearby stream suggested that robins sometimes nest in large shrubs well away from trees. Elsewhere robins appeared to be breeding in an open stand of large Jeffrey pines on the edge of sagebrush scrub with scattered currant bushes that might have satisfied a key requirement not found elsewhere in most dry stands of pine.

Sage Thrasher *(Oreoscoptes montanus)* (map: Appendix, p. 28)

A common and nearly ubiquitous breeder recorded in 61 (82.4%) of 74 atlas blocks (22 PO, 8 PR, 31 CO). Representative breeding locations were Cowtrack Mountain (8600', NY, 6/29/93, DS), near River Spring Lakes (6500', NE, 6/08/95; DLS, AD), plateau W of Taylor Canyon (8000', NE, 7/08/95, DS), 1 mi S of Sentinel Meadow (9300', X, 7/16/94, DS), E of upper Wilfred Canyon (9700', X, 7/05/95, DS), about 0.5 mi NE of Crowley Lake dam (6900', NY, 6/08/95, DS), and 2.5 mi S of Casa Diablo Mountain (6400', NY, 6/07/95; AD, DLS). The high elevation breeding limit in the White Mountains is about 11,000 ft (Johnson and Cicero 1986). Sage Thrashers bred in moderate height to tall stands of desert scrub with open runways and foraging grounds on flat or gently sloping terrain. Thrashers avoided tall and closed stands of scrub. The structure of the scrub habitat appears much more important than the species composition as these thrashers nested in stands of greasewood on alkaline soils and in various combinations of sagebrush, bitterbrush, rabbitbrush, and other shrubs on various soil types.

Loggerhead Shrike *(Lanius ludovicianus)* (map: Appendix, p. 28)

An uncommon and local breeder recorded in 27 (36.5%) of 74 atlas blocks (2 O, 13 PO, 3 PR, 11 CO), primarily in the northern and eastern portions of the study area. Representative breeding locations were Horse peak of Cowtrack Mountain (8800', Z, 6/29/93, DS), NW side of Granite Mountain (8000', FY, 7/11/93, DS), 2 mi SSW of benton Hot Springs (6400', FL, 5/27/92, DS), 1.5 mi E of north end of Crowley Lake (6900', NY, 6/07/95, DS), N of Watterson Troughs (8100', Z, 6/13/94, DS), and Watterson Canyon (7100', NY, 6/14/94, DS). A shrike at about 9000 ft. east of McLaughlin Springs on 30 July 1995 (AD, PJM) probably was an upslope, post-breeding wanderer. High elevation breeding limits are about 7000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 7500 ft east

of the Sierra (Gaines 1988). Shrikes bred in tall stands of sagebrush and bitterbrush, usually on the flats or gently sloping terrain of valleys and dry washes. Adults were seen feeding fledged young in open pinon woodland, but it is unclear if they actually nested in this habitat. Shrikes also were seen foraging in the early successional stages of burns with a sparse ground cover of grass, forbs, and scattered bushes and snags.

European Starling *(Sturnus vulgaris)* (map: Appendix, p. 29)

A fairly common and very local breeder recorded in 11 (14.9%) of 74 atlas blocks (4 O, 4 PO, 0 PR, 7 CO), primarily in Long Valley and secondarily Adobe Valley. Representative breeding locations were lower Dexter Canyon (6800', CF, 6/12/91; PJM, DS), Alpers Owens River Ranch (7100', NY, 6/07/94, DS), Casa Diablo Hot Springs (7200', FL, 6/14/94, PJM), Convict Creek (7000', ON, 6/16/94, PJM), and McGee Creek (6900', CF, 6/23/92, PJM). The high elevation breeding limit in the eastern Sierra is about 7500 ft (Gaines 1988). Starlings foraged primarily in wet meadows and irrigated pastures and nested in natural or woodpecker-excavated cavities in nearby trees or telephone poles or in cavities in buildings.

Plumbeus Solitary Vireo *(Vireo solitarius plumbeus)* (map: Appendix, p. 29)

An uncommon and local breeder recorded in 30 (40.5%) of 74 atlas blocks (16 PO, 7 PR, 7 CO), primarily in pinon-dominated slopes to the east and jeffrey pine forests to the west. Representative breeding locations were 0.5 mi N of McGee Meadow (8800', X, 6/13/91; PJM, DS), 1 mi S of McGee Meadow (8300', FY, 7/17/93, DS), Black Canyon (7100', NE, 6/26/92, PJM), Frazier Canyon (7000', FY, 7/24/91, PJM), Kelty Canyon (6800', X, 6/25/91, DS), Benton Range NE of Black Lake (7200', CN, 6/02/92, DS), Benton Range 1.5 mi NW of Tower Mine (6900', CF, 7/05/93, DS), northeast side Lookout Mountain (7100', P and S, 6/08 & 7/10/94, DS), and Wilfred Canyon (7500', CN, 6/04/92, DS). High elevation breeding limits are about 8200 ft in both the White-Inyo Range (Johnson and Cicero 1986) and the eastern Sierra (Gaines 1988). Plumbeus Solitary Vireos nested in stands of large pinons and locally in aspen groves and in open to moderately closed Jeffrey pine forests with small pines in the understory.

Warbling Vireo *(Vireo gilvus)* (map: Appendix, p. 29)

A fairly common and local breeder recorded in 27 (36.5%) of 74 atlas blocks (3 O, 4 PO, 8 PR, 15 CO), primarily in the central portion of the study area. Representative breeding locations were near Sagehen Spring (8400', NB, 6/17/91, H&PG), Sawmill Meadow (9100'[seen at 9200'], CF, 7/17/93; PJM, DJK), Frazier Canyon (7200', ON, 6/21/91, DS), Alpers Owens River Ranch (7100', ON, 7/07/94, DS), Wilfred Canyon (8000', CF, 7/19/92, DS), and Owens Gorge below Upper Power Plant (5800', NB, 6/22/95, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8500 ft in the eastern Sierra (Gaines 1988). Warbling Vireos bred in riparian forests and woodlands of aspen, black cottonwood, tall willows, and waterbirch and in adjacent dense stands of lodgepole pines.

Orange-crowned Warbler *(Vermivora celata)* (map: Appendix, p. 29)

Breeding status unclear. Seen widely from June onwards, primarily in willow and aspen riparian groves, but little indication of persistent singing, territorial behavior, or other breeding activities. We believe most of the juveniles seen probably moved into the study area from lower elevations, as upslope movement of juveniles and family groups occurs frequently in the Sierra Nevada (J. Steele pers. comm.). Nevertheless, records of an adult carrying nesting material at Wildrose Canyon at 7400 ft on 31 May 1992 (PJM), another performing a distraction display at Frazier Canyon at 7300 ft on 17 June 1993 (PJM), and a singing male, with a downy fledgling nearby, at Frazier Canyon at 7500 ft on 31 July 1995 (PJM) documented at least occasional local breeding within the study area. Virtually all birds seen well, including those exhibiting breeding behaviors, showed characteristics of the widespread breeding race in California, *V. c. lutescens,* not the race, *V. c. orestera,* that is the expected breeding race east of the Cascade-Sierra mountains (Grinnell and Miller 1944). A juvenile showing characteristics of the race *V. c. orestera* seen at Wildrose Canyon on 19 July 1993 may have been a post-breeding wanderer from the White Mountains, the nearest location where this race is known to breed (Johnson and Cicero 1986). The high elevation breeding limit in the White Mountains is about 9500 ft (Johnson and Cicero 1986).

Virginia's Warbler *(Vermivora virginiae)* (map: Appendix, p. 30)

An uncommon and very local breeder recorded in 5 (6.8%) of 74 atlas blocks (2 PO, 0 PR, 3 CO), exclusively in canyons of the Benton Range and the eastern flank of Glass Mountain. Representative breeding locations were Black Canyon (7300', X, 5/29/92, PJM), Kelty Canyon (7000', FL, 7/24/91, PJM; 7800', P, 6/25/91, DS), Frazier Canyon (7500', CF, 6/29/91, DS), 2 mi SSW of Benton Hot Springs (6300', CF, 6/26/92, DS), and Benton Range 1.5 mi NW of Tower Mine (6900', CF and DD, 6/09/93, DS). High elevation breeding limits are about 9500 ft in the White Mountains (Johnson and Cicero 1986) and 8500 ft in the eastern Sierra, where the species breeds sporadically. Virginia's Warblers bred in riparian thickets of willow, wildrose, waterbirch, and black cottonwood with dense ground cover for nest concealment. Birds foraged in riparian trees and brush or in adjacent desert scrub and pinon pines. We did not find these warblers breeding in mountain mahogany woodlands as they do in the White Mountains (Johnson and Cicero 1986) or occasionally in the eastern Sierra (Gaines 1988).

Yellow Warbler *(Dendroica petechia)* (map: Appendix, p. 30)

An uncommon and local breeder recorded in 19 (25.7%) of 74 atlas blocks (9 PO, 3 PR, 7 CO), primarily in the Owens River drainage in Long Valley and the Upper Owens Gorge. Also occurred locally in the Dexter-Adobe Creek drainage on the north side of Glass Mountain and at Pizona springs in the Bodie Hills. Representative breeding locations were Pizona (7100', S, 5/27 & 6/14/92; PJM, ES), upper Dexter Creek (8500', X, 6/29/95, DS), North Canyon (7300', X, 6/28/91, DS), Alpers Owens River Ranch (7100', ON, 6/07/94, DS), McGee Creek (6900', NE, 6/24/92, PJM), upper Owens Gorge (6600', FY, 6/23/92, PJM), and Owens Gorge above Upper Power Plant (6100', X, 6/23/95, DS). High elevation breeding limits are about 8200 ft, at least formerly, in the White Mountains (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Johnson and Cicero (1986)

reported June records for 9000 ft in the White Mountains but there is a similar record for 9900 ft at a site in the sub-alpine of the eastern Sierra where long-term studies show the species does not breed (Gaines 1988). Yellow Warblers usually nested in the densest willow-wildrose riparian thickets. As cowbird parasitism was high for this species, cowbirds may have excluded it from some types of riparian vegetation where it formerly bred.

Yellow-rumped (Audubon's) Warbler *(Dendroica coronata auduboni)* (map: Append, p. 30)

A common and fairly widespread breeder recorded in 40 (54.0%) of 74 atlas blocks (2 O, 16 PO, 6 PR, 18 CO), primarily in the central portion of the study area. Representative breeding locations were 1.5 mi SE of Devil's Punchbowl (8000', CF, 7/10/93, DS), Crooked Meadows (8800', FL, 7/11/95, DS), near Taylor Springs (7100', FY, 7/16/93, DS), Bald Mountain Spring (8200', FY, 7/16/94, ES), E flank of Glass Mountain (10,400', Z, 7/21/93, DS), Sentinel Meadow Research Natural Area (10,100', FL, 7/19/93, DJK, PJM; 10,000', CF, 7/19/94, DS), Sawmill Meadow (9200', CF, 7/17/93; PJM, DJK), S of Alpers Owens River Ranch (7300', CN, 6/08/94, DS), and SW of Little Antelope Valley (7400', FY, 7/12/94, PJM). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,300 ft in the eastern Sierra (Gaines 1988). Yellow-rumped Warblers bred in aspen groves; Jeffrey pine, lodgepole pine, and lodgepole-limber pine forests; and, locally, in the cooler and shadier stands of pinons in the upper pinon zone where these pines mix with mountain mahogany. These warblers may also occasionally nest in whitebark pines near the top of Glass Mountain.

Black-throated Gray Warbler *(Dendroica nigrescens)* (map: Appendix, p. 30)

A fairly common and local breeder recorded in 21 (28.4%) of 74 atlas blocks (1 O, 10 PO, 3 PR, 8 PR), primarily in the eastern portion of the study area. Representative breeding locations were Granite Mountain (8500', Z, 7/03/93, DS; 7700', FY, 7/03/93, DS), Black Mountain (7200', FY, 6/28/92, DS), Benton Range NE of Black Lake (7600', NE, 6/02/92, DS), Frazier Canyon (7500', FY, 7/31/95; PJM, DJK), 2 mi SSW of Benton Hot Springs (6700', CF, 6/26/92, DS), about 1.5 mi ESE of mouth of O'Harrel Canyon (8000', Z, 6/10/94, DS), Wilfred Canyon (7800', CF, 6/04/92, DS), and near Deer Spring (7600', CF, 7/02/93, DS). High elevation breeding limits are about 9500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft east of the Sierra (Gaines 1988). Black-throated Gray Warblers were found locally in stands of large pinons and occasionally where these pines mix with mountain mahogany.

MacGillivray's Warbler *(Oporornis tolmiei)* (map: Appendix, p. 31)

An uncommon and local breeder recorded in 19 (25.7%) of 74 atlas blocks (11 PO, 1 PR, 7 CO), primarily in the central portion of the atlas area. Representative breeding locations were lower Dexter Canyon (6800', FL, 7/20/92, PJM), spring W of O'Harrel Canyon (7300', CF, 6/27/94, DS), Black Canyon (7300', CF, 6/26/92, PJM), Frazier Canyon (7600', FY, 7/31/95; PJM, AD), Wilfred Canyon (7400', DD, 6/04/92, DS; 8400', CF, 7/19/92, DS; 9000', CF, 7/19/92, DS), and Owens Gorge below Upper Power Plant (5900', X, 6/01/95, DS). High elevation breeding limits are about 9500 ft in the White Mountains

(Johnson and Cicero 1986) and 8000 ft, perhaps occasionally to 10,300 ft, in the eastern Sierra (Gaines 1988). MacGillivray's Warblers bred in wildrose thickets in the understory or edge of willow and aspen riparian groves along streams, springs, and seeps.

Common Yellowthroat *(Geothlypis trichas)* (map: Appendix, p. 31)

A very rare and very local breeder recorded in 4 (5.4%) of 74 atlas blocks (2 PO, 1 PR, 1 CO). Representative breeding locations were Black Lake (6400', CF, 6/27/92, DS), Hot Creek Fish Hatchery (7000', A, 6/24/92, PJM), Owens Gorge (6600', Z, 6/23/92, PJM), and Rock Creek (6800', Z, 5/31/92, PJM). There are single June records of singing males, apparently unmated, for 6700 ft in the White Mountains (Johnson and Cicero 1986) and 6500 ft near Mono Lake (Gaines 1988), indicating that our records for the Glass Mountain region may be at the upper elevational breeding limit for this species in California. Common Yellowthroats were found in freshwater cattail-tule marsh at Black Lake or locally in patches of such marsh mixed with willow riparian in the Owens River drainage.

Western Tanager *(Piranga ludoviciana)* (map: Appendix, p. 31)

A fairly common and widespread breeder recorded in 56 (75.7%) of 74 atlas blocks (1 O, 21 PO, 14 PR, 21 CO). Representative breeding locations were North Canyon (7800', FY, 7/20/92, DS), south end of Mono Craters (8300', CF, 7/14/93, DS), small meadow south of Crooked Meadows (8800', FY, 7/30/95; PJM, AD), Taylor Springs area (7300', CF, 7/16/93, DS), Black Mountain (8200', CF, 6/28/92, DS), Sentinel Meadow Research Natural Area (9200', CF, 7/19/93, PJM, DJK; 9400', X, 7/12/95, DS), slopes above McGee Meadow (9200', CF, 7/18/93, DS), Kelty Canyon (7200', CF, 6/21/91, DS), north side of Lookout Mountain (7800', CN, 6/15/94, MJM), ridge S of Little Antelope Valley (7700', CF, 7/13/94, PJM), Long Chance Mine (7000', CF, 6/29/92, DS), W of Owens Gorge (6700', CF, 7/04/94, DS), and Owens Gorge above Upper Power Plant (6200', X, 6/23/95, DS). High elevation breeding limits are about 9800 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8900 ft in the eastern Sierra (Gaines 1988). Western Tanagers bred in aspen groves, pinon pine woodland, and jeffrey pine forest and, locally, in open lodgepole pine forest with currant bushes in the understory. In pinon pine woodland, tanagers appeared to prefer the cooler and shadier confines of moderately dense groves, especially in canyons and on north-facing slopes; proximity to riparian groves with water and berries appeared to be desired but not required.

Black-headed Grosbeak *(Pheucticus melanocephalus)* (map: Appendix, p. 31)

A fairly common and fairly widespread breeder recorded in 35 (47.3%) of 74 atlas blocks (1 O, 15 PO, 10 PR, 10 CO), primarily in the eastern and central portion of the study area. Representative breeding records were Dexter Canyon (7000', NB, 6/12/91; DS, PJM), below Crooked peak of Sagehen Peak (8700', X, 6/09/95, DS), N of McLaughlin Springs (8800', Z, 6/23/92; H&PG), North Canyon (7900', CF, 7/20/92, DS), lower Black Canyon (6700', NE, 6/25/94, DS), Frazier Canyon (7600', FY, 7/31/95; PJM, AD), 2 mi SSW of Benton Hot Springs (6300', FY, 6/26/92, DS), mouth of Wilfred Canyon (7300', FY, 7/14/92, DS), Wildrose Canyon (7600', NY, 6/12/95; AD, DLS), Banner Ridge (8300', CF, 7/05/95; DJK, DoK), and Owens Gorge below Upper Power Plant (5800', S, 6/1&22/95, DS). High

elevation breeding limits are about 8900 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Black-headed Grosbeaks bred in aspen and tall willow riparian groves but also very locally in pure pinon pine woodland. While feeding young, adults sometimes flew hundreds of yards out from nesting habitats to forage in adjoining stands of tall desert scrub bushes.

Lazuli Bunting *(Passerina amoena)* (map: Appendix, p. 32)

An uncommon and local breeder recorded in 28 (37.8%) of 74 atlas blocks (17 PO, 8 PR, 3 CO). Representative breeding locations were lower Dexter Canyon (6800', FY, 7/20/92, PJM), E of Johnny Meadow (8400', Z, 7/11/95, DS), near Bald Mountain Spring (8200', X, 7/15/94, ES), Frazier Canyon (7200', FY, 7/31/95; PJM, AD), Wildrose Canyon (7500', FY, 7/23/91, PJM), Moran Spring (6800', A, 6/03/92, DS), Mammoth Creek (7200', P, 7/13/95, DS), and Owens Gorge below Upper Power Plant (5800', S, 6/1&22/95, DS). The Owens Gorge supported by far the largest concentrations in the study area. For example, about 28 buntings were counted along about a 2 mi stretch of the gorge, both above and below the Upper Power Plant, on 22-23 June 1995 (DS). High elevation breeding limits are about 8200 ft (rarely to 9000') in the White Mountains (Johnson and Cicero 1986) and 8000 ft in the eastern Sierra (Gaines 1988). Lazuli Buntings bred in willow-wildrose thickets along streams and meadow edges. Birds sang from or sought cover in riparian thickets but also foraged extensively in, or well out from, the edges in brush and herbaceous vegetation.

Indigo Bunting *(Passerina cyanea)* (map: Appendix, p. 32)

Our only record of this species was of a singing male at 7100 ft in Wet Fork Black Canyon on 26 June 1992 (PJM). Although this may have been an out-of-place migrant, it is possible that it could have tried to breed locally. An apparent hybrid Lazuli X Indigo Bunting has been observed at Mono Lake (Gaines 1988).

Green-tailed Towhee *(Pipilo chlorurus)* (map: Appendix, p. 32)

A common and nearly ubiquitous breeder recorded in 72 (97.3%) of 74 atlas blocks (13 PO, 15 PR, 44 CO). Representative breeding locations were W of Cowtrack Mountain (7800', NE, 6/24/93, DS), west side of Mono Craters (7500', NE, 6/27/93, DS), near Big Sand Flat (7900', NE, 6/25/95, DS), north side of Granite Mountain (7900', NE, 6/29/93, BB), Johnny Meadow (8500', CF, 7/18/93; PJM, DJK), Sentinel Meadow Research Natural Area (10,100', Z, 7/19/94, DS), Black Mountain (8600', CF, 6/28/92, DS), near Deadman Creek 1 mi W of Big Springs Campground (7400', NE, 5/28/92, DS), Wilfred Canyon (8100', NE, 6/04/92, DS), E of upper Wilfred Canyon (9400', CF, 7/17/94, DS; 9900', X, 7/17/94, DS), N of Watterson Troughs (8300', NE, 6/13/94, DS), SW of Little Antelope Valley (7300', NE, 7/12/94, PJM), Banner Ridge area (8000', NE, 6/12/94, DS), and Benton Range about 1 mi N of Tower Mine (6500', NE, 6/09/93, DS). A juvenile at 10,800 ft near the top of Glass Mountain on 21 July 1993 (DS) probably was an upslope wanderer. High elevation breeding limits are about 10,000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 9500 ft in the eastern Sierra (Gaines 1988). Green-tailed Towhees bred in pinon pine woodland with a brushy understory, open mountain mahogany woodland, tall mixed desert scrub, and the tall brushy edges of riparian thickets. Although Green-tailed Towhees were absent from extensive

areas of low to moderate stature sagebrush, rabbitbrush, and bitterbrush, they did occur widely in tall mixed sagebrush and bitterbrush thickets. They were especially numerous in tall brush in drainages and along the edges of riparian thickets.

Rufous-sided Towhee *(Pipilo erythrophthalmus)* (map: Appendix, p. 32)

A fairly common and fairly widespread breeder recorded in 42 (56.8%) of 74 atlas blocks (16 PO, 9 PR, 17 CO). Representative breeding locations were E of Indian Spring (7800', CF, 6/24/93, DS), Wet Fork Black Canyon (7100', NE, 5/29/92, PJM), upper Wet Fork Black Canyon (9000', X, 7/11/95; AD, DLS), Klondike Canyon (7200', CF, 6/28/92, DS), Kelty Canyon (8000', DD, 6/25/91, DS; 8400', P, 6/25/91, DS), Frazier Canyon (7100', FL, 6/12/95; PJM, AD, DLS), mouth of Wilfred Canyon (7300', FY, 7/14/92, DS), east slope of Benton Range (6900', FY, 6/09/93, DS), N of Watterson Troughs (8200', CF, 6/13/94, DS), and Owens Gorge above Upper Power Plant (6100', X, 6/23/95, DS). High elevation breeding limits are about 9000 ft in the White-Inyo Range (Johnson and Cicero 1986) and 7500 ft east of the Sierra (Gaines 1988). Rufous-sided Towhees bred primarily in willow and aspen thickets with a dense brushy understory, particularly of wildrose. They also were sometimes numerous in extensive, arborescent mountain mahogany thickets on flats or in arborescent thickets of sagebrush, bitterbrush, and wildrose in canyon bottoms. Rufous-sided Towhees also occurred sparingly in pinon pine woodland mixed with tall bitterbrush and mountain mahogany. All these habitats required a well-developed leaf litter layer for foraging.

Chipping Sparrow *(Spizella passerina)* (map: Appendix, p. 33)

A fairly common and widespread breeder recorded in 51 (68.9%) of 74 atlas blocks (16 PO, 10 PR, 25 CO). Representative breeding locations were canyon on northeast side of Granite Mountain (7100', NY, 7/11/93, DS), Adobe Hills E of Adobe Lake (6500', CN, 6/07/93, DS), Crooked Meadows (8800', NY, 7/11/95, DS), Sentinel Meadow Research Natural Area (10,100', CF, 7/19/93; DJK, PJM), near south peak of Glass Mountain (10,800'[seen at 11,000'], CF, 7/21/93, DS), S of Alpers Owens River Ranch (7100', NY, 7/10/94, DS), SW of Little Antelope Valley (7300', FY, 7/12/94, PJM), south flank of Glass Mountain (7800', NE, 6/11/94, DS), Banner Ridge area (8300', CF, 7/13/94, DS), south side of Casa Diablo Mountain (7400', NE, 6/07/95; AD, DLS). High elevation breeding limits are about 10,400 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,000 ft in the eastern Sierra (Gaines 1988). Chipping Sparrows bred in pinon pine and mountain mahogany woodlands and open Jeffrey pine, lodgepole pine, lodgepole-limber pine, and whitebark pine forests. Chipping Sparrows occurred very patchily in these woodlands and forests, where they appeared to prefer stands with a ground cover of grasses and herbaceous annuals that provide an abundant seed source.

Brewer's Sparrow *(Spizella breweri)* (map: Appendix, p. 33)

A very common and nearly ubiquitous breeder recorded in 72 (97.3%) of 74 atlas blocks (4 PO, 15 PR, 53 CO). Representative breeding locations were W of Mono Craters (6900', NE, 6/20/93, DS), Dutch Petes Ranch (6400', CF, 6/01/92, DS), Frazier Canyon

(7200' NE, 6/12/95; PJM, AD), W of Taylor Canyon (7900', NE, 7/08/95, DS), near Deadman Creek 1 mi W of Big Springs Campground (7400', NE, 5/28/92, DS), near McLaughlin Spring (9300', CF, 7/16/94, DS), 1.5 mi W of mouth of O'Harrel Canyon (7000', NE, 6/06/94, DS), E of upper Wilfred Canyon (9800', CF, 7/17/94, DS), N of Watterson Troughs (8400', NE, 6/13/94, DS), near Clover Patch (7900', NE, 7/06/95, DS), Chidago Flat (6700', CF, 6/03/92, DS), Casa Diablo Mountain (7200', NE, 6/06/95, PJM; 6200', P, 6/07/95; AD, DLS). A juvenile at 10,800 ft near the top of Glass Mountain on 21 July 1993 (DS) probably was an upslope wanderer. High elevation breeding limits are about 10,400 ft in the White-Inyo Range (Johnson and Cicero 1986) and 9200 ft in the eastern Sierra (Gaines 1988). Brewer's Sparrows bred in large or tiny expanses of desert scrub of almost any species composition or structure except tall, very dense stands of sagebrush and bitterbrush.

Vesper Sparrow *(Pooecetes gramineus)* (map: Appendix, p. 33)

An uncommon and fairly widespread breeder recorded in 43 (58.1%) of 74 atlas blocks (25 PO, 10 PR, 8 CO). Representative breeding locations were W of Mono Craters (7200', CF, 7/09/93, DS), near Adobe Lake (6500', CF, 7/01/93, DS), Crooked Meadows (8800', S, 6/29 & 7/11/95, DS), McLaughlin Springs (8600', CF, 7/23/93, DS), 1 mi S of Sentinel Meadow (9300', X, 7/16/94, DS), south flank of Glass Mountain (7600', CF, 7/03/94, DS), E of upper Wilfred Canyon (9700', T and P, 7/05/95, DS), west slope of Benton Range 1.5 mi E of Wildrose Canyon (7600', CF, 6/08/93, DS), and Little Antelope Valley (7300', FL, 7/13/94, PJM). High elevation breeding limits are about 10,500 ft in the White Mountains (Johnson and Cicero 1986) and 9000 ft east of the Sierra (Gaines 1988). Small numbers of Vesper Sparrows occurred around dry to mesic meadows bordered by open desert scrub usually dominated by sagebrush and rabbitbrush. They were sometimes locally very numerous where sagebrush, rabbitbrush, and extensive grass intermixed in stands regenerating after fire. The presence of at least moderate amounts of grass seemed to be important to this species.

Black-throated Sparrow *(Amphispiza bilineata)* (map: Appendix, p. 33)

A fairly common and local breeder recorded in 30 (40.5%) of 74 atlas blocks (10 PO, 12 PR, 8 CO). Black-throated Sparrows bred primarily on the low slopes around Adobe and Long valleys and in the Benton Range, and numbers generally increased from west to east. Representative breeding locations were near Adobe Lake (6500', NY, 6/07/93, DS), 2.5 mi NW of Benton Hot Springs (7200', CF, 6/27/92, DS), 2 mi SSW of Benton Hot Springs (6200', CF, 6/26/92, DS), along McLaughlin Creek (8200', S, 7/05/94, DS), W of O'Harrel Canyon (7000', CF, 7/09/94, DS), 1.5 mi N of Watterson Troughs (8700', P, 6/13/94, DS), 1 mi SW of Little Alkali Lake (7000', CF, 7/02/94, DS), and Owens Gorge below Upper Power Plant (5900', X, 7/04/94, DS). High elevation breeding limits are about 6800 ft in the White-Inyo Range (Johnson and Cicero 1991) and 7500 ft east of the Sierra (Gaines 1988). Black-throated Sparrows used low-stature, open mixed desert scrub, whether an expression of soil type (often rocky) or regeneration after fire. They generally did not occur on the low flats dominated by sagebrush, rabbitbrush, bitterbrush, or greasewood, but instead on slopes above where sagebrush, rabbitbrush, and bitterbrush mix with other shrubs such as ephedra, cotton horsebrush, and Shockley's desert thorn.

Sage Sparrow *(Amphispiza belli)* (map: Appendix, p. 34)

A fairly common and widespread breeder recorded in 51 (68.9%) of 74 atlas blocks (2 O, 16 PO, 21 PR, 14 CO). Numbers of breeding birds in the study area appeared to increase from west to east. Representative breeding locations were W of Mono Craters (6900', CF, 6/20/93, DS), W of Big Sand Flat (7800', NE, 6/25/95, DS), peak 1 mi ENE of Gaspipe Springs (8500', CF, 7/13/93, DS), Horse peak of Cowtrack Mountain (8800', X, 6/29/93, DS), Sagehen Meadow (8600', X, 6/23/92, H&PG), near Adobe Lake (6500', CF, 6/07/93, DS), Watterson Canyon (7200', NE, 6/14/94, DS), 1.5 mi N of Watterson Troughs (8700', P, 6/13/94, DS), 1 mi SE of Deer Spring (7100', NE, 6/16/94, DS), and 1.25 SW of Casa Diablo Mountain (6900', FL, 6/09/95; AD, DLS). Sage Sparrows seen at 9300 ft about 1 mi SE of McLaughlin Springs on 16 July 94 (DS) and at 9700 ft E of Upper Wilfred Canyon on 17 July 1994 (DS) were probably upslope wanderers. High elevation breeding limits are about 7500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 8000 ft east of the Sierra (Gaines 1988). Habitat use of the Sage Sparrow overlapped widely with that of the Black-throated Sparrow, but, unlike the latter species, the Sage Sparrow also was very numerous on valley floors and flats dominated by sagebrush and rabbitbrush of low to moderate stature and closure.

Savannah Sparrow *(Passerculus sandwichensis)* (map: Appendix, p. 34)

A common and local breeder recorded in 19 (25.7%) of 74 atlas blocks (7 PO, 0 PR, 12 CO), primarily in Adobe and Long valleys. Representative breeding locations were wetlands N of stone corral N of Adobe Ranch (6500', CF, 6/30/93, DS), Indian Meadows (6600' CF, 6/24/91, DS), Black Lake (6400', CF, 6/02/92, DS), Upper Owens River (6800', CF, 6/09/94, DS), near Casa Diablo Hot Springs (7200', X, 6/14/94, PJM), Little Hot Creek (7000', FY, 7/21/94, PJM), Little Alkali Lake (6900', CF, 6/15/94, DS), and west side of Crowley Lake (6800', NE, 6/11/91, PJM). The high elevation breeding limit in the eastern Sierra is about 7400 ft (Gaines 1988). Savannah Sparrows bred in wet meadows and low sedge marsh.

Fox Sparrow *(Passerella iliaca)* (map: Appendix, p. 34)

A fairly common and local breeder recorded in 19 (25.7%) of 74 atlas blocks (1 O, 9 PO, 2 PR, 8 CO), primarily in the central portion of the study area in drainages of Glass Mountain. Representative breeding locations were Dexter Canyon (7000', X, 6/12/91; PJM, DS), Black Canyon (7200', FL, 6/26/92, PJM), Black Mountain (8600', FL, 6/28/92, DS), near McGee Meadow (8800', FY, 7/18/93, JH), west flank of Glass Mountain E of O'Harrel Canyon (10,600', X, 6/13/93; S. Miller, R. Knapp), near Sawmill Meadow (9200', CF, 6/28/91, DS), Big Springs Campground (7400', FL, 7/21/93; PJM, DJK), and peak W of Glass Mountain Ridge (9600', X, 7/03/94, DS). High elevation breeding limits are about 9600 ft in the White-Inyo Range (Johnson and Cicero 1986) and 9500 ft in the eastern Sierra (Gaines 1988). Fox Sparrows bred in willow and aspen riparian thickets with a dense understory, particularly of wildrose, and in extensive, usually relatively closed, stands of mountain mahogany. These habitats had a well-developed leaf litter layer for foraging.

Song Sparrow *(Melospiza melodia)* (map: Appendix, p. 34)

A common and local breeder recorded in 30 (40.5%) of 74 atlas blocks (10 PO, 5 PR, 15 CO). Representatives breeding locations were Indian Spring (7500', CF, 6/24/93, DS), Baxter Spring (7600', CF, 6/09/95, DS), Big Springs Campground (7300', CF, 6/15/94, MJM), Alpers Owens River Ranch (7100', CF, 6/28/94, DS), Convict Creek 0.5 mi E of Hwy 395 (6900', NE, 7/02/94, DS), Dexter Creek (8700', X, 6/23/92, H&PG), near Sawmill Meadow (8700', Z, 6/28/91, DS; 9200', X, 7/17/93; PJM, DJK), and Owens Gorge below Upper Power Plant (5900'[seen at 5800'], CF, 6/22/95, DS). High elevation breeding limits are about 9600 ft in the White Mountains (Johnson and Cicero 1986) and 9500 ft in the eastern Sierra (Gaines 1988). Song Sparrows bred primarily in dense riparian willow-wildrose thickets near running water. Willows are not required as Song Sparrows were found along some small streams where the cover consisted only of wildrose, nettles, tall grass, and low rushes.

White-crowned Sparrow *(Zonotrichia leucophrys)* (map: Appendix, p. 35)

A fairly common and very local breeder recorded in 4 (5.4%) of 74 atlas blocks (0 PO, 0 PR, 4 CO), all on Glass Mountain. Representative breeding locations were Crooked Meadows (8800', NY, 6/29/95, DS), upper Dexter Creek (8500', X, 6/29/95, DS), Wet Meadow (8400', FL, 7/18/93; PJM, DJK), McLaughlin Springs (8700', NY, 7/05/94, DS), Sawmill Meadow (9100', FL, 7/17/93; DJK, PJM), and Kelty Meadows (9000', X, 6/17/92; ES, MMc). Elevational breeding limits are from about 8200 to 10,500 ft in the White Mountains (Johnson and Cicero 1986) and from 8500 (formerly 7000') to 11,000 ft in the eastern Sierra (Gaines 1988). White-crowned Sparrows bred around wet meadows where nesting cover consisted of low willows, small lodgepole pines, and sagebrush or *Ribes* scrub.

Dark-eyed (Oregon) Junco *(Junco hyemalis thurberi)* (map: Appendix, p. 35)

A very common and local breeder recorded in 28 (37.8%) of 74 atlas blocks (11 PO, 3 PR, 14 CO), primarily in the central portion of the study area, particularly around Glass Mountain. Representative breeding locations were Black Canyon (7200', FL, 6/26/92, PJM), Crooked Meadows (8800', NE, 6/18/91, H&PG), Wet Meadow (8600', NE/NY, 7/21/92, DS), slopes W of McGee Meadow (8600', NE, 6/13/91; PJM, DS), Alpers Canyon (7400', CF, 7/15/92, DS), Sentinel Meadow Research Natural Area (9600', CF, 7/30/95; AD, PJM; 10,100', FL, 7/19/93; PJM, DJK), south peak Glass Mountain (11,000', P/A, 7/21/93, DS), Sawmill Meadow (9100', NY, 6/28/91, DS), W of O'Harrel Canyon (7300', CF, 7/09/94, DS), and Wilfred Canyon (8600', NE, 7/19/92, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,600 ft in the eastern Sierra (Gaines 1988). Juncos preferred open foraging areas with sparse or low grass and forb cover. Nests were on the ground concealed by such cover or other debris, such as downed logs. Juncos were most numerous around wet meadows and in adjacent aspen groves and lodgepole pine forests. Juncos also occurred in moderately dense stands of lodgepole and limber pines at upper elevations and in whitebark pine on the top of Glass Mountain. They occurred sparingly in shady groves of tall pinons and in the upper pinon zone where these pines mixed with mountain mahogany. Juncos were rare in Jeffrey pine forests, except on the borders of aspen groves and wet meadows.

Dark-eyed (Gray-headed) Junco *(Junco hyemalis caniceps)* (map: Appendix, p. 35)

A very rare and questionably very local breeder recorded in 1 (1.4%) of 74 atlas blocks (1 PO, 0 PR, 0 CO). Our only record of Gray-headed Junco was of one singing male in a shady second-growth Jeffrey pine forest with lots of sapling trees at 8200 ft about 1 mi N of McGee Meadow on 17 July 1993 (DS). Nearby, the Gray-headed Junco is a rare summer resident in the White Mountains from about 7400 to 10,500 ft (Johnson and Cicero 1986).

Red-winged Blackbird *(Agelaius phoeniceus)* (map: Appendix, p. 35)

A common and local breeder recorded in 26 (35.1%) of 74 atlas blocks (2 O, 3 PO, 2 PR, 21 CO), primarily in Adobe Valley and the Long Valley-Owens River drainage. Representative breeding locations were wetlands N of stone corral N of Adobe Ranch (6500', NE and NY, 6/04/93, DS), River Spring Lakes (6500', NE, 6/14/91; PJM, DS), S of Ford Spring (7100', NE, 7/09/94, DS), Watterson Meadow (6700', ON, 5/30/92, DS), Alpers Owens River Ranch (7100', NE, 6/07/94, DS), Casa Diablo Hot Springs (7200', CF, 6/14/94, PJM), Little Alkali Lake (6900', NE and NY, 6/15/94, DS), west side of Crowley Lake (6800', NE, 6/11/91, PJM), and Owens Gorge below Upper Power Plant (5800', CF, 6/22/95, DS). High elevation breeding limits are about 8200 ft in the eastern Sierra (Gaines 1988). Red-winged Blackbirds bred in wet sedge meadows and lake- or streamside freshwater cattail and tule marshes.

Western Meadowlark *(Sturnella neglecta)* (map: Appendix, p. 36)

An uncommon and local breeder recorded in 22 (29.7%) of 74 atlas blocks (1 O, 6 PO, 10 PR, 6 CO), primarily in the Adobe Valley and Long Valley areas. Representative breeding locations were Dutch Petes Ranch (6400', CF, 6/01/92, DS), Upper Owens River (6800', CF, 6/09/94, DS), Hot Creek Fish Hatchery (7100', CF, 6/14/94, PJM), Little Alkali Lake (6900', FL, 6/15/94, DS), and Watterson Troughs (7700', Z, 6/13/94, DS). The high elevation breeding limit in the eastern Sierra is about 7500 ft (Gaines 1988). Western Meadowlarks bred in dry to mesic alkali, grassy, or sedge meadows, with or without a mixture of rabbitbrush and sagebrush.

Yellow-headed Blackbird *(Xanthocephalus xanthocephalus)* (map: Appendix, p. 36)

A common and very local breeder recorded in 13 (17.6%) of 74 atlas blocks (2 O, 5 PO, 1 PR, 7 CO), primarily in Adobe and Long valleys. Representative breeding locations were Black Lake (6400', CF, 6/02/92, DS), Upper Owens River (6800', CF, 7/01/94, DS), Little Alkali Lake (6900', NE, 6/08/95, DS), Hot Creek Fish Hatchery (7100', CF, 6/14/94, PJM), and marshy pond near Whitmore Hot Springs/Pool (7000', CF, 7/02/94, DS). The high elevation breeding limit in the eastern Sierra is about 7600 ft (Gaines 1988). Yellow-headed Blackbirds bred in tule and cattail marshes and wet sedge meadows on the borders of freshwater lakes, alkali lakes, and reservoirs, and on the floodplains of streams and rivers.

Brewer's Blackbird *(Euphagus cyanocephalus)* (map: Appendix, p. 36)

A locally common and widespread breeder recorded in 51 (68.9%) of 74 atlas blocks (6 O, 11 PO, 5 PR, 35 CO). Representative breeding locations were W of Mono Craters (7200', CF, 7/09/93, DS), Indian Spring (7600', NE, 6/24/93, DS), Gaspipe Springs (8000',

NE, 6/25/93, DS), upper Sagehen Meadow (8400', NE, 6/26/95, DS), Crooked Meadows (8800', Z, 6/29/95, DS), Dutch Petes Ranch (6400', CF, 6/01/92, DS), Big Springs Campground (7200', FY, 7/21/93; DJK, PJM), Little Antelope Valley (7100', CF, 6/16/94, PJM), Clover Patch (7800', CF, 7/06/95, DS), and Layton Springs on NE shore of Crowley Lake (6800', NE and NY, 6/07/95, DS). The high elevation breeding limit in the eastern Sierra is about 8000 ft (Gaines 1988); in the White Mountains, occurs to 9500 ft where thought to be a post-breeding wanderer (Johnson and Cicero 1986). Brewer's Blackbirds nested in loose colonies in sagebrush, rabbitbrush, or other shrubs close to foraging sites in wet sedge meadows and along the edges of streams, lakes, and seeps.

Brown-headed Cowbird *(Molothrus ater)* (map: Appendix, p. 36)

A fairly common and nearly ubiquitous breeder recorded in 62 (83.8%) of 74 atlas blocks (29 PO, 18 PR, 15 CO). Representative breeding locations were wetlands N of stone corral N of Adobe Ranch (6500', NE, 6/04/93, DS), mouth of Frazier Canyon (6900', NY, 6/29/91, DS), 2 mi SSW of Benton Hot Springs (6300', FL, 6/27/92, DS), Crooked Meadows (8800', Z, 6/18/91, H&PG), near Sawmill Meadow (9000', Z, 6/28/91, DS), W of O'Harrel Canyon (7200', NY, 7/09/94, DS), Wilfred Canyon (8100', NE, 6/04/92, DS), SW of Little Antelope Valley (7300', FL, 7/12/94, PJM), near Deer Spring (7300', FL, 7/02/93, DS), and Owens Gorge below Upper Power Plant (5900', Z, 7/04/94, DS). Host species were Blue-gray Gnatcatcher, Yellow Warbler, Green-tailed Towhee, and Red-winged Blackbird, and one fledgling cowbird was fed by both a Plumbeus Solitary Vireo and a Cassin's Finch (PJM). Of 8 instances of parasitism recorded by one observer, 5 involved the Blue-gray Gnatcatcher (DS). The high elevation breeding limit in the eastern Sierra is about 10,100 ft (Gaines 1988); in the White-Inyo Range, cowbirds occur rarely to 11,600 ft, but the upper limits of breeding are unknown. Although cowbirds were found in most habitats within their elevational range, they were most numerous and conspicuous, in courtship and chasing, around riparian thickets and groves, springs, and meadow edges, particularly in the vicinity of cattle or sheep. They generally were uncommon to rare in forested regions far from the aforementioned habitats. Foraging birds were seen on or around cattle and sheep and in meadows and along lakeshores and stream edges.

Northern (Bullock's) Oriole *(Icterus galbula bullockii)* (map: Appendix, p. 37)

A rare and very local breeder recorded in 8 (10.8%) of 74 atlas blocks (2 O, 2 PO, 1 PR, 5 CO), principally near Tom's Place and in the Upper Owens Gorge. Representative breeding locations were Pizona (6900', X, 6/14/92, ES), North Canyon (7300', X, 6/28/91, DS; Z, 7/20/92, DS), Rock Creek (6800', FY, 6/22/92, PJM), and Upper Owens Gorge (5800-6400', CF and UN, 6/22&23/95, DS). Most nests were in quaking aspen or black cottonwood groves, but orioles foraged widely in these trees, willows, and in herbaceous vegetation near the ground.

Scott's Oriole *(Icterus parisorum)* (map: Appendix, p. 37)

A very rare and questionably very local breeder recorded in 2 (2.7%) of 74 atlas blocks (2 PO, 0 PR, 0 CO). The only sightings were of (1) two males (one singing) at about 6400 ft on the east slope of the Benton Range about 2 mi SSW of Benton Hot Springs on 26

June 1992 (DS) and (2) one male at about 8100 ft on the south flank of Glass Mountain about 1.5 mi ESE of the mouth of O'Harrel Canyon on 10 June 1994 (DS). The former birds were in tall desert scrub on the edge of pinon pine woodland with a few scattered junipers; the latter bird was in a mixed woodland of pinon pine, juniper, and mountain mahogany. The only other known record of this oriole from the study area is of a male seen in flight through the pinons at the top of the grade on the road going across the Benton Range on 16 June 1937 (J. Grinnell, field notes on file at Museum of Vertebrate Zoology, Berkeley). The high elevation breeding limit in the Coso Mountains, Inyo County, is about 8000 ft (Grinnell and Miller 1944).

Cassin's Finch *(Carpodacus cassinii)* (map: Appendix, p. 37)

A very common and widespread breeder recorded in 60 (81.1%) of 74 atlas blocks (1 O, 12 PO, 23 PR, 25 CO). Representative breeding locations were Dry Creek NE of Mono Mills (7000', FL, 7/12/93, DS), Granite Mountain (8200', CN, 6/10/93, DS), Sagehen Spring (8300', NB, 6/17/91, H&PG), North Canyon (7300', NB, 6/28/91, DS), Black Mountain (8200', ON, 6/28/92, DS), McLaughlin Springs (8700', ON, 7/23/93, DS), Sentinel Meadow Research Natural Area (9400', FY, 7/30/95; AD, PJM), south peak Glass Mountain (11,000, ON, 7/14/95, DS), SE of peak of Lookout Mountain (8200', CN, 6/15/94, MJM), 1 mi ESE of mouth of O'Harrel Canyon (7700', ON, 6/09/94, DS), NW of Little Antelope Valley (7500', CN, 6/16/94, PJM), S of Deer Spring (7200', CN, 6/16/94, DS), and Rock Creek (6800', P, 5/31/92, PJM). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,000 ft in the eastern Sierra (Gaines 1988). Cassin's Finches bred in pinon and mountain mahogany woodland, aspen groves, and Jeffrey pine, lodgepole pine, lodgepole-limber pine, and whitebark pine forests. They foraged in trees on buds and seeds and on the ground on seeds of annuals.

House Finch *(Carpodacus mexicanus)* (map: Appendix, p. 37)

A fairly common and widespread breeder recorded in 52 (70.3%) of 74 atlas blocks (27 PO, 16 PR, 9 CO). Representative breeding locations were Cowtrack Mountain (8700', Z, 6/29/93, DS), Granite Mountain (8000', X, 6/10/93, DS), Black Mountain (8400', Z, 6/28/92, DS), Hot Creek Fish Hatchery (7100', FL, 6/14/94, PJM), W of O'Harrel Canyon (7200', CF, 7/09/94, DS), N of Watterson Troughs (8200', X, 6/13/94, DS), near Deer Spring (7300', CN, 6/27/91, DS), near Moran Spring (7000', NY, 6/03/92, DS), 3 mi S of Casa Diablo Mountain (6200' and 6400', NE, 6/07/95; DLS, AD), and Owens Gorge at Upper Power Plant (6000'[seen at 5900'], NB, 7/04/94, DS). High elevation breeding limits are uncertain in the White-Inyo Range (Johnson and Cicero 1986, 1991) and east of the Sierra (Gaines 1988). House Finches bred in pinon woodland, rocky cliffs and outcrops in the sagebrush and pinon zone, and locally in mountain mahogany woodland and in tall stands of sagebrush and bitterbrush. Nests were found in pinon trees, in cholla cactus (in the Benton Range), and on shelves or cavities of human structures. Breeding birds often concentrated close to streams or springs where water was available and berries more prevalent. Numbers varied dramatically from year to year, at least at one site, and post-breeding birds sometimes concentrated in patches of fruiting *Ribes* bushes.

Red Crossbill *(Loxia curvirostra)* (map: Appendix, p. 38)

A fairly common and fairly widespread breeder or summer visitor recorded in 42 (56.8%) of 74 atlas blocks (1 O, 32 PO, 5 PR, 5 CO). Because Red Crossbills, like Pinon Jays and Clark's Nutcrackers, are early breeders and had completed most of their nesting activities before we began field work each year, we were unable to define their breeding distribution and elevational limits as well as we would have liked. Nevertheless, representative breeding locations were N of Mono Craters near Hwy 395 (6800', Z, 6/15/91, DS), E of Indiana Summit (8400', FY, 7/10/94, DJK), near Crooked Spring (8700', FL, 6/24/92, H&PG), Wild Cow Canyon (8200', FL, 7/21/92; DS, PJM), E flank of Glass Mountain (10,400', Z, 7/21/93, DS), Sawmill Meadow (9200', FL, 7/17/93; DJK, PJM), and W slope of Benton Range about 1 mi E of Watterson Meadow (8000', FY, 6/08/93, DS). High elevation breeding limits are about 10,500 ft in the White-Inyo Range (Johnson and Cicero 1986) and 10,000 ft in the eastern Sierra (Gaines 1988). Red Crossbills occurred in pinon pine woodland and Jeffrey pine, lodgepole pine, and lodgepole-limber pine forests. Numbers varied greatly among and within habitats from year to year, apparently in response to the changing abundance of conifer seed crops.

Pine Siskin *(Carduelis pinus)* (map: Appendix, p. 38)

A rare to common and local breeder recorded in 16 (21.6%) of 74 atlas blocks (7 O, 7 PO, 8 PR, 1 CO), primarily in the central portion of the study area. Representative breeding locations were North Canyon (8000', P and N, 7/20/92, DS), Crooked Meadows (8800', C and P, 6/30 & 7/1/95, DS), Wet Meadow (8600', FL, 7/21/92; PJM, DJK), McGee Canyon (8000', P, 6/09/95, DLS), W flank of Glass Mountain (10,300', P, 7/14/95, DS), top of Glass Mountain (11,000', Z, 7/14/95, DS), upper Wet Fork Black Canyon (9100', P, 7/11/95; AD, DLS), and Big Springs Campground (7500', P, 5/28/92, PJM). The high elevation breeding limit in the eastern Sierra is about 10,000 ft (Gaines 1988). Pine Siskins occurred primarily in lodgepole pine forest and secondarily in Jeffrey pine forest. Numbers varied greatly from year to year, and were most numerous in 1995 following the wet winter of 1994-95.

Lesser Goldfinch *(Carduelis psaltria)* (map: Appendix, p. 38)

A fairly common and local breeder recorded in 27 (36.5%) of 74 atlas blocks (15 PO, 8 PR, 4 CO), primarily in the southern portion of the study area. Representative nesting locations were lower McLaughlin Creek (7600', CN, 7/05/94, DS), McLaughlin Springs (8700', P, 7/23/93, DS), Frazier Canyon (7600', FY, 7/31/95; PJM, AD), Rock Creek (6900', FS, 6/14/93, PJM), and Owens River Gorge below Upper Power Plant (5800', NB, 6/22/95, DS). The high elevation breeding limit in the White Mountains is about 8100 ft (Johnson and Cicero 1986). Lesser Goldfinches occurred in riparian thickets, aspen groves, and pinon woodland and may nest in trees or shrubs within or close to these habitats.

House Sparrow *(Passer domesticus)* (map: Appendix, p. 38)

A fairly common and very local breeder recorded in 6 (8.1%) of 74 atlas blocks (1 PO, 0 PR, 5 CO), exclusively in the southwestern portion of the study area close to Hwy 395. Representative breeding locations were Hot Creek Fish Hatchery (7100', ON, 6/14/94, PJM),

near Whitmore Pool (7000', CN, 6/15/94, DS), just E of Hwy 395 about 2 mi NW of crossing at McGee Creek (6900', ON, 6/08/95, DS), South Landing at Crowley Lake (6800', NY, 7/19/93, JH), and Rock Creek (6800', ON, 6/14/93, PJM). The high elevation breeding limit in the eastern Sierra is about 7200 ft (Gaines 1988). House Sparrows bred in artificial structures around human habitations.

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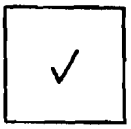
APPENDIX

On the pages that follow are preliminary maps of the breeding distribution of 152 taxa of birds found on breeding bird atlas surveys of the Glass Mountain region of Mono County, California, from 1991 to 1995.

The patterns below designate the breeding categories shown on the maps (see Table 1):



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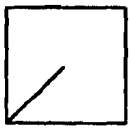

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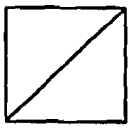

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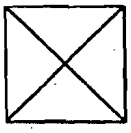

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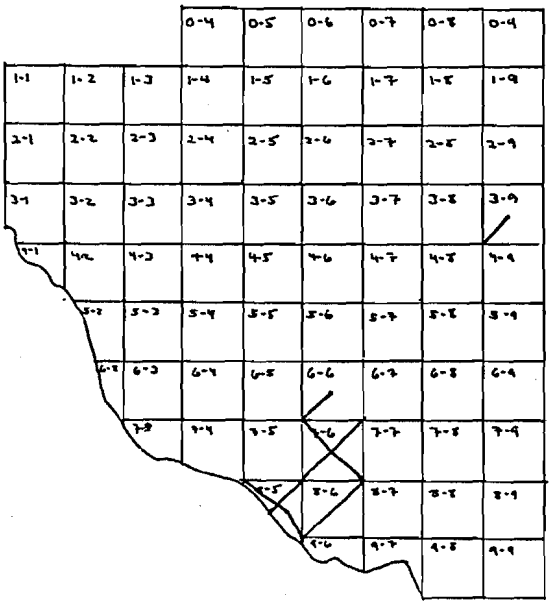

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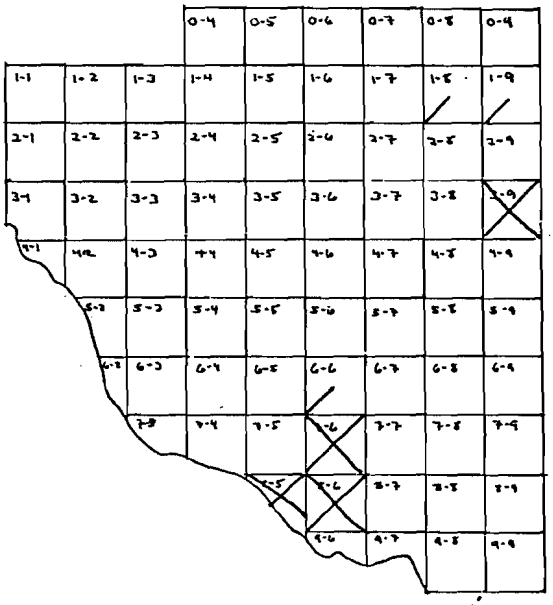

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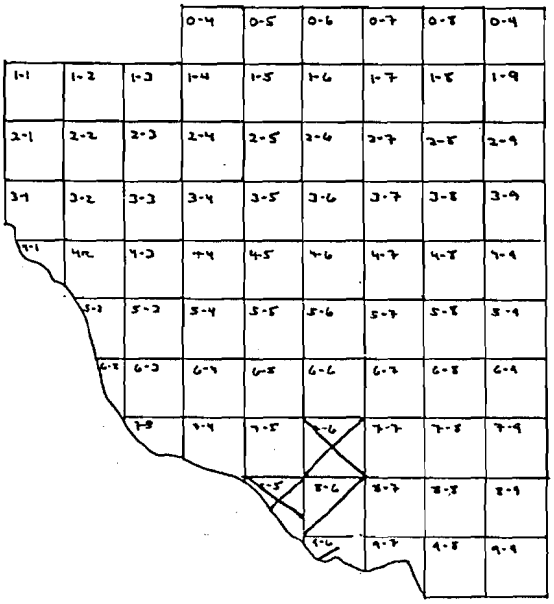

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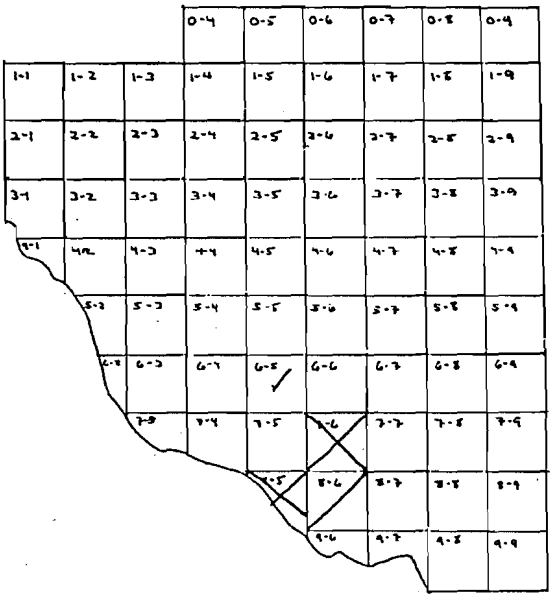
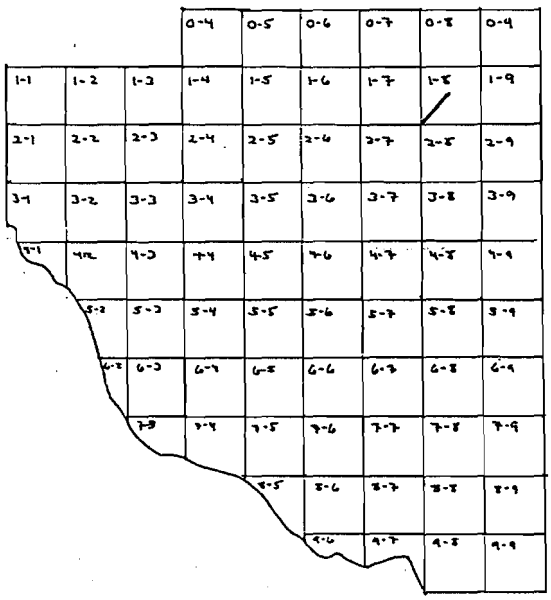
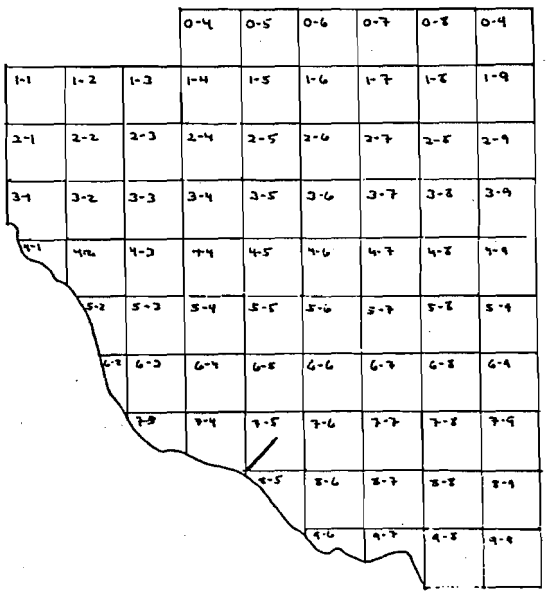


Appendix -- 2

AMERICAN BITTERN



LEAST BITTERN



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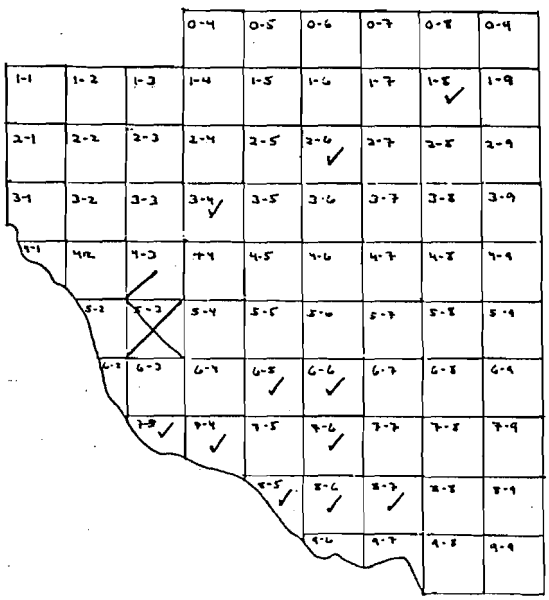

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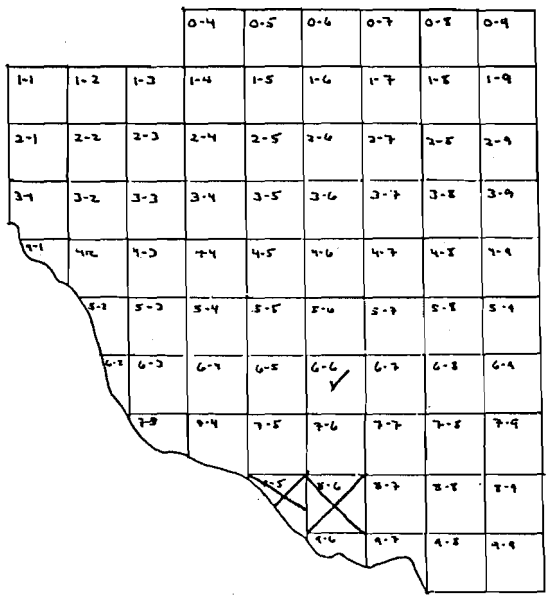

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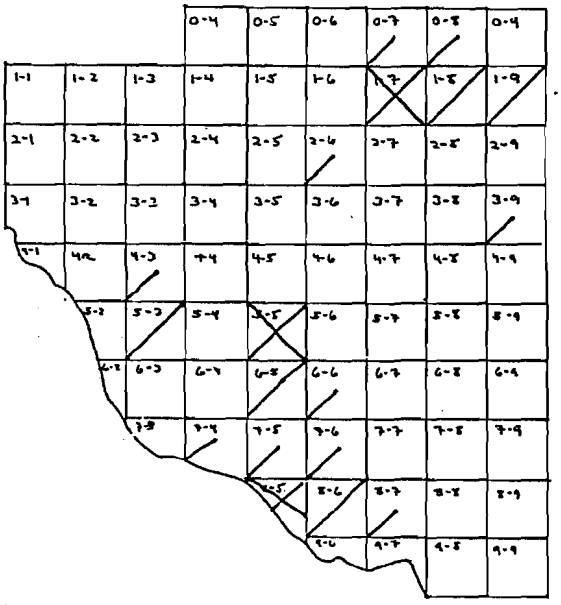
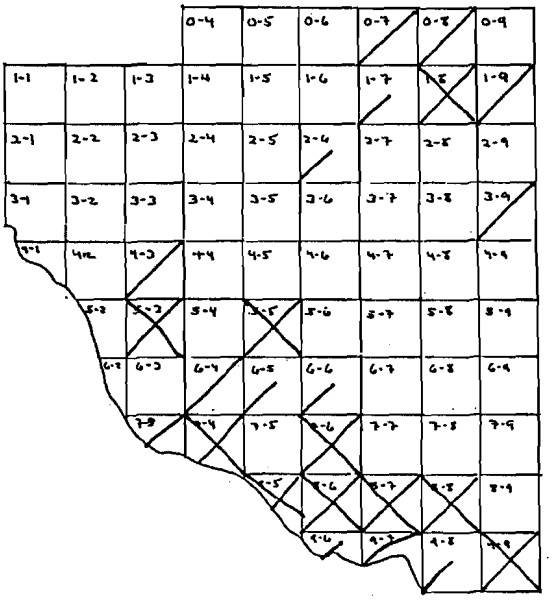


MALLARD



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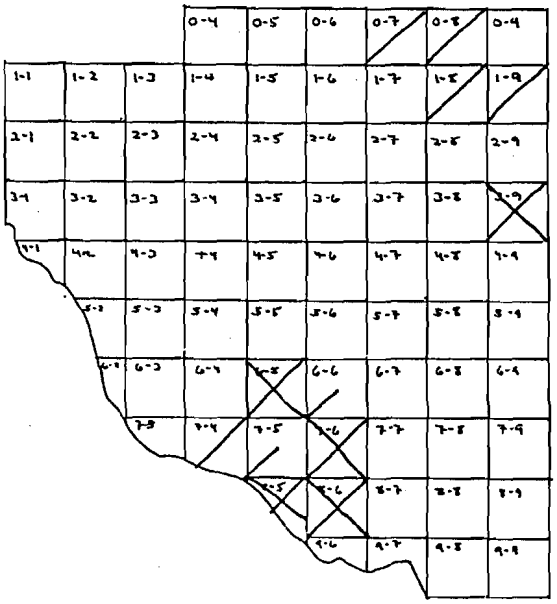

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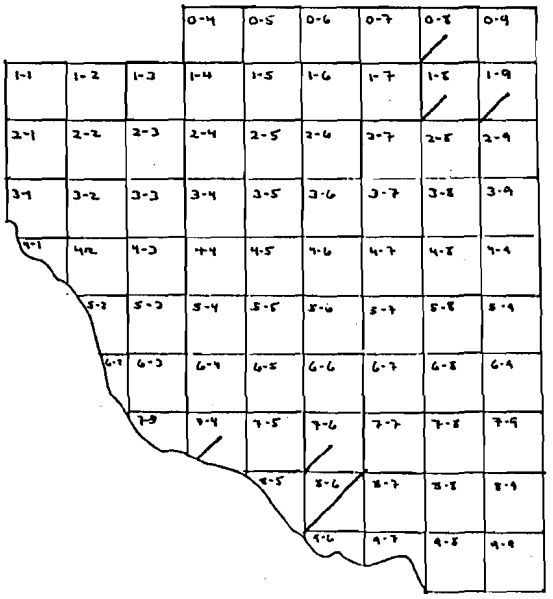
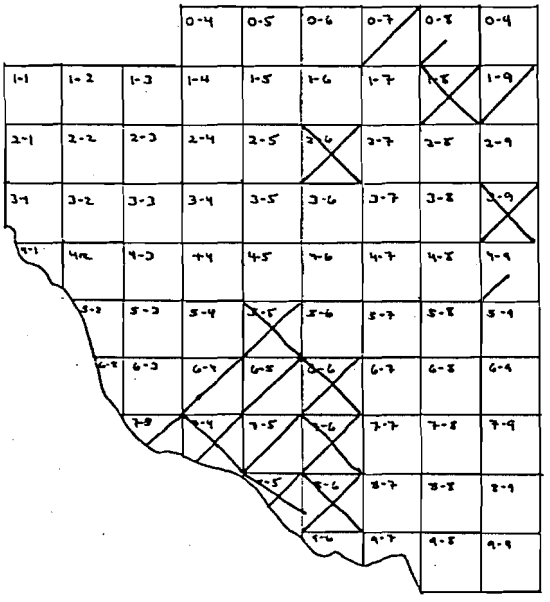


Appendix -- 4

CINNAMON TEAL



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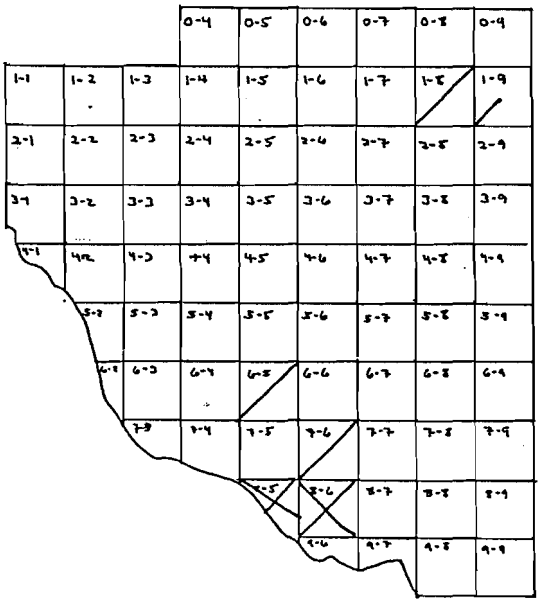

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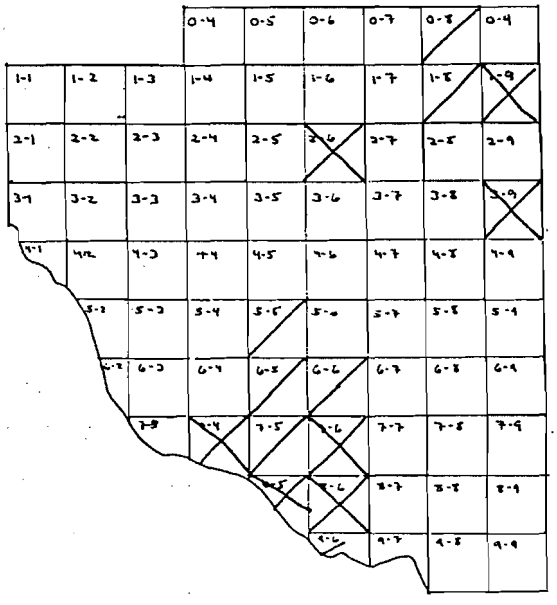
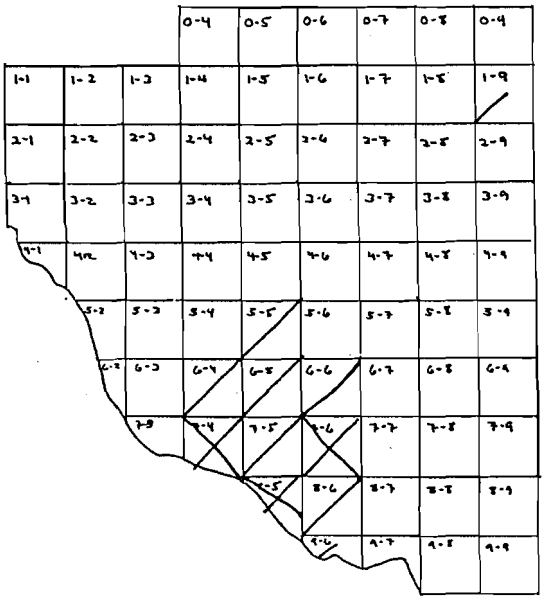


AMERICAN WIGEON



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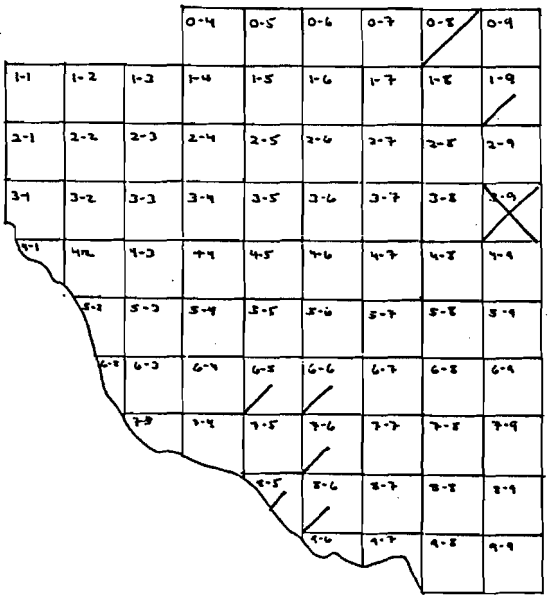

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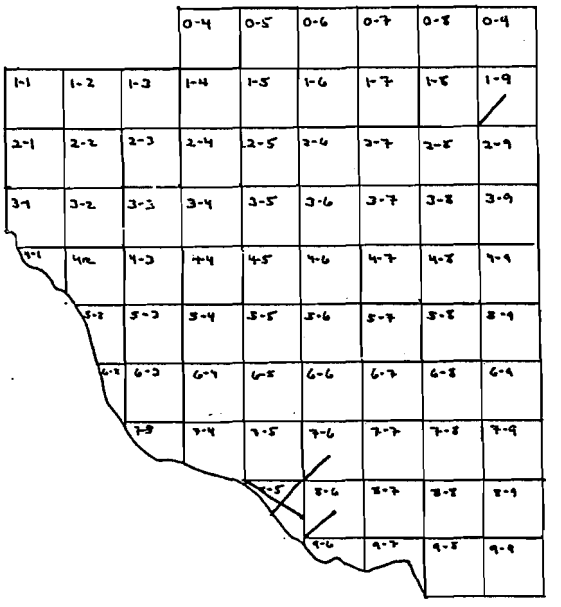

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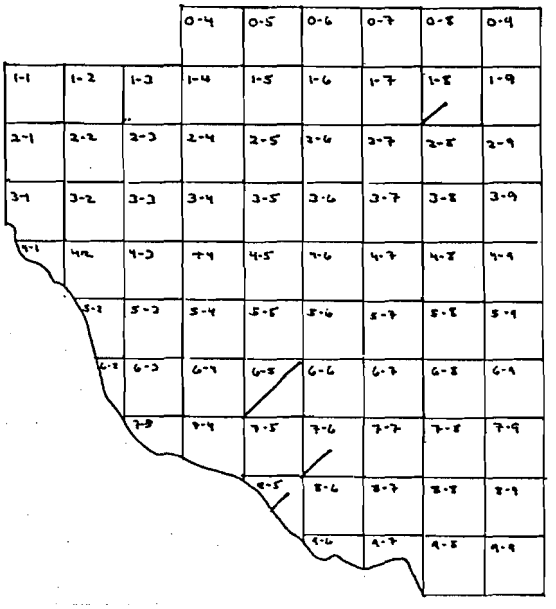

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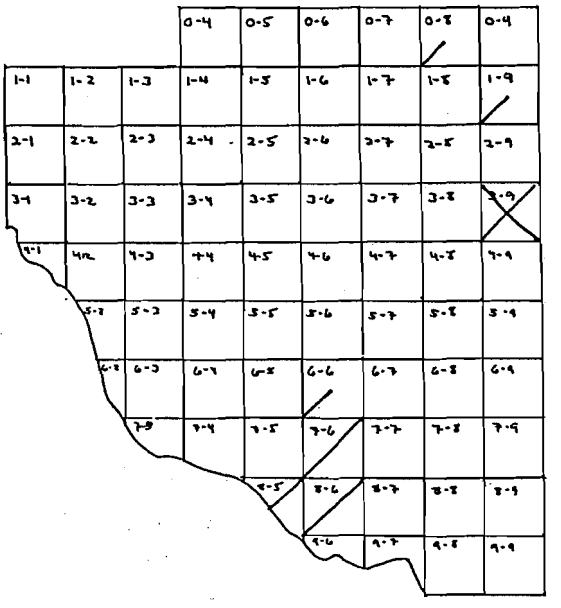
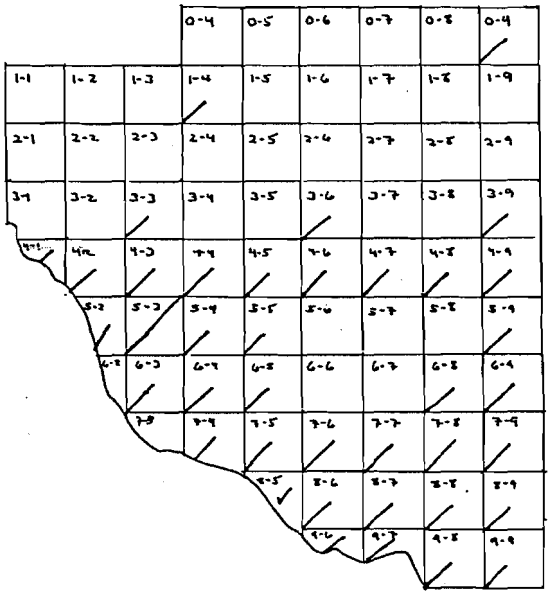


Appendix -- 6

TURKEY VULTURE



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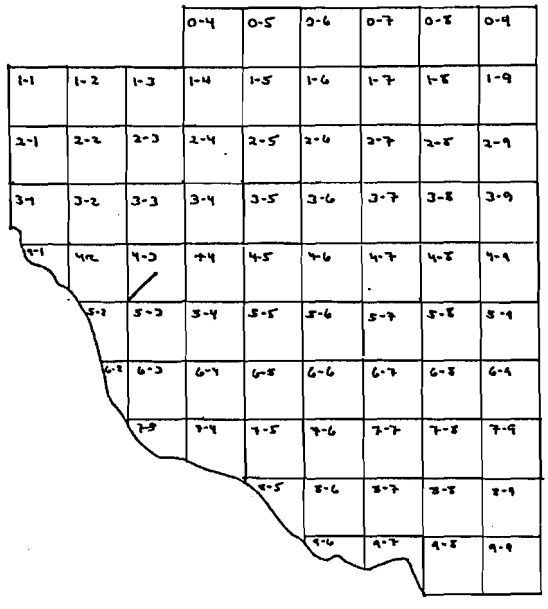

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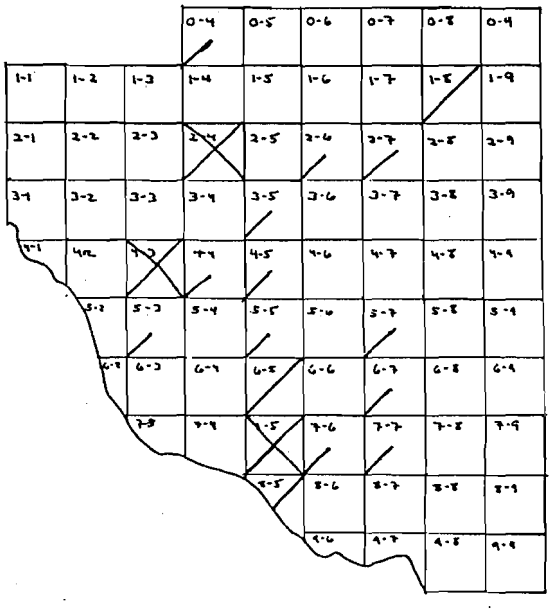

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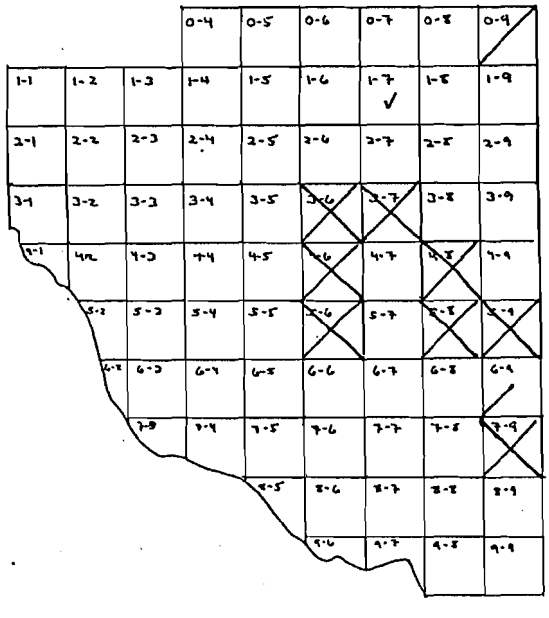

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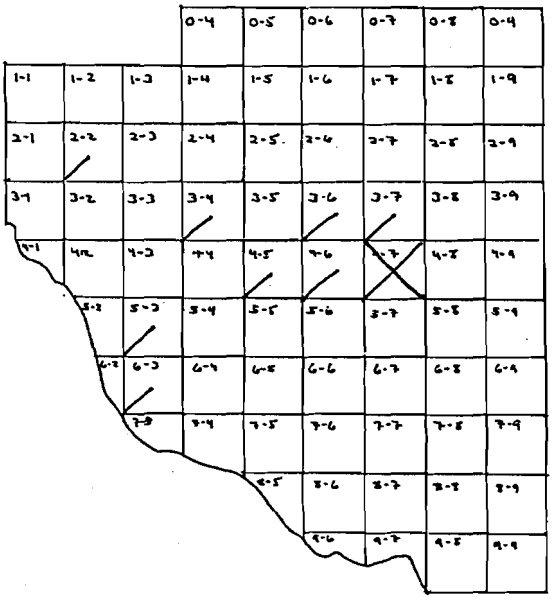

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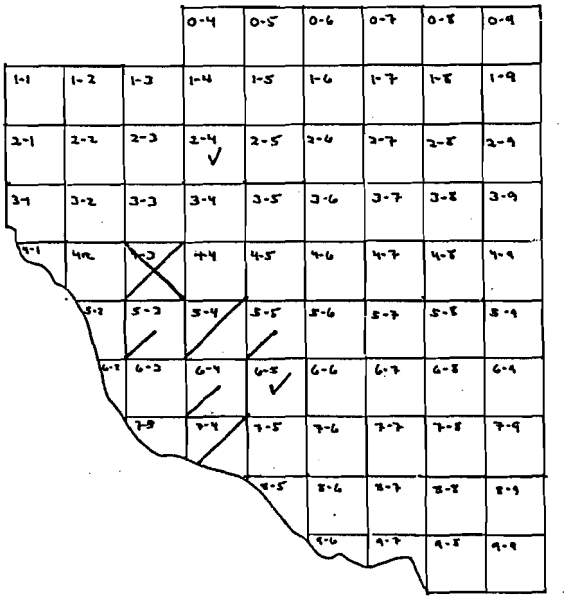

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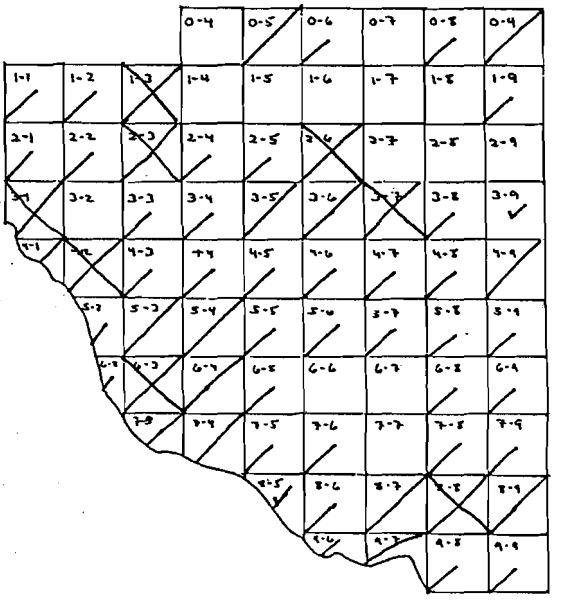

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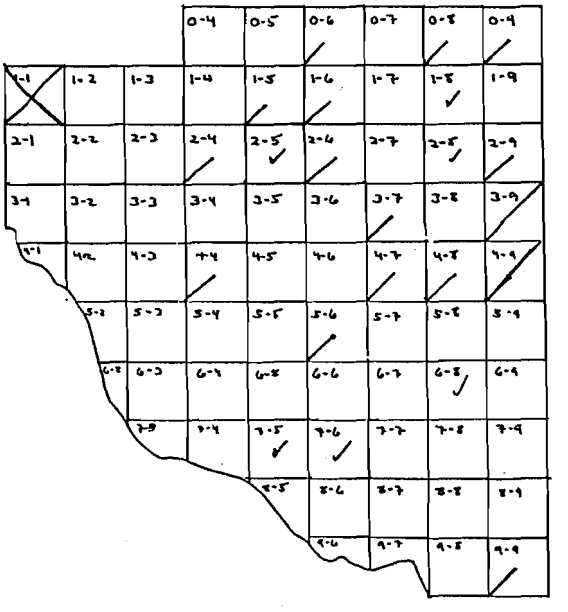

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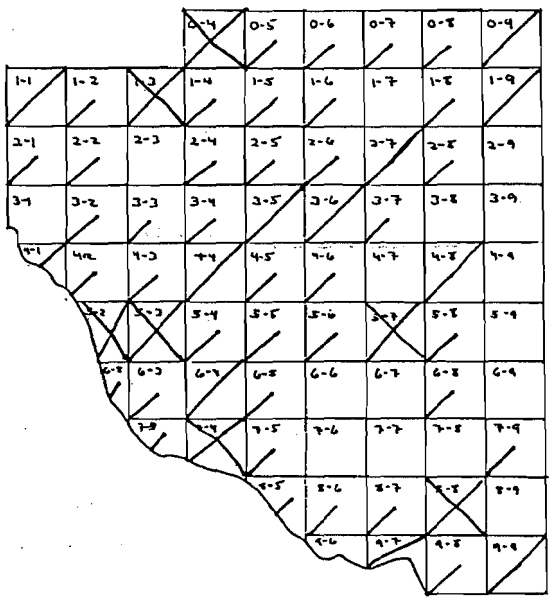

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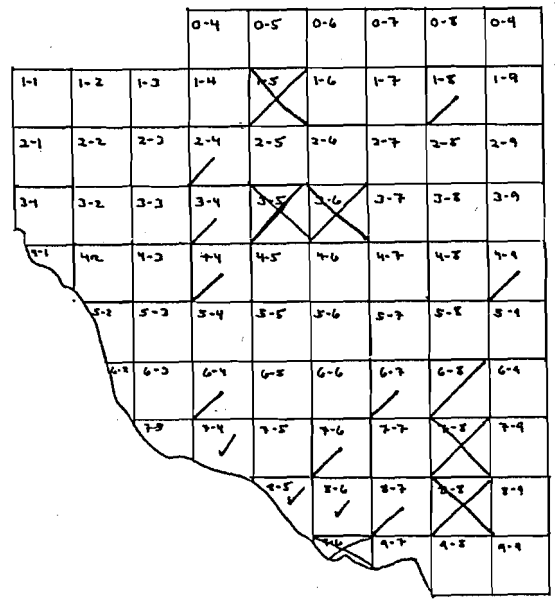

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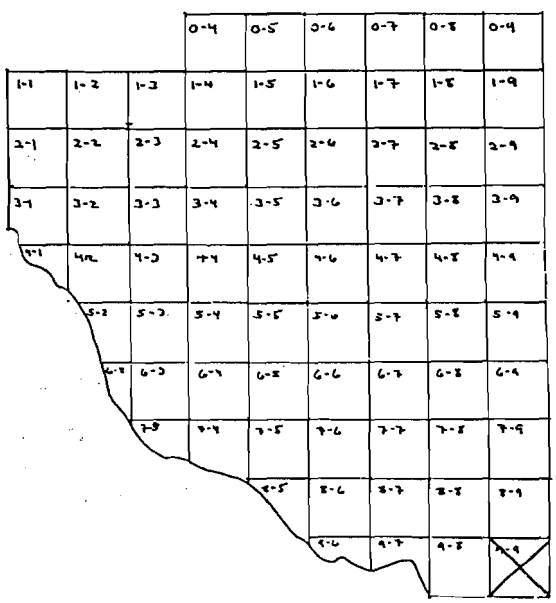

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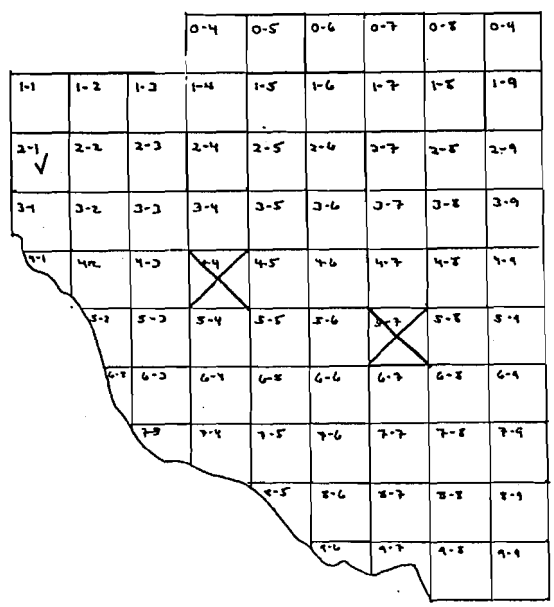

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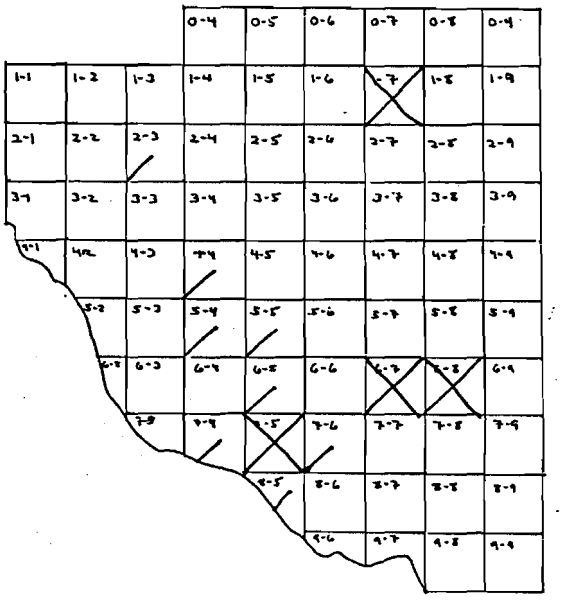

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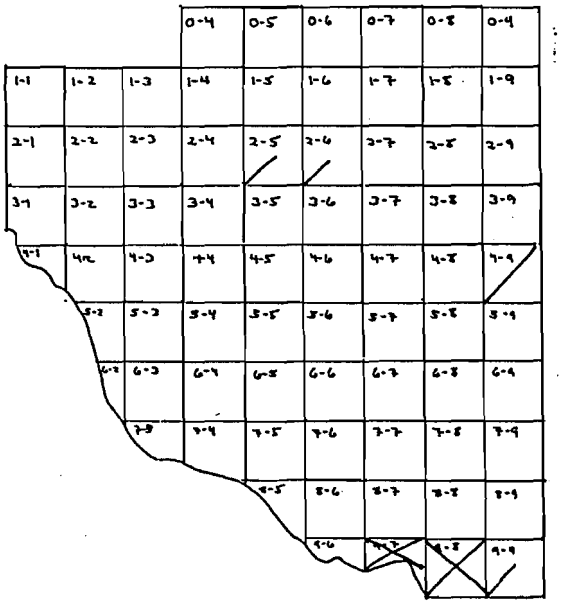

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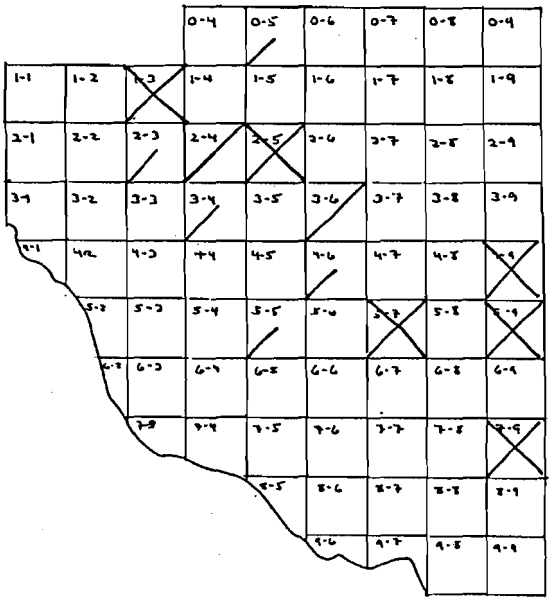

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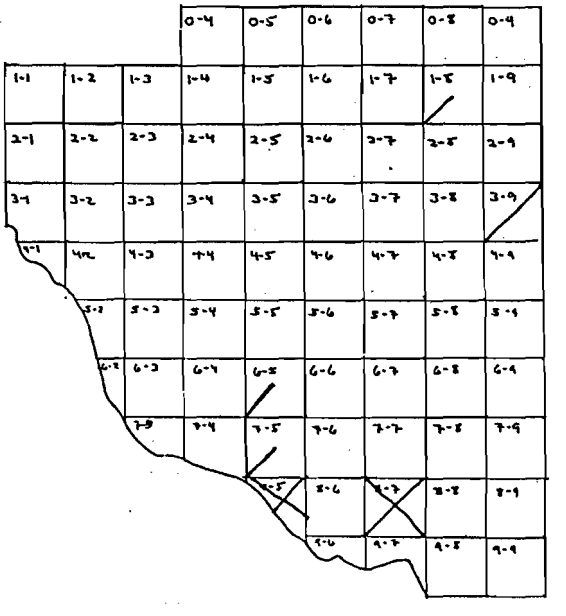
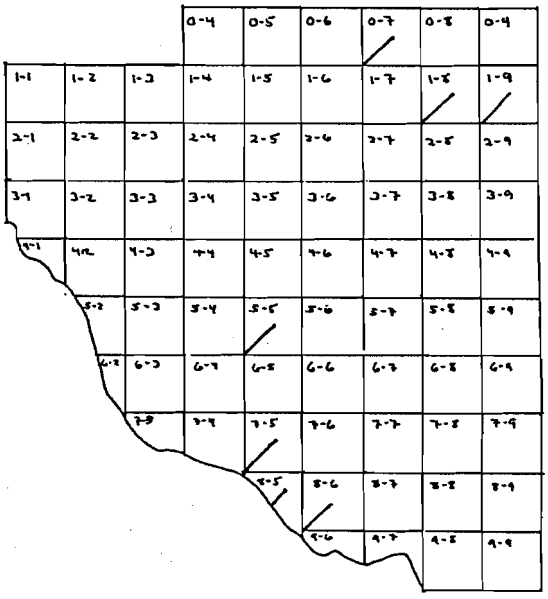
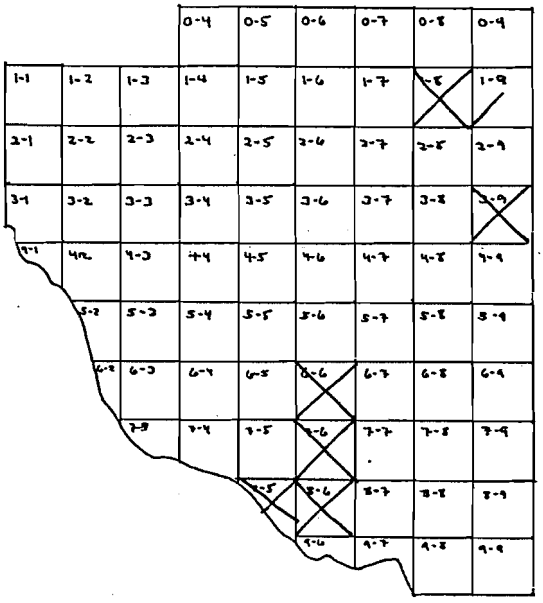


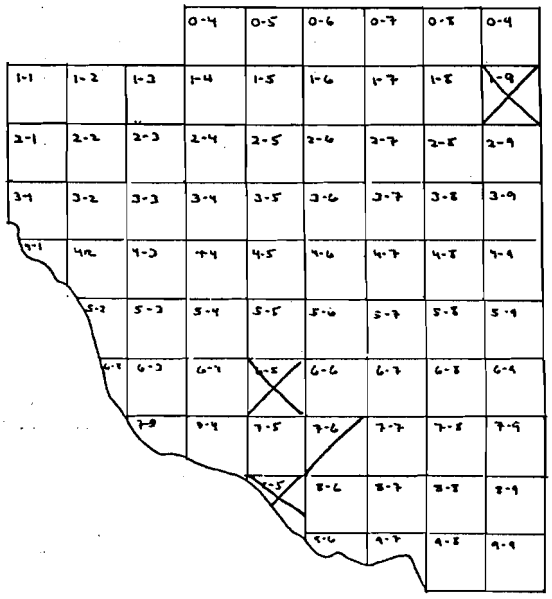
SORA



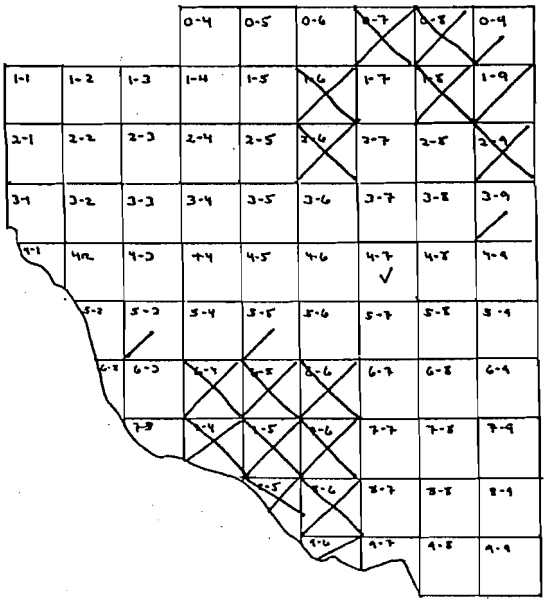
AMERICAN COOT



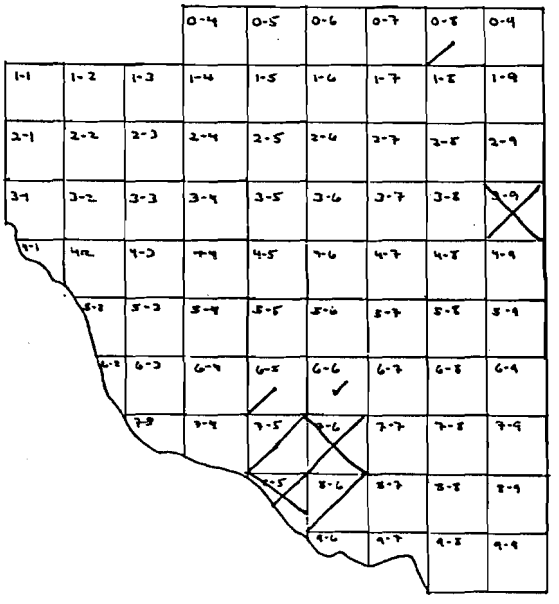
SNOWY PLOVER



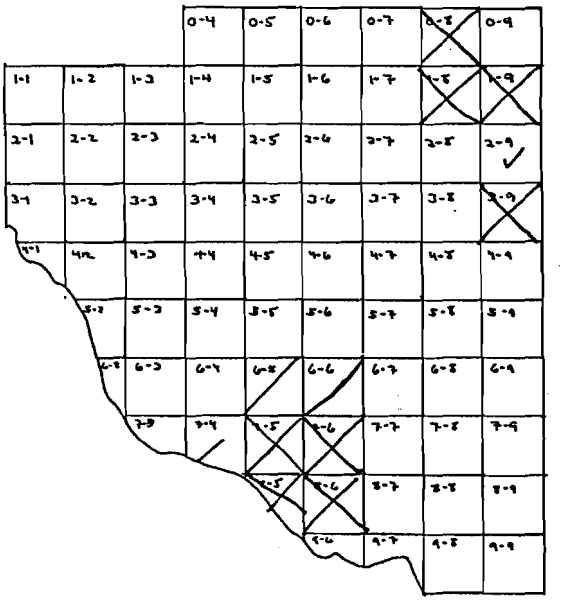
KILLDEER



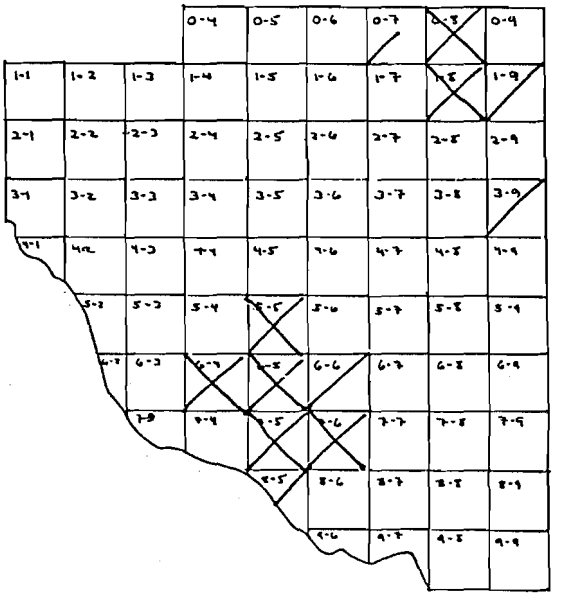
BLACK-NECKED STILT



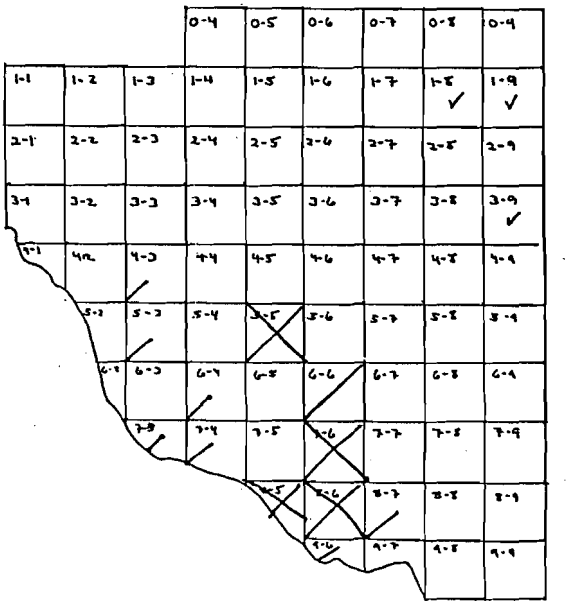
AMERICAN AVOCET



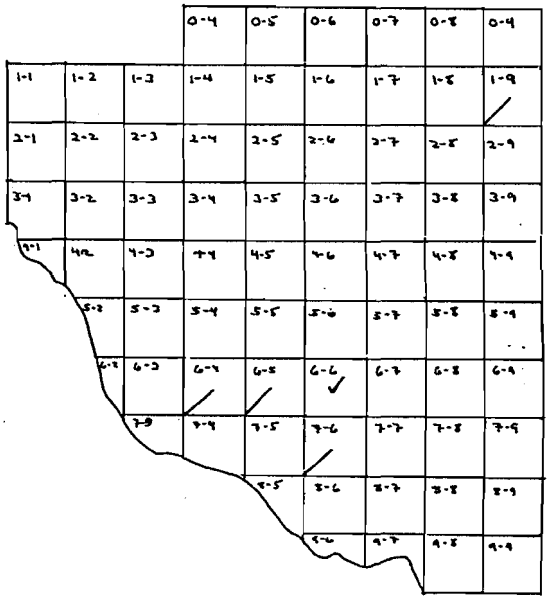
WILLET



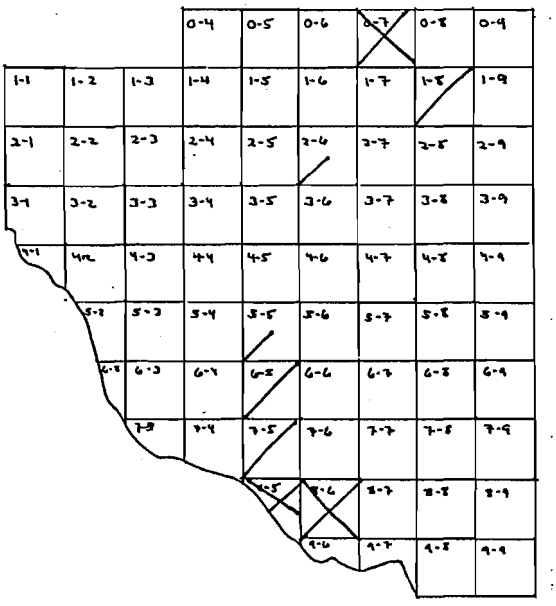
SPOTTED SANDPIPER



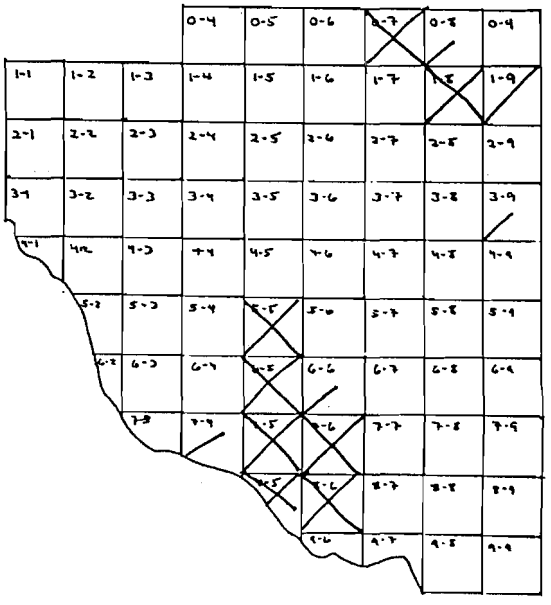
LONG-BILLED CURLEW



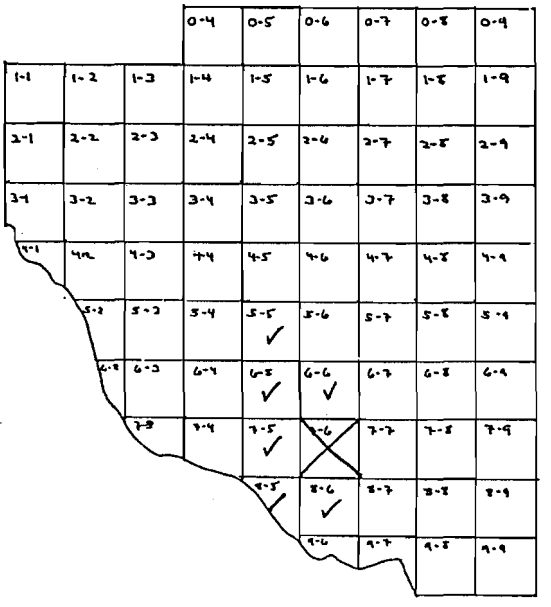
COMMON SNIPE



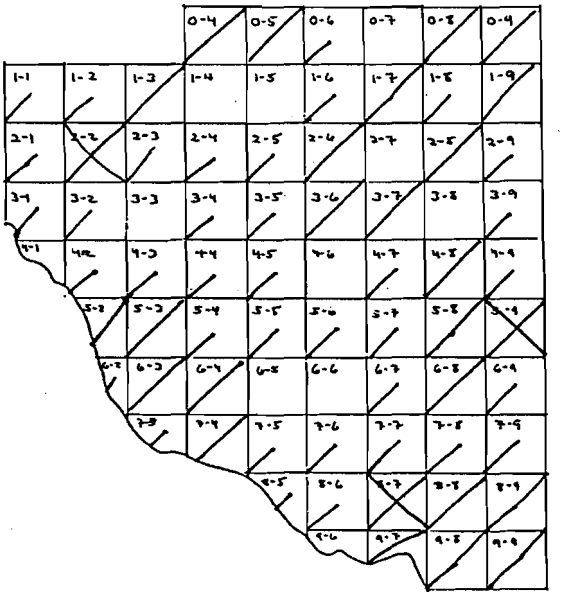
WILSON'S PHALAROPE



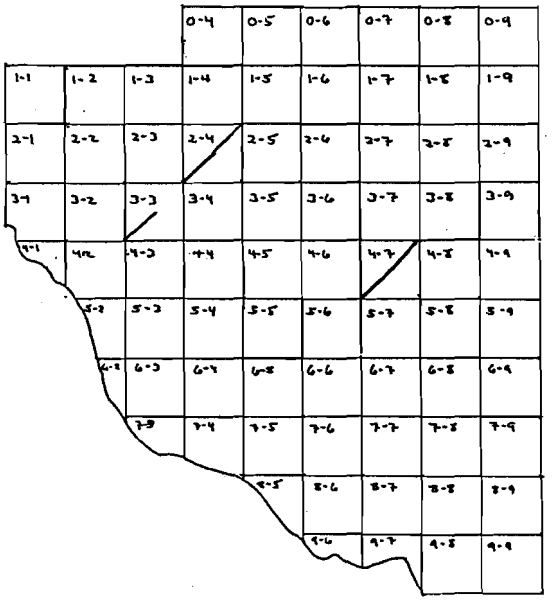
FORSTER'S TERN



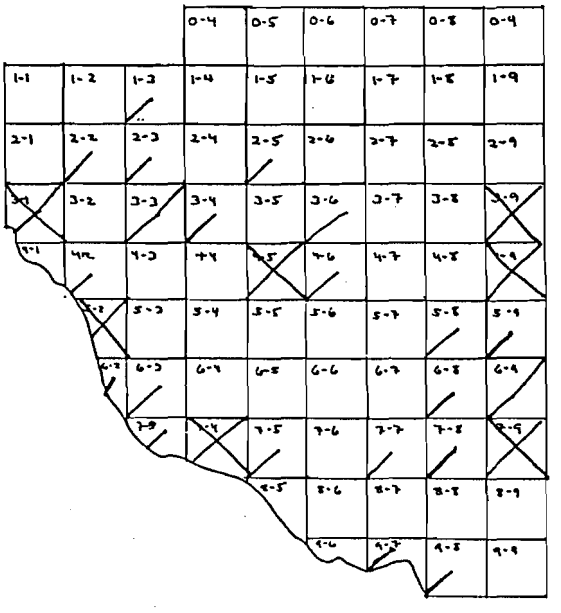
MOURNING DOVE



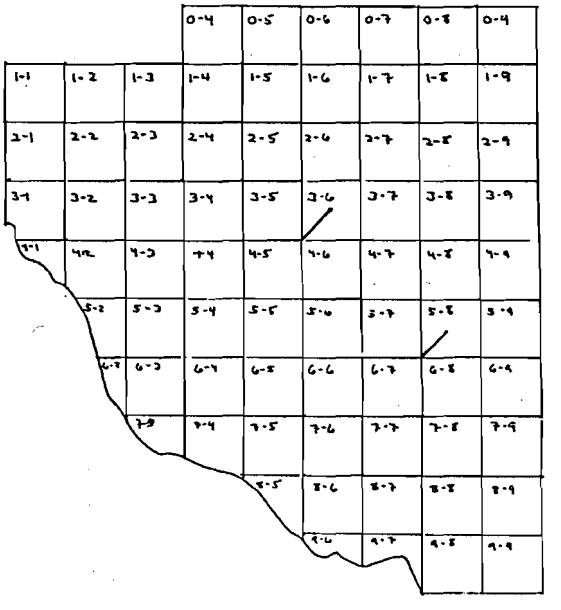
FLAMMULATED OWL



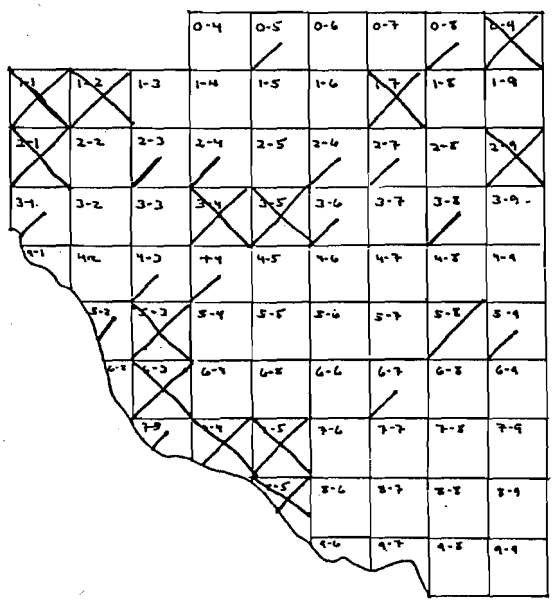
GREAT HORNED OWL



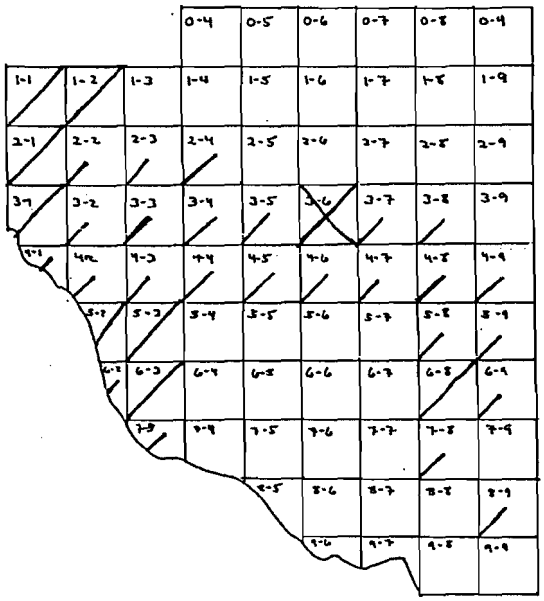
NORTHERN PYGMY-OWL



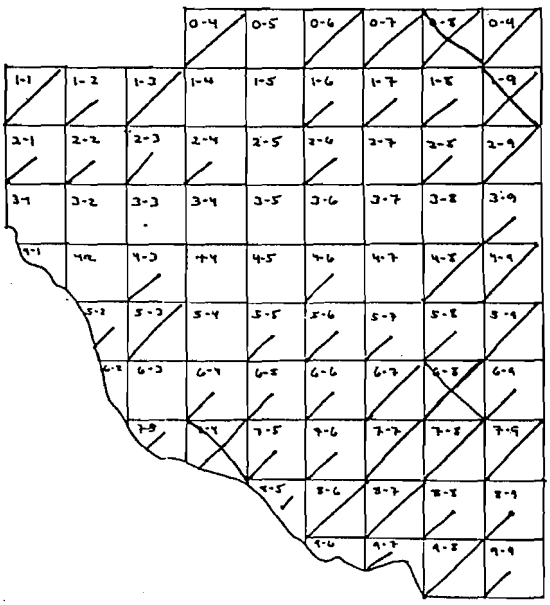
LONG-EARED OWL



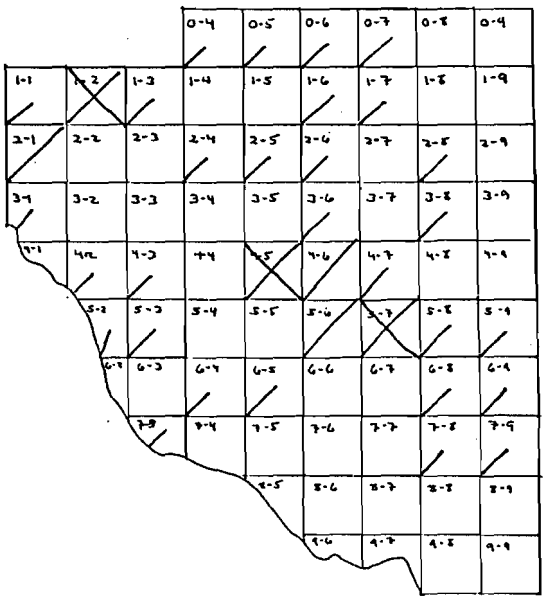
NORTHERN SAW-WHET OWL



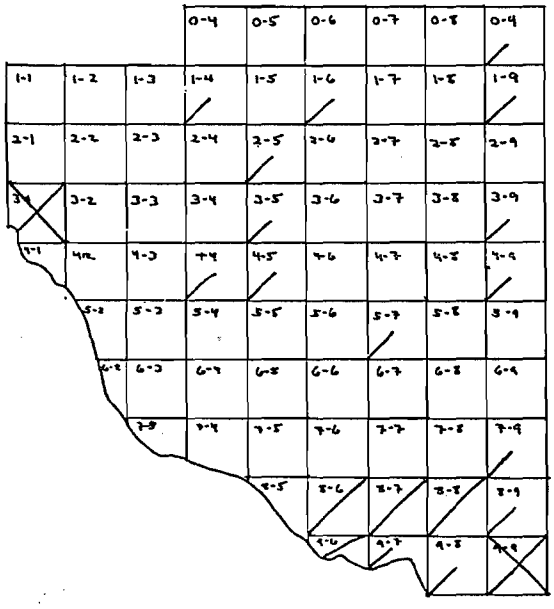
COMMON NIGHTHAWK



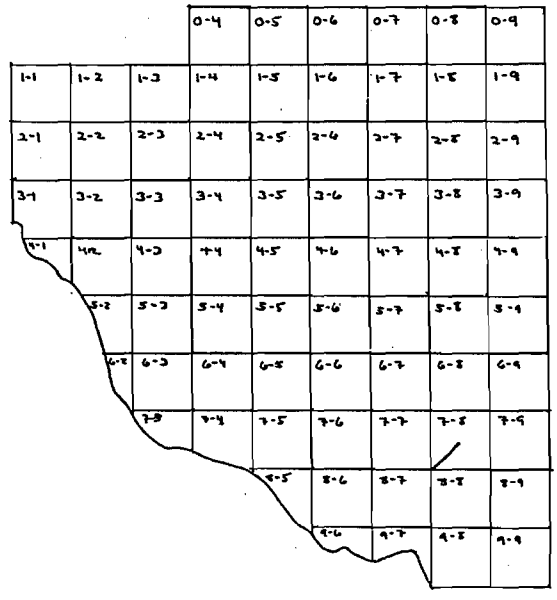
COMMON POORWILL



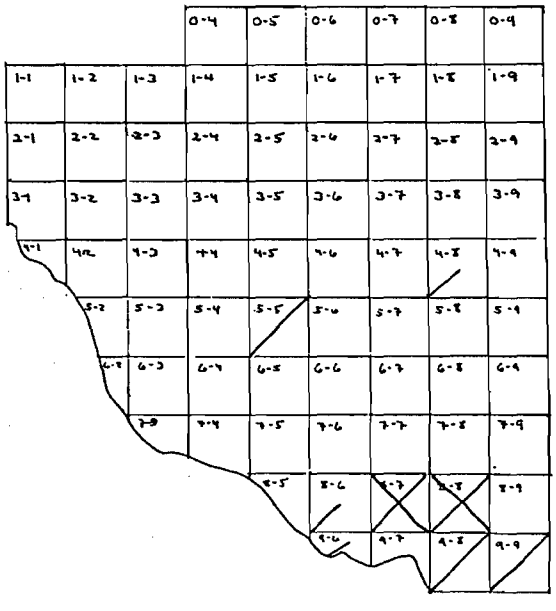
WHITE-THROATED SWIFT



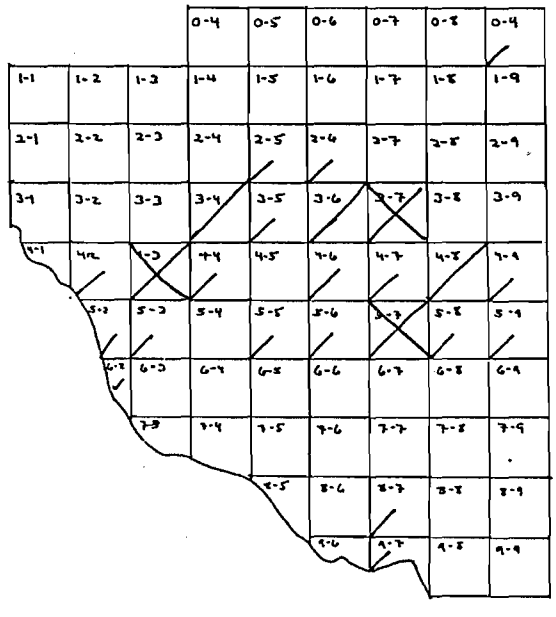
BLACK-CHINNED HUMMINGBIRD



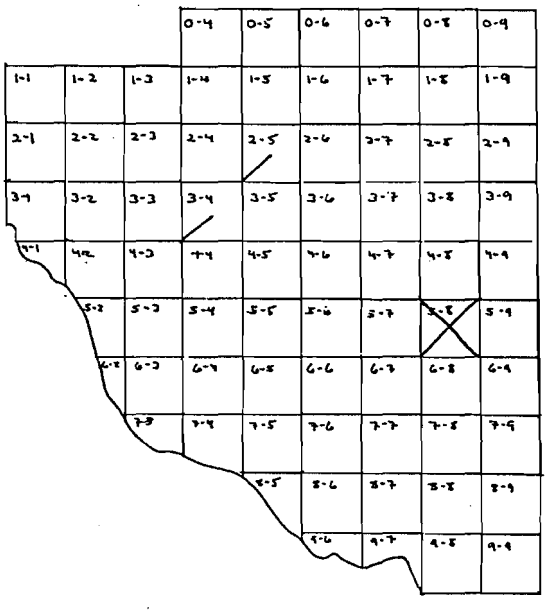
COSTA'S HUMMINGBIRD



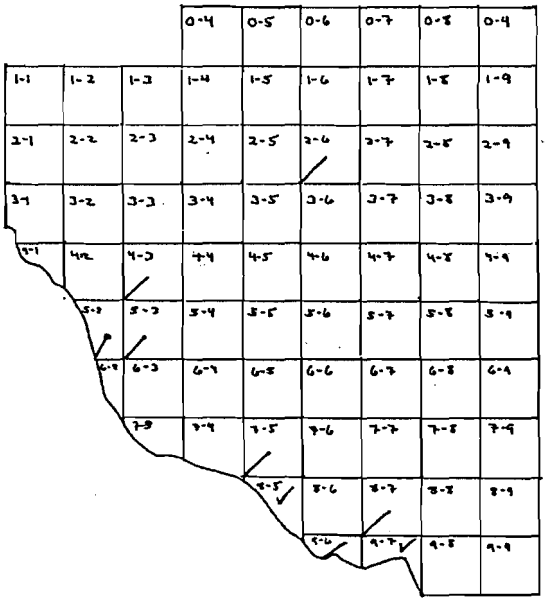
CALLIOPE HUMMINGBIRD



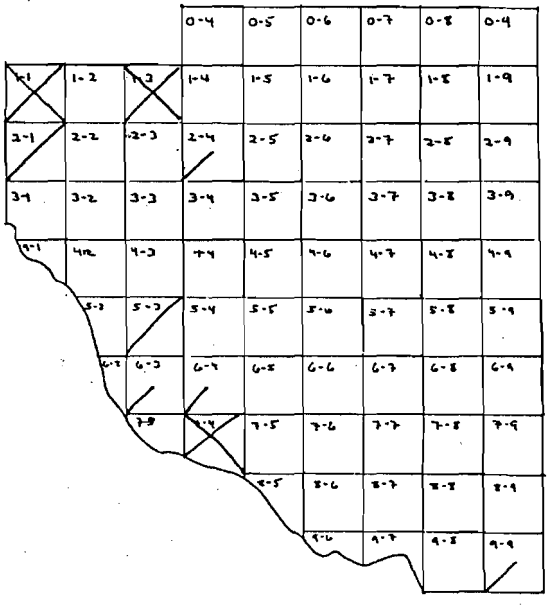
BROAD-TAILED HUMMINGBIRD



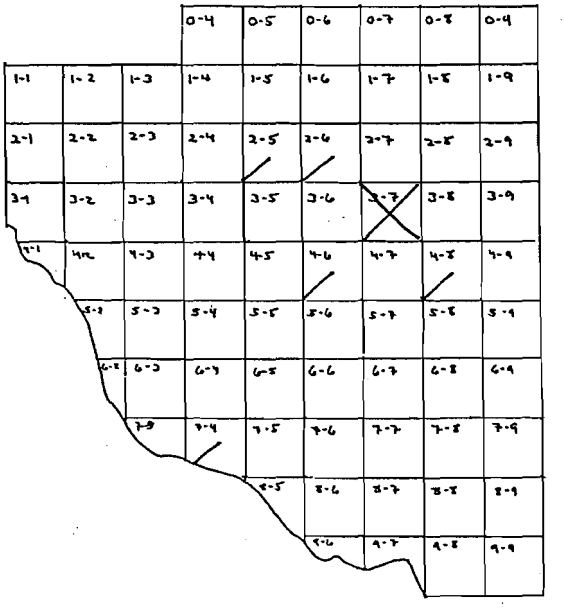
BELTED KINGFISHER



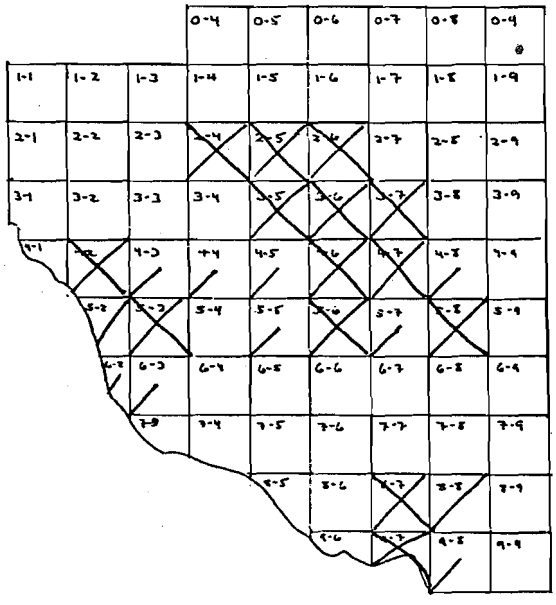
LEWIS' WOODPECKER



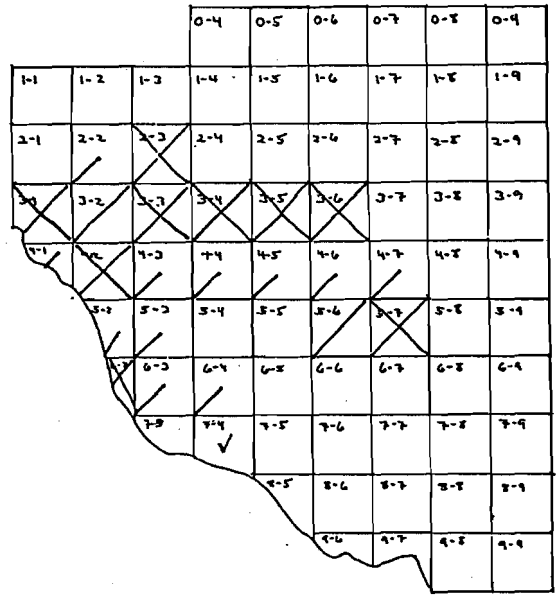
RED-NAPED SAPSUCKER



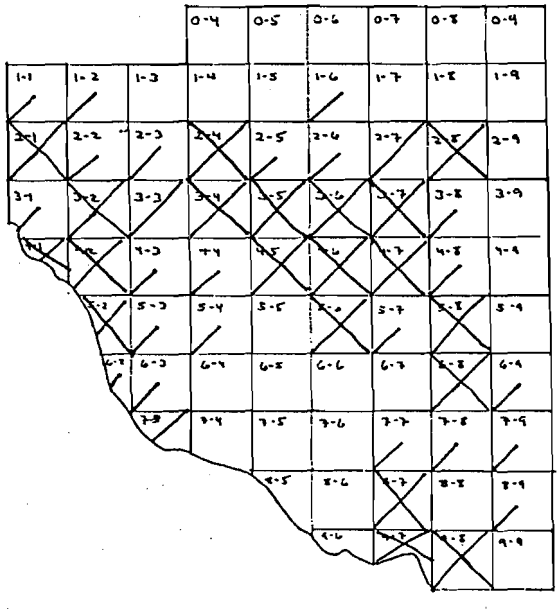
RED-BREASTED SAPSUCKER



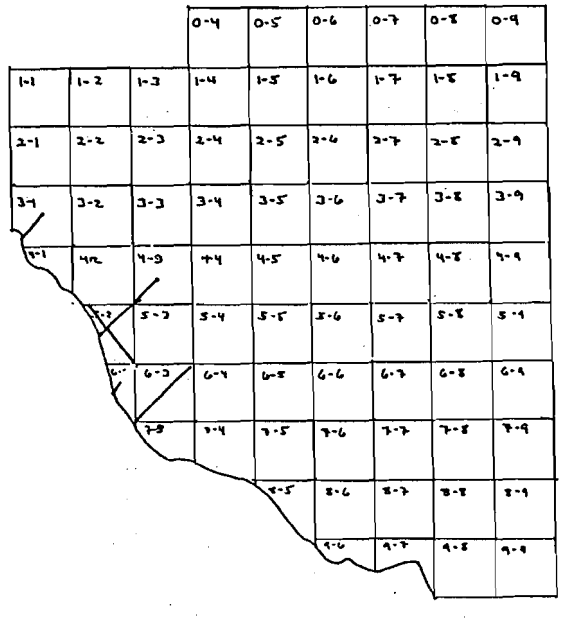
WILLIAMSON'S SAPSUCKER



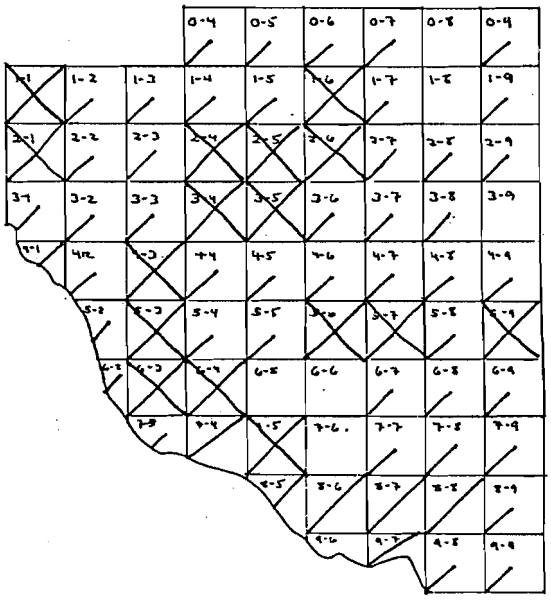
HAIRY WOODPECKER



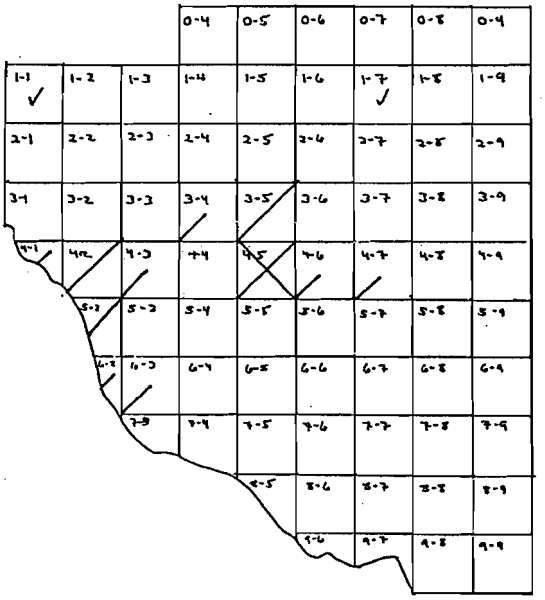
WHITE-HEADED WOODPECKER



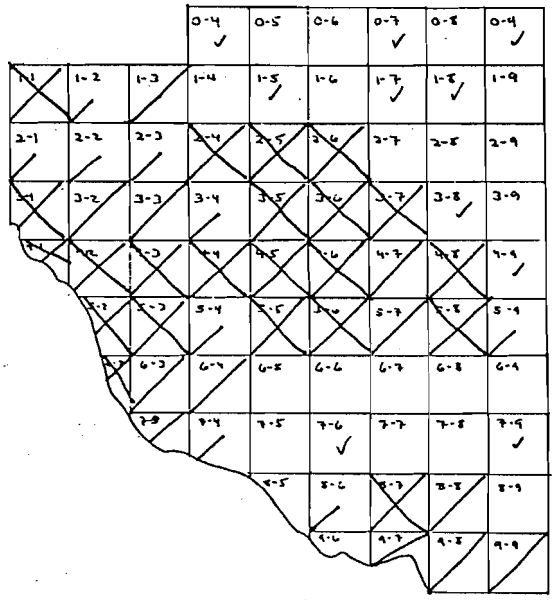
NORTHERN FLICKER



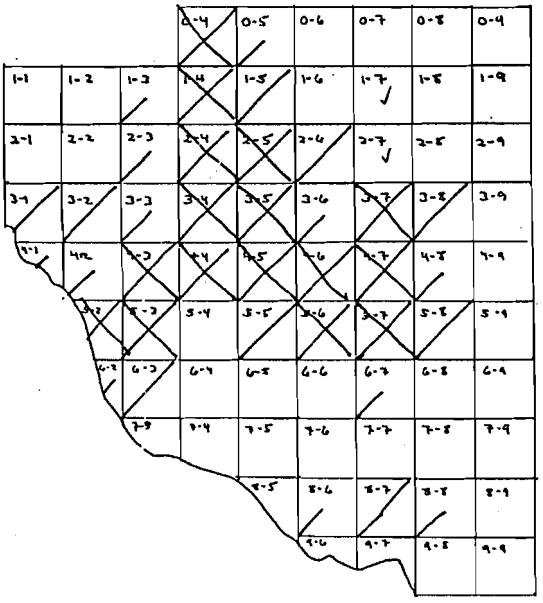
OLIVE-SIDED FLYCATCHER



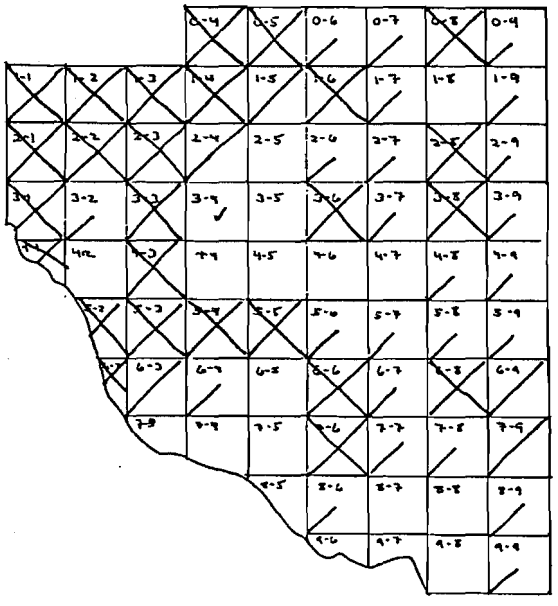
WESTERN WOOD-PEWEE



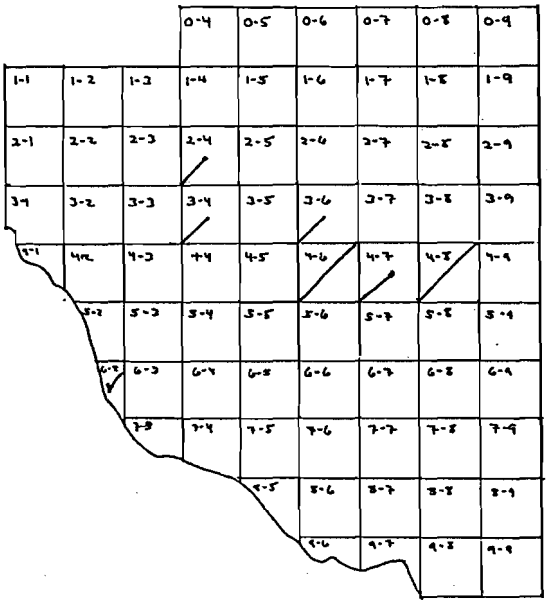
DUSKY FLYCATCHER



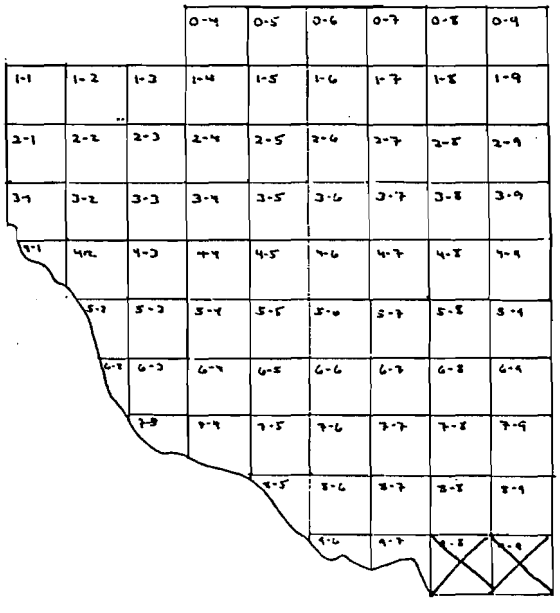
GRAY FLYCATCHER



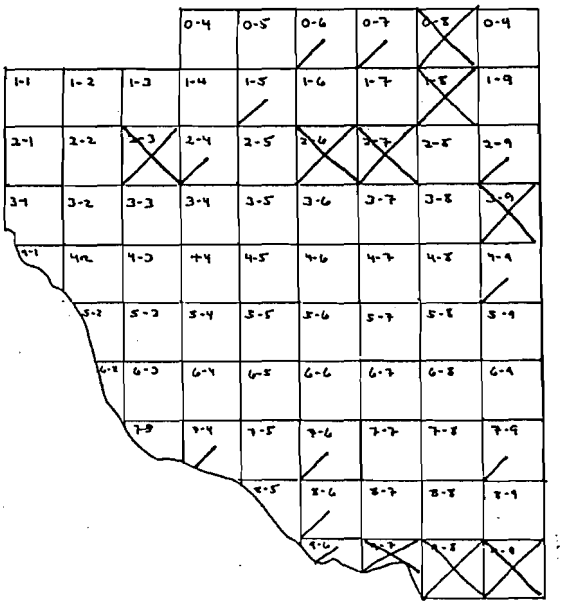
"WESTERN" FLYCATCHER



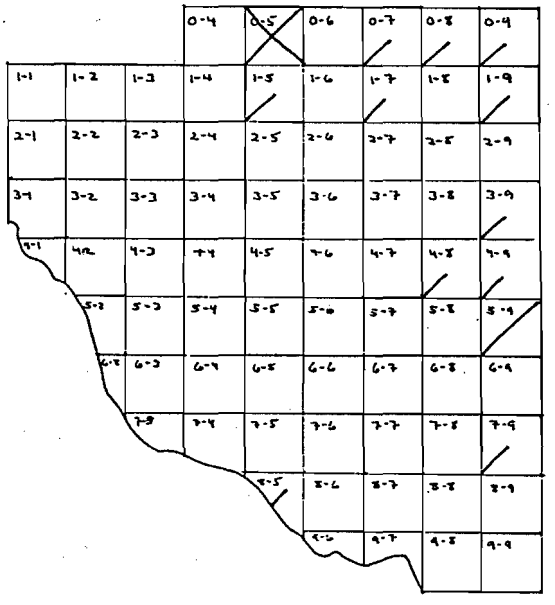
BLACK PHOEBE



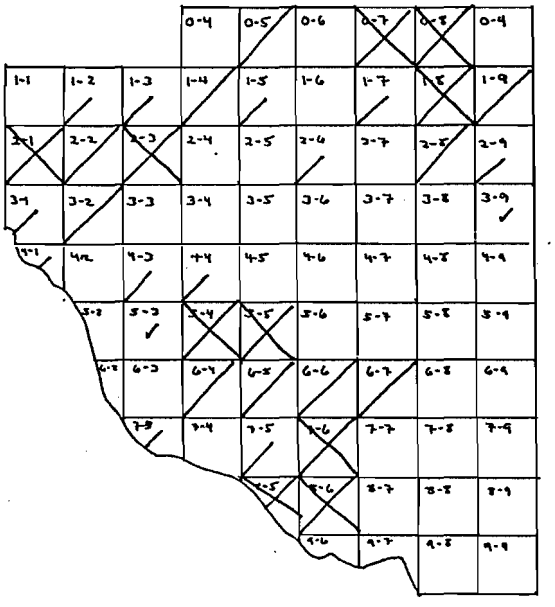
SAY'S PHOEBE



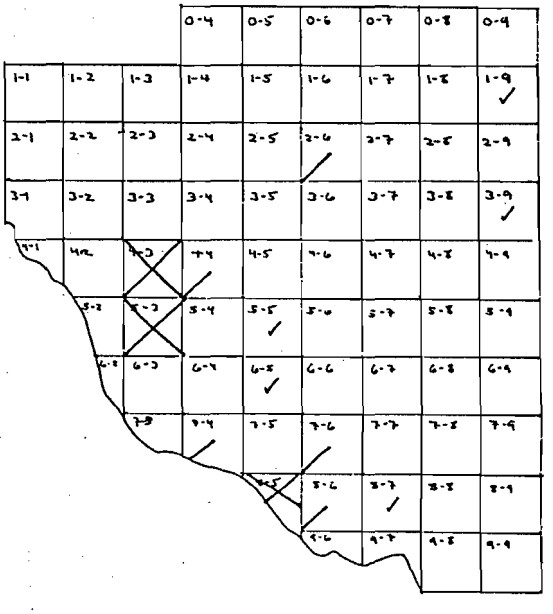
ASH-THROATED FLYCATCHER



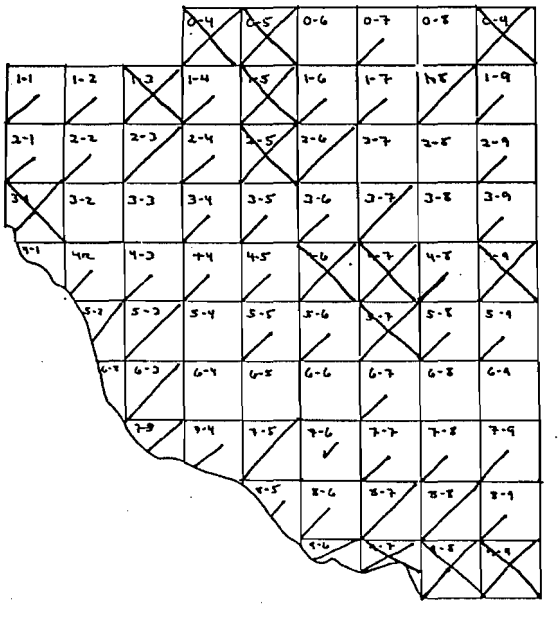
HORNED LARK



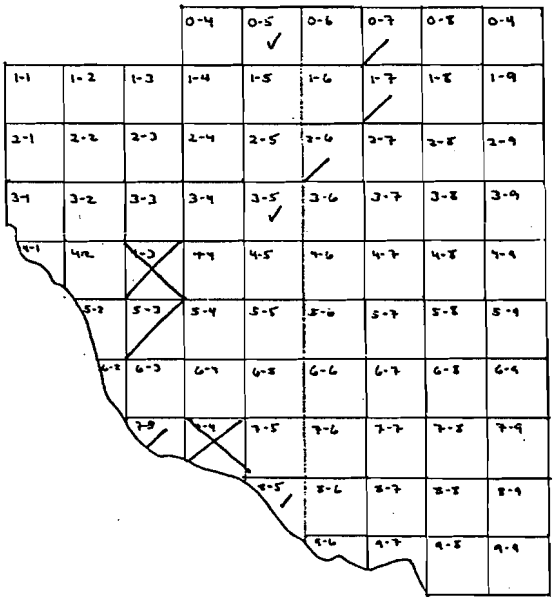
TREE SWALLOW



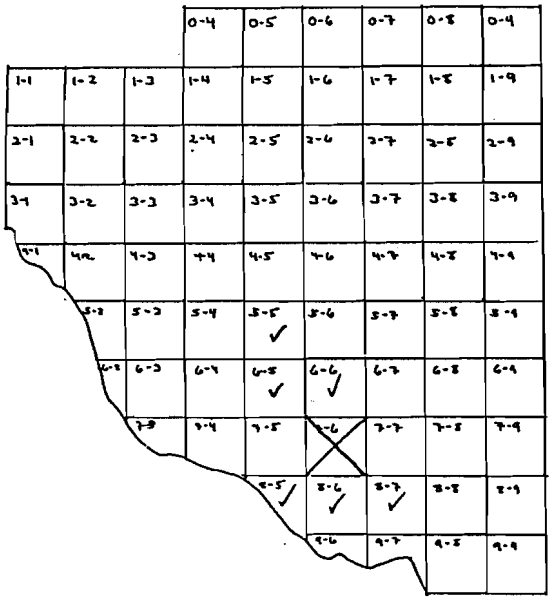
VIOLET-GREEN SWALLOW



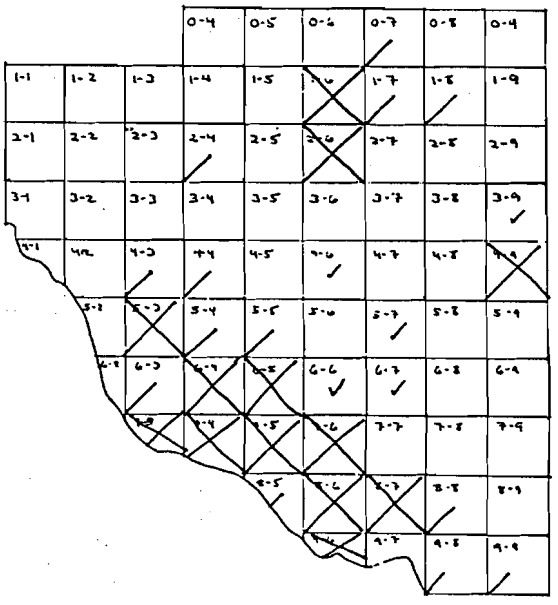
N. ROUGH-WINGED SWALLOW



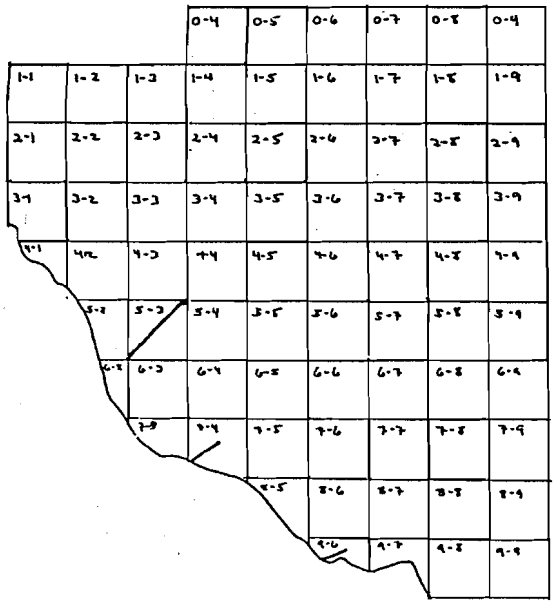
BANK SWALLOW



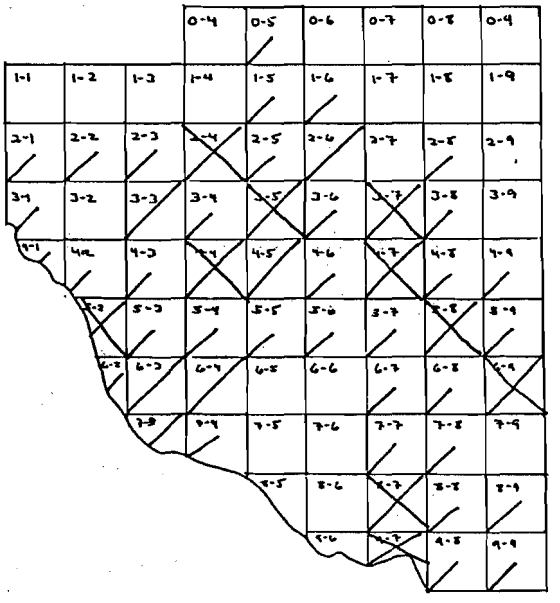
CLIFF SWALLOW



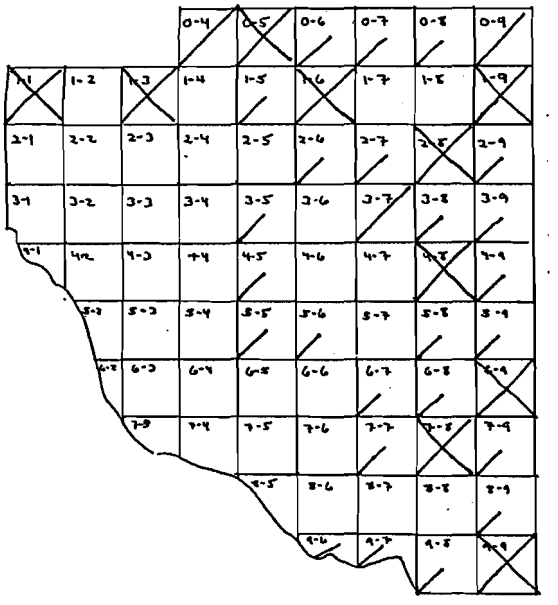
BARN SWALLOW



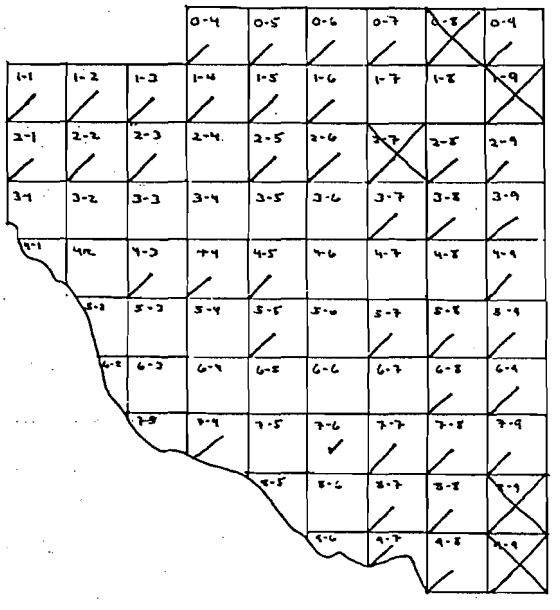
STELLER'S JAY



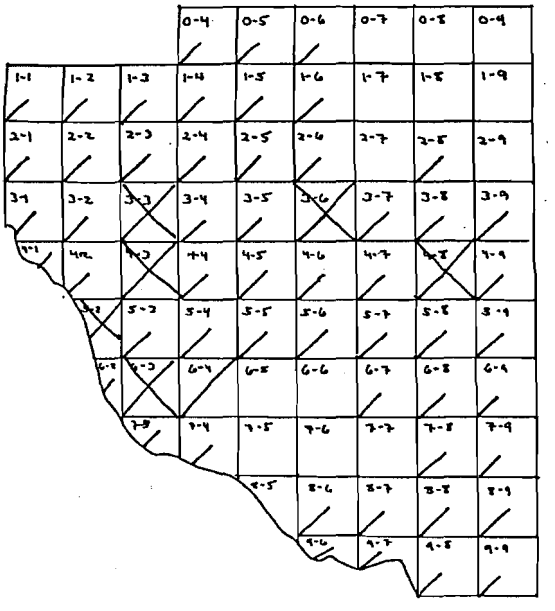
SCRUB JAY



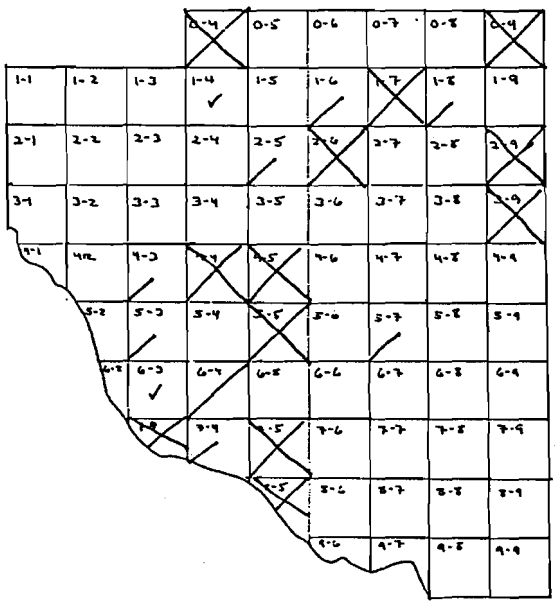
PINYON JAY



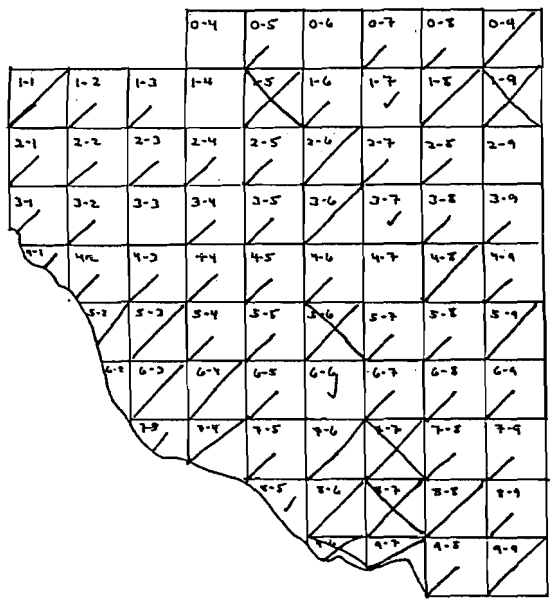
CLARK'S NUTCRACKER



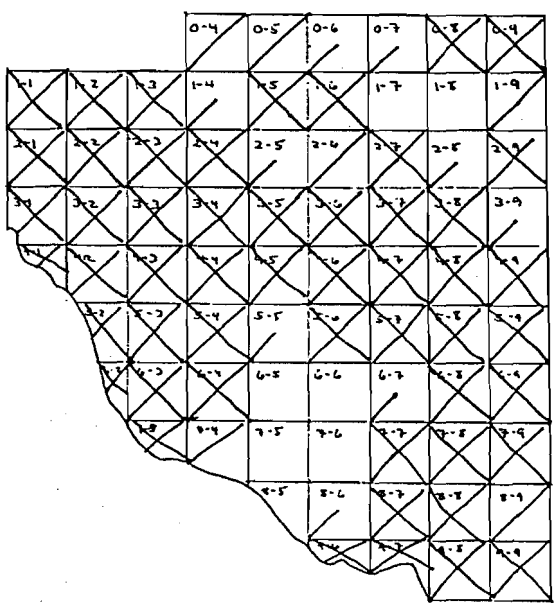
BLACK-BILLED MAGPIE



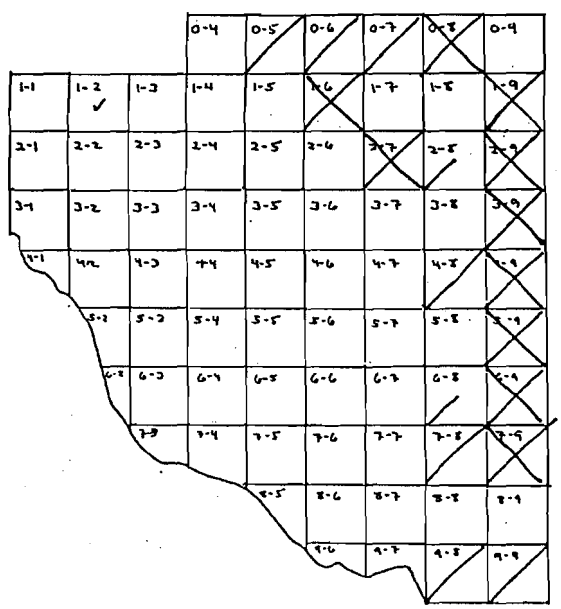
COMMON RAVEN



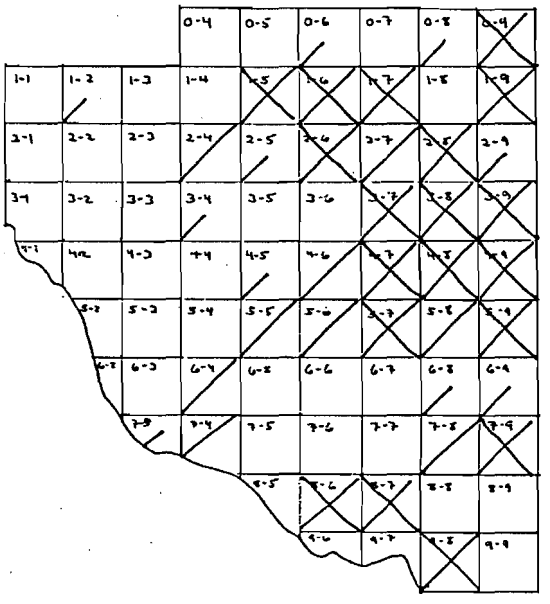
MOUNTAIN CHICKADEE



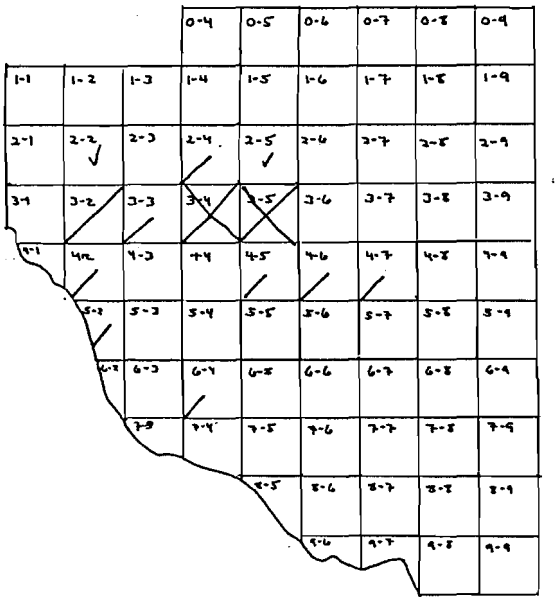
PLAIN TITMOUSE



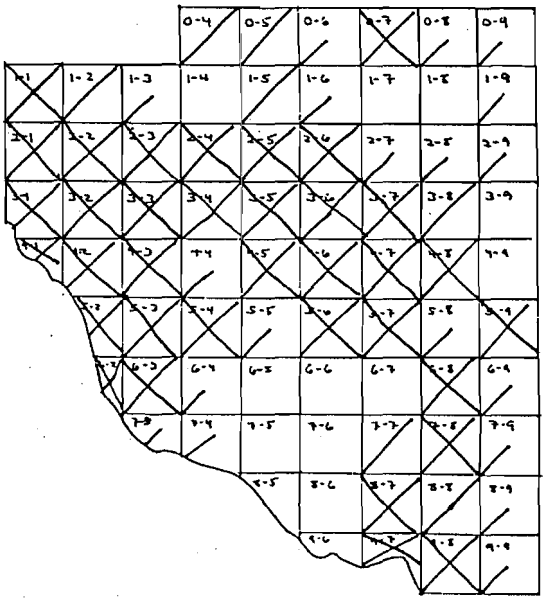
BUSHTIT



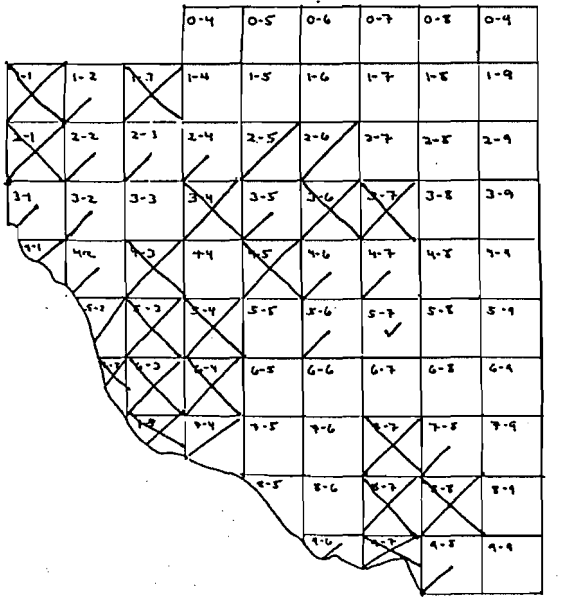
RED-BREASTED NUTHATCH



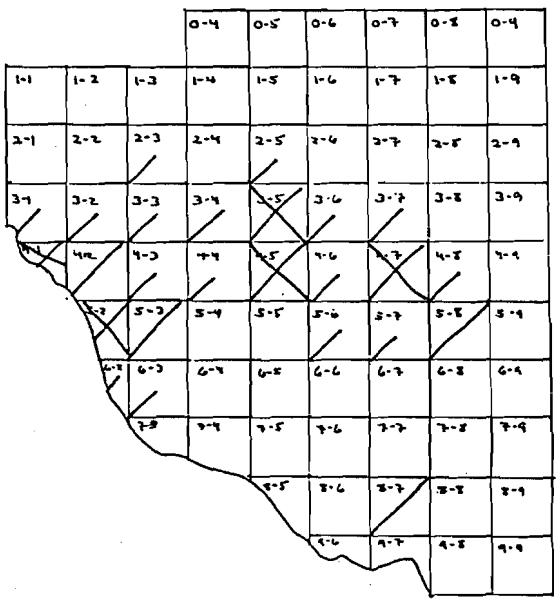
WHITE-BREASTED NUTHATCH



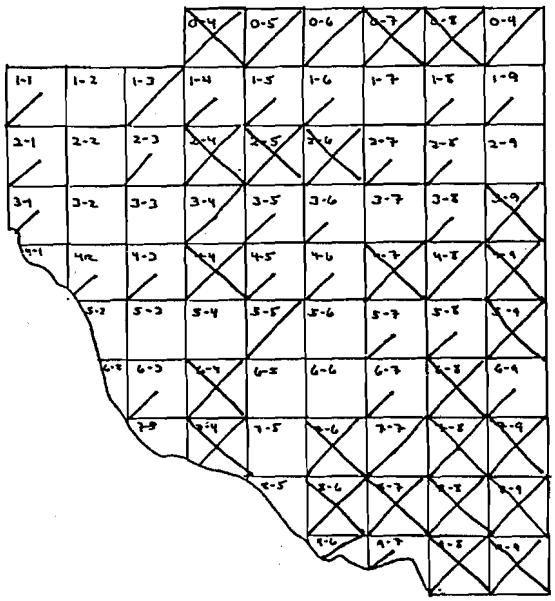
PYGMY NUTHATCH



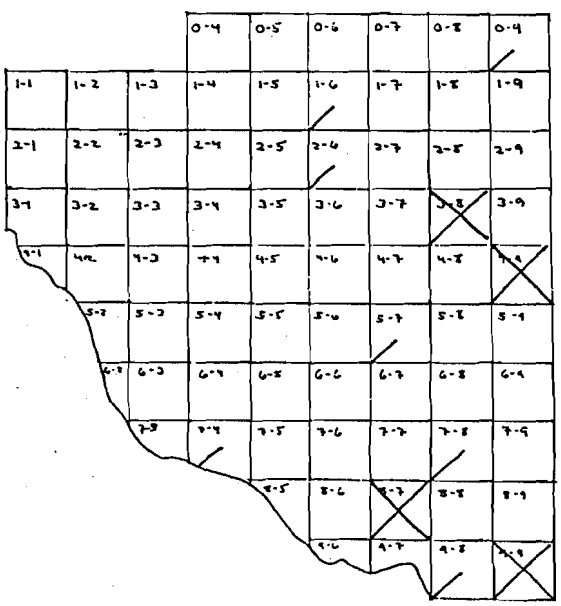
BROWN CREEPER



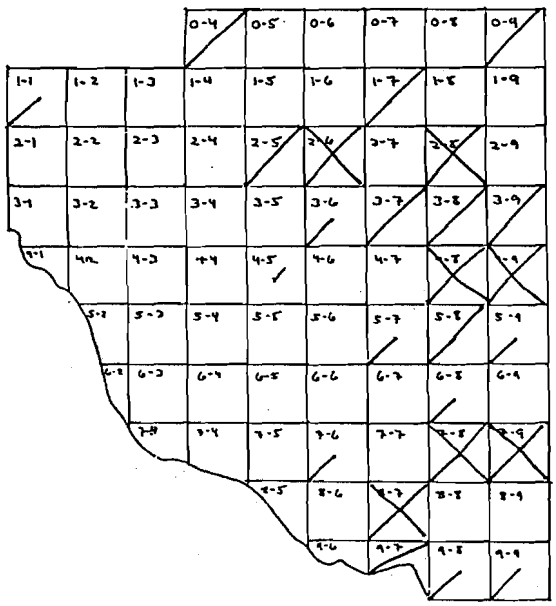
ROCK WREN



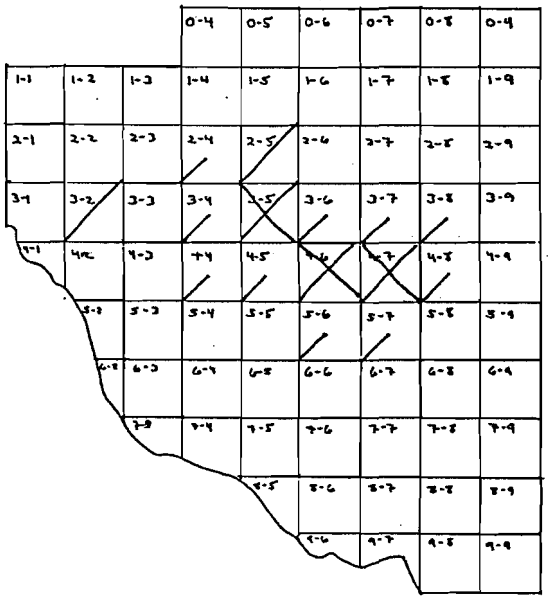
CANYON WREN



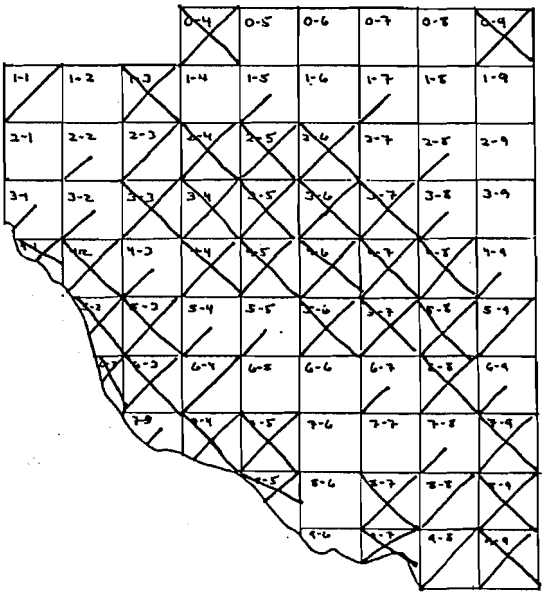
BEWICK'S WREN



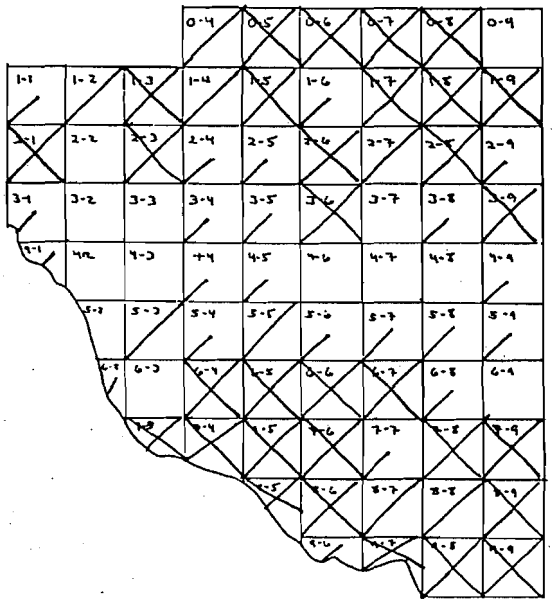
HERMIT THRUSH



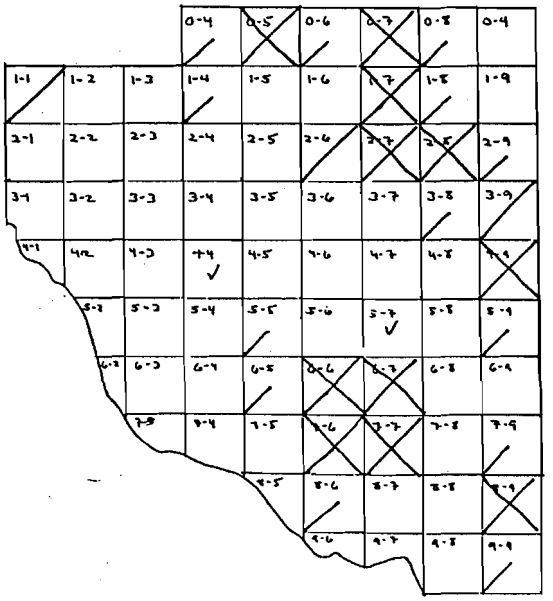
AMERICAN ROBIN



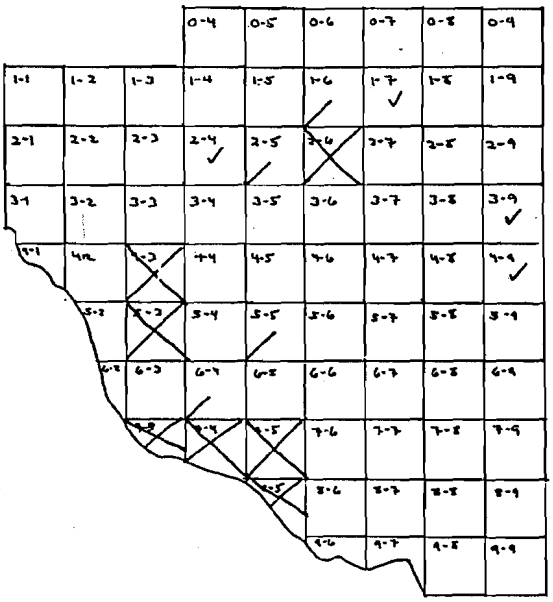
SAGE THRASHER



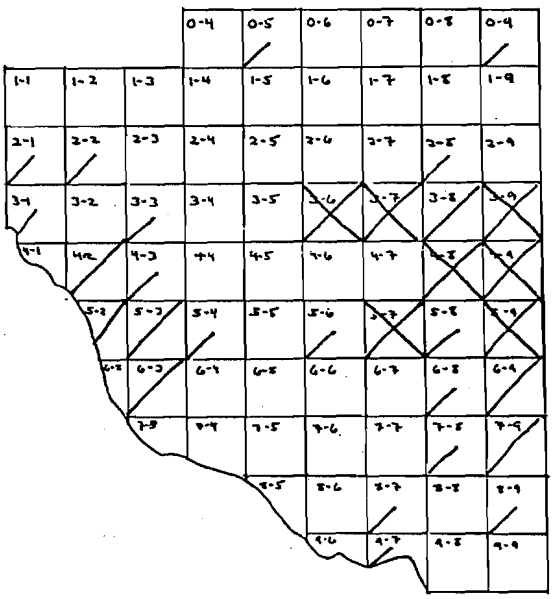
LOGGERHEAD SHRIKE



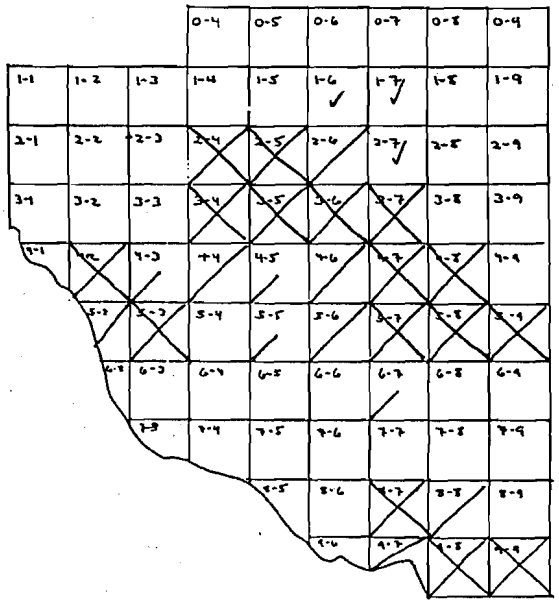
EUROPEAN STARLING



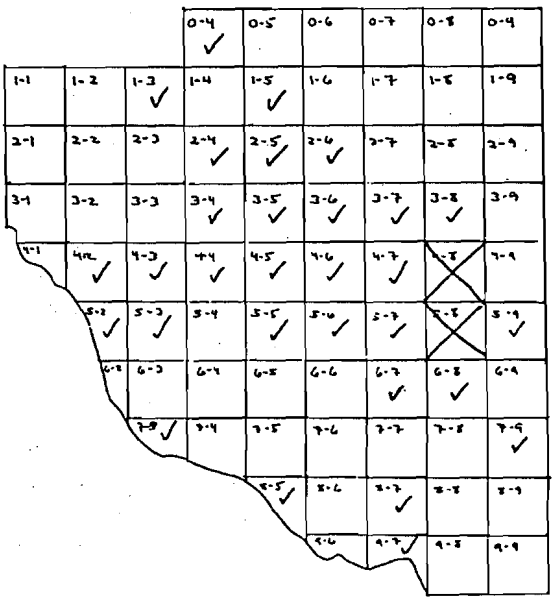
PLUMBEUS SOLITARY VIREO



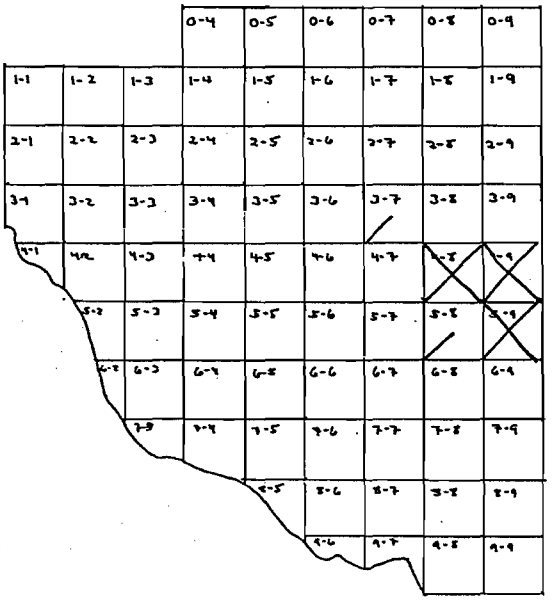
WARBLING VIREO



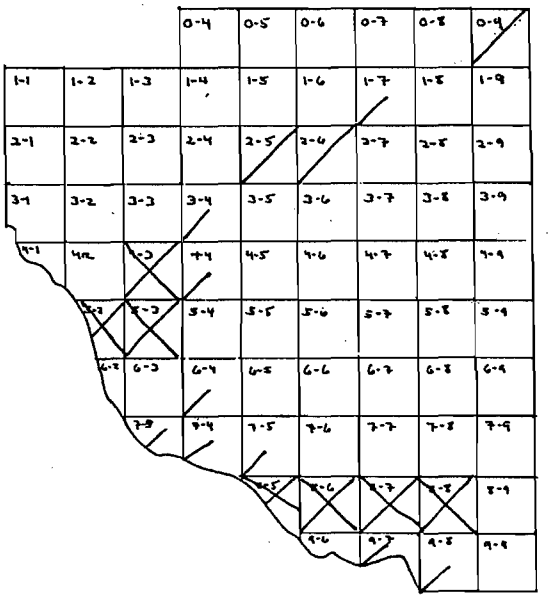
ORANGE-CROWNED WARBLER



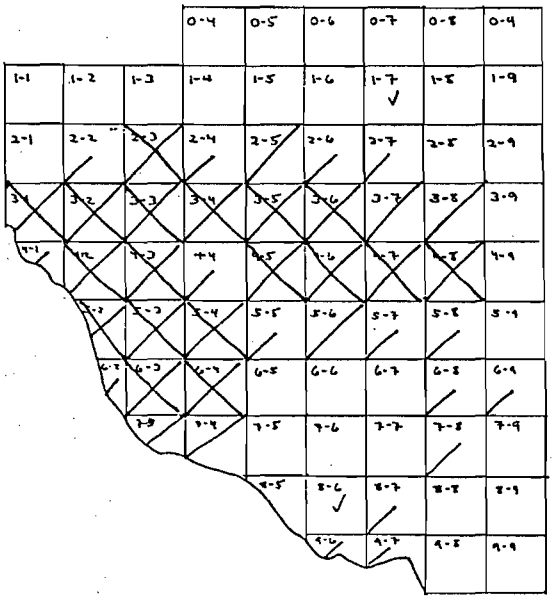
VIRGINIA'S WARBLER



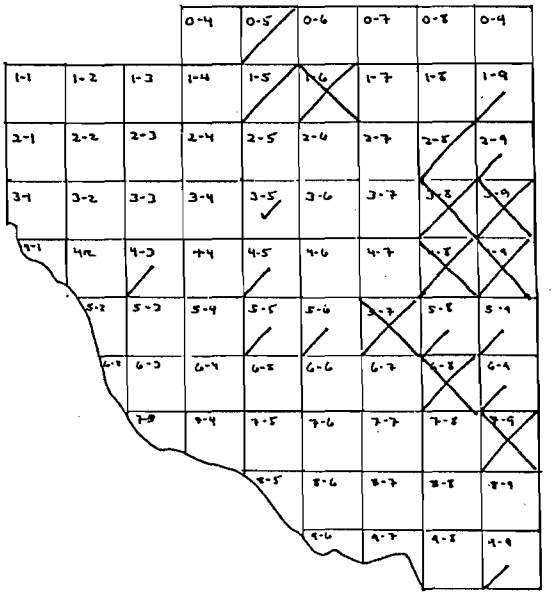
YELLOW WARBLER



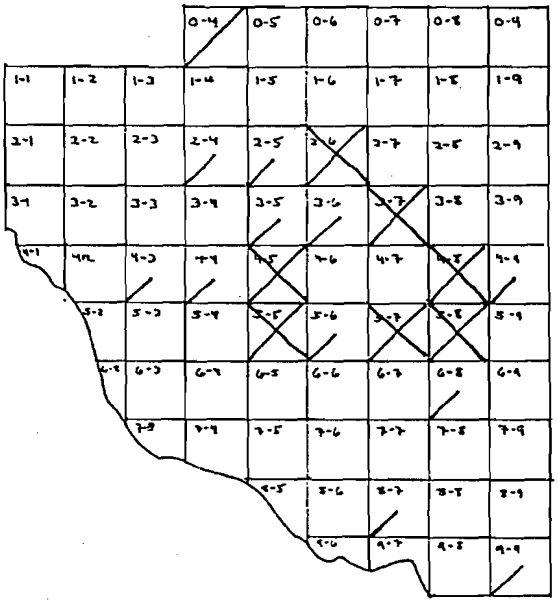
YELLOW-RUMPED WARBLER



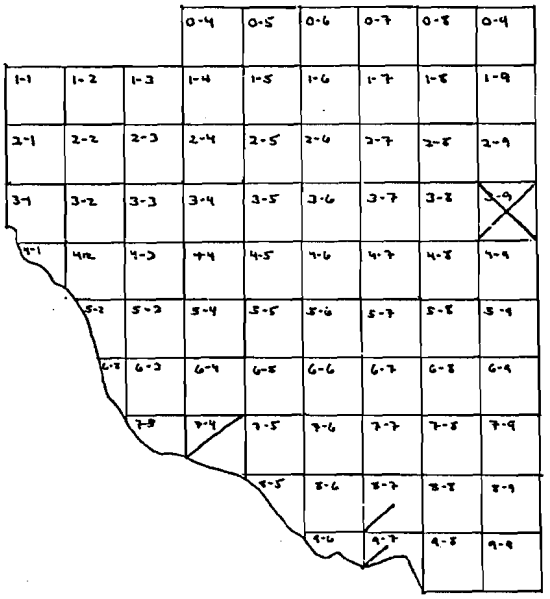
BLACK-THROATED GRAY WARBLER



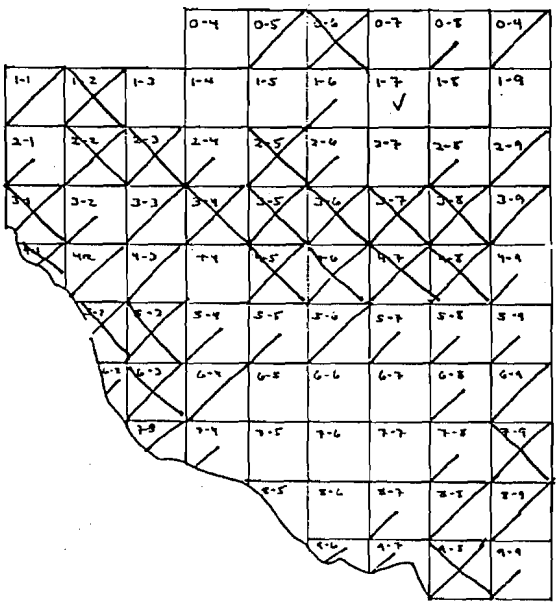
MACGILLIVRAY'S WARBLER



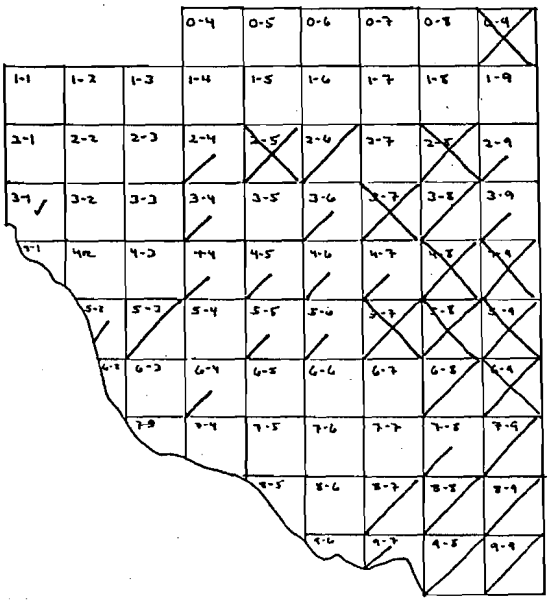
COMMON YELLOWTHROAT



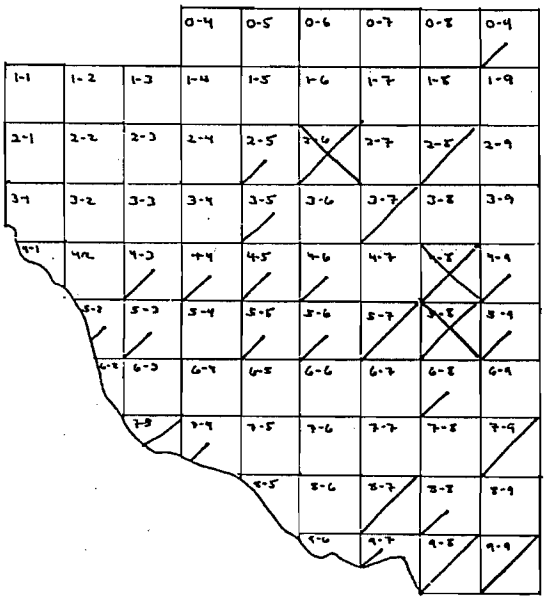
WESTERN TANAGER



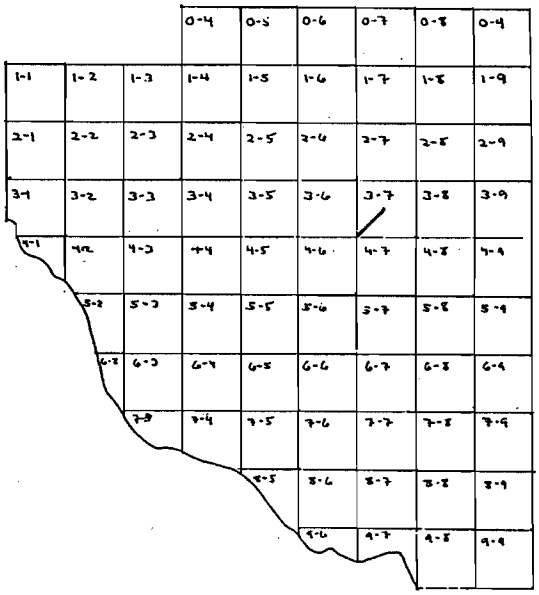
BLACK-HEADED GROSBEAK



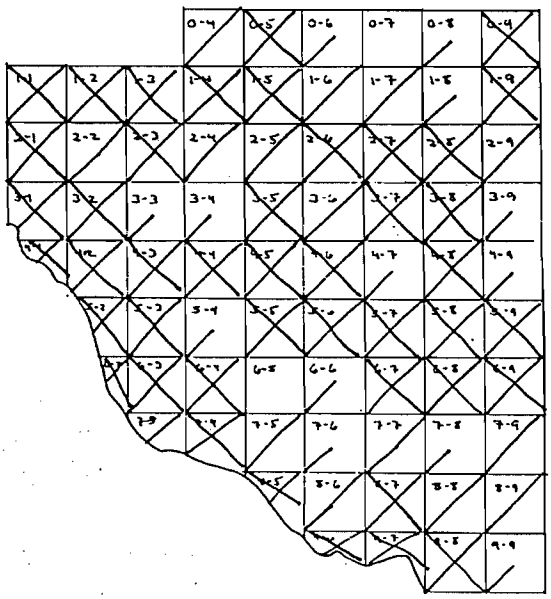
LAZULI BUNTING



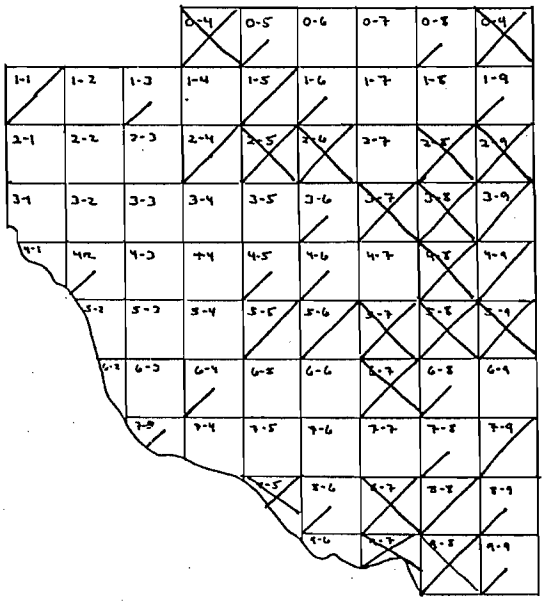
INDIGO BUNTING



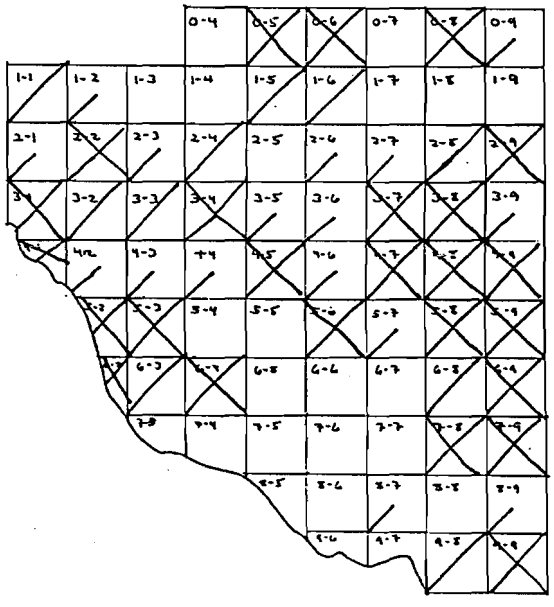
GREEN-TAILED TOWHEE



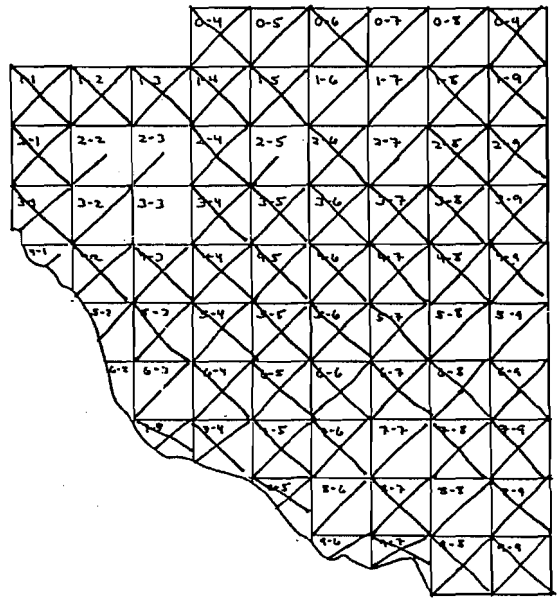
RUFOUS-SIDED TOWHEE



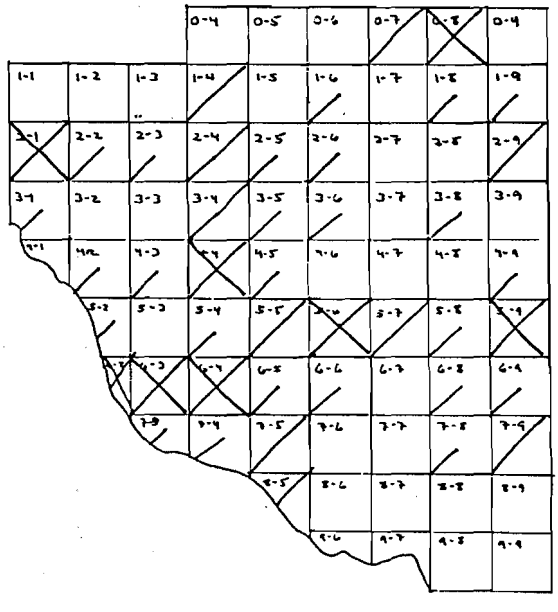
CHIPPING SPARROW



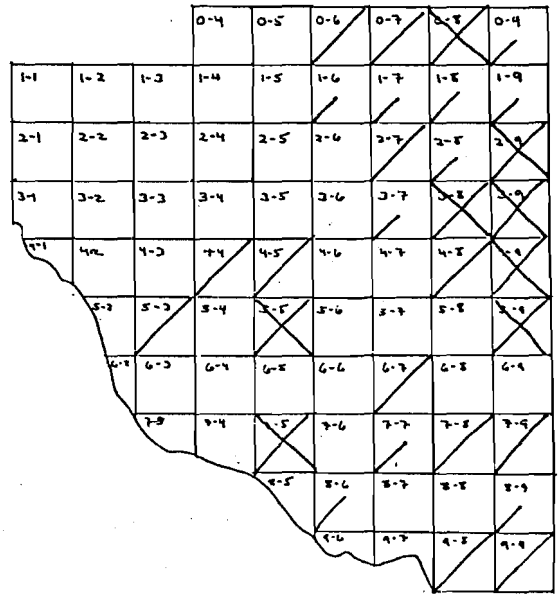
BREWER'S SPARROW



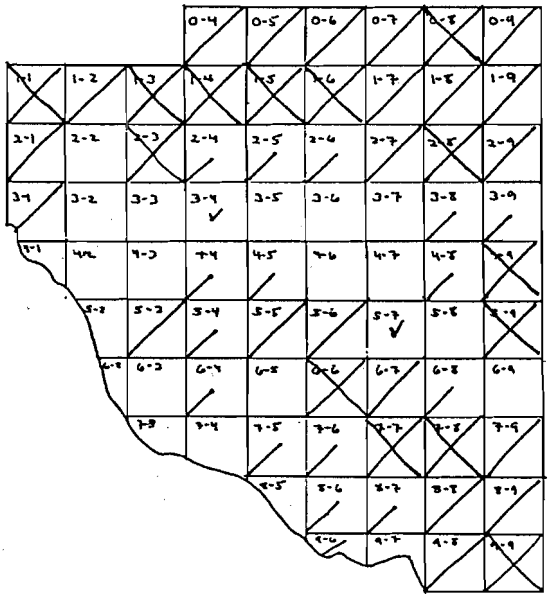
VESPER SPARROW



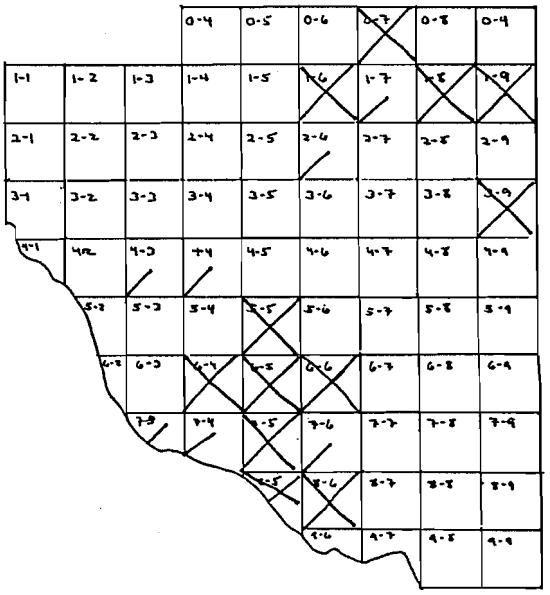
BLACK-THROATED SPARROW



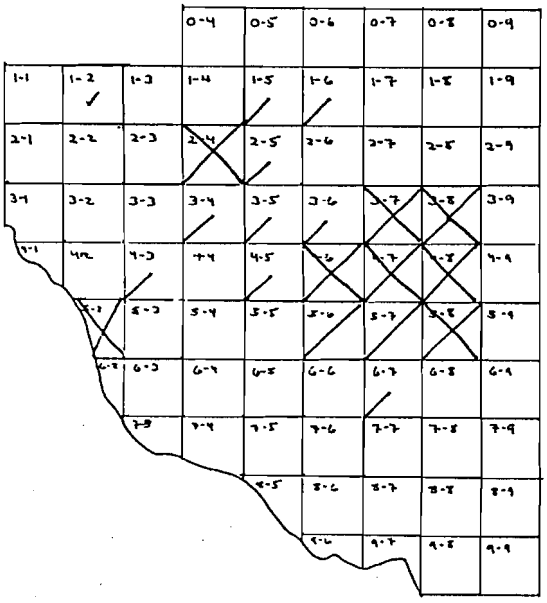
SAGE SPARROW



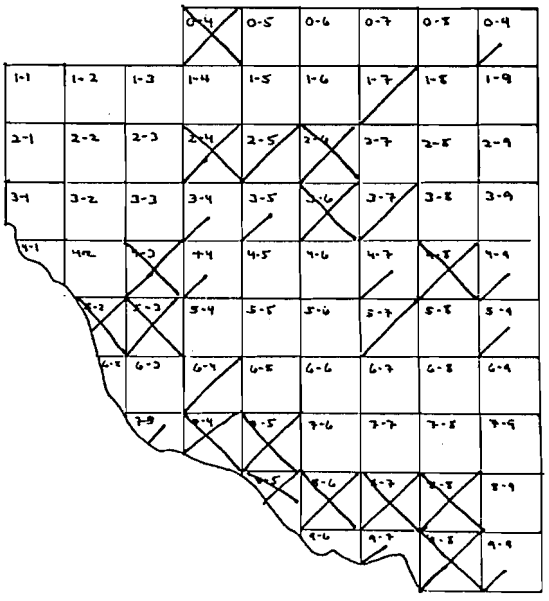
SAVANNAH SPARROW



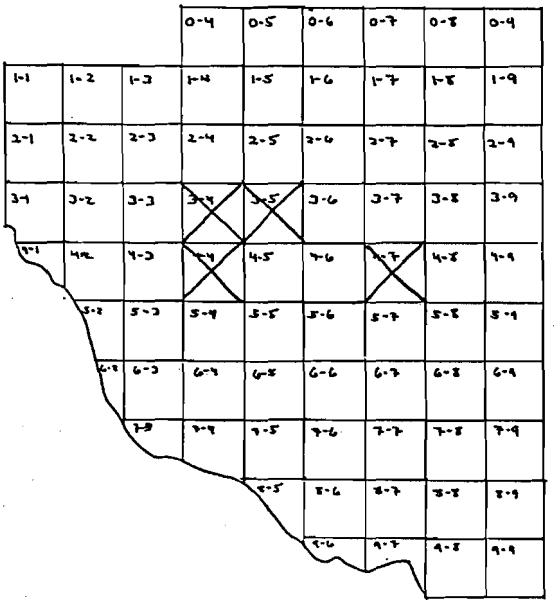
FOX SPARROW



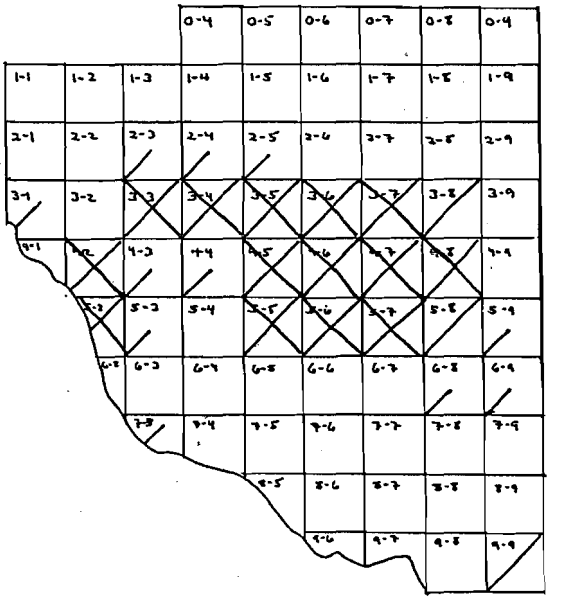
SONG SPARROW



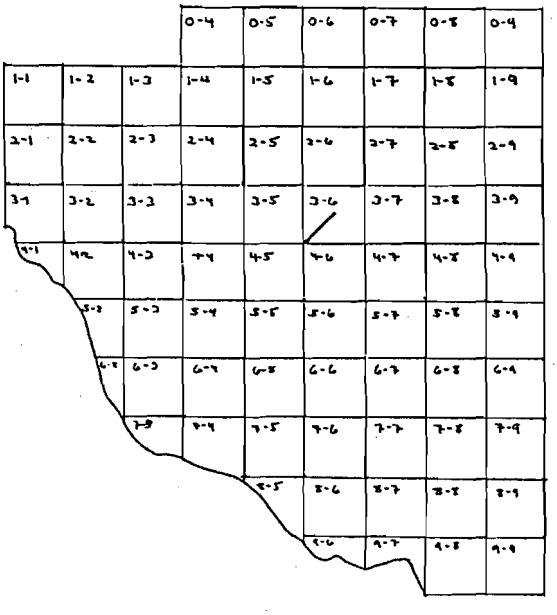
WHITE-CROWNED SPARROW



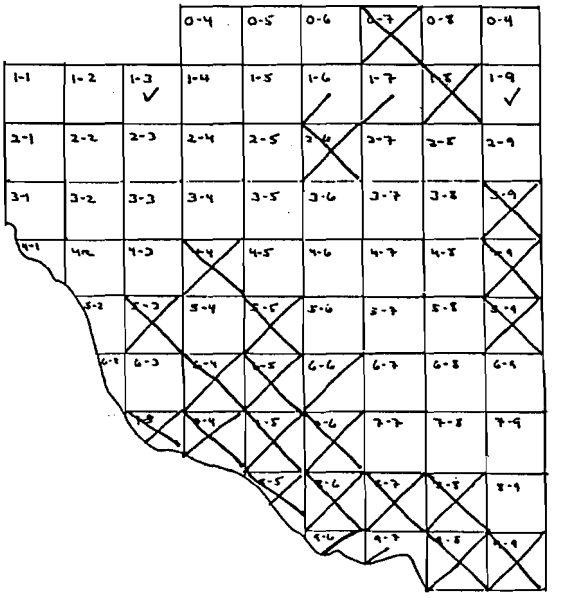
OREGON JUNCO



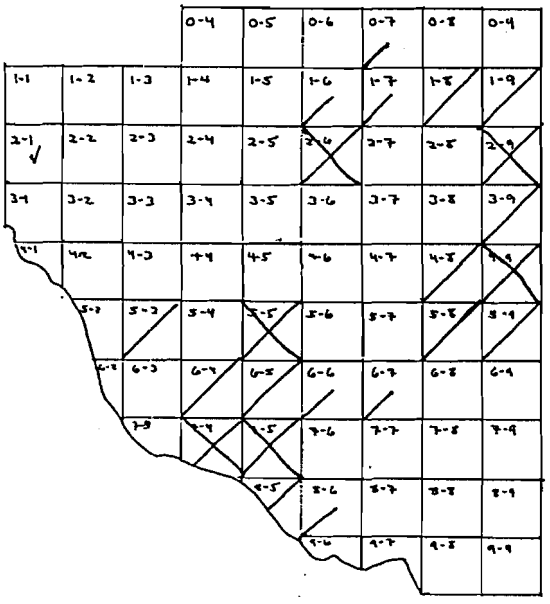
GRAY-HEADED JUNCO



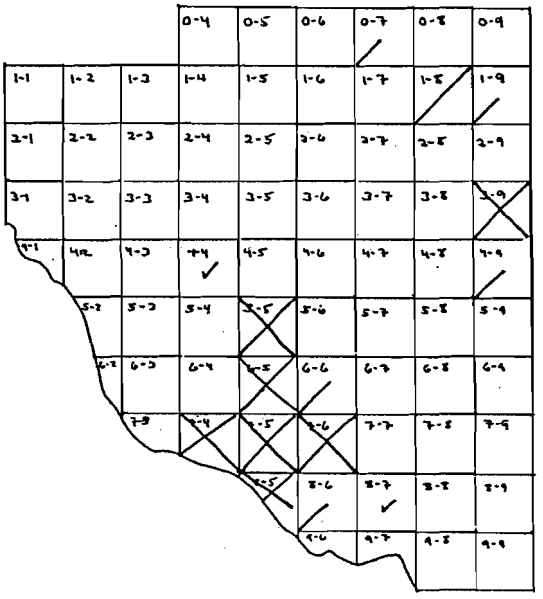
RED-WINGED BLACKBIRD



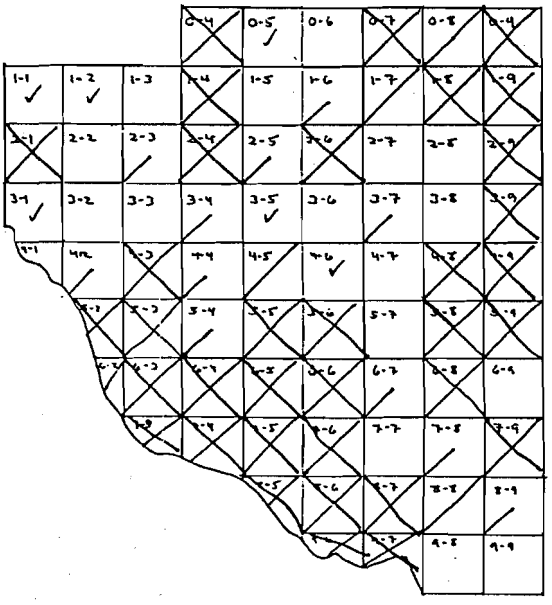
WESTERN MEADOWLARK



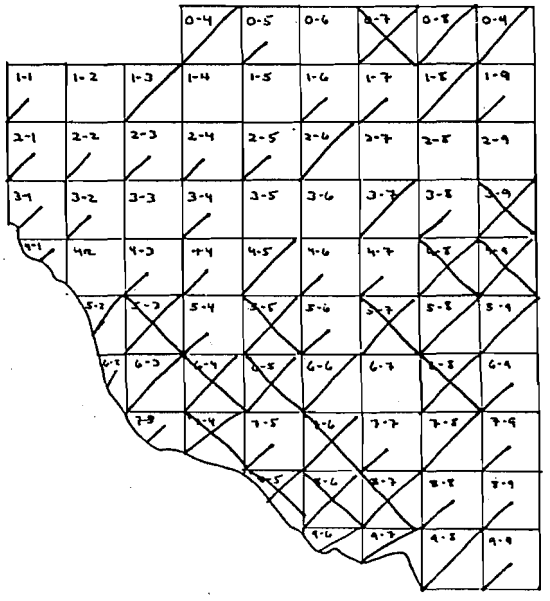
YELLOW-HEADED BLACKBIRD



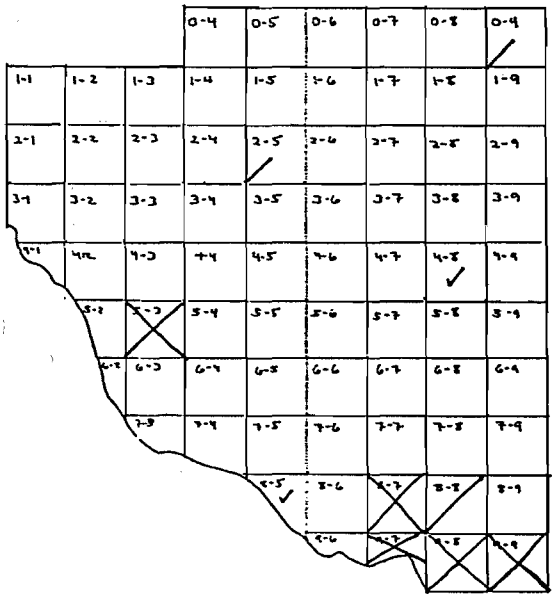
BREWER'S BLACKBIRD



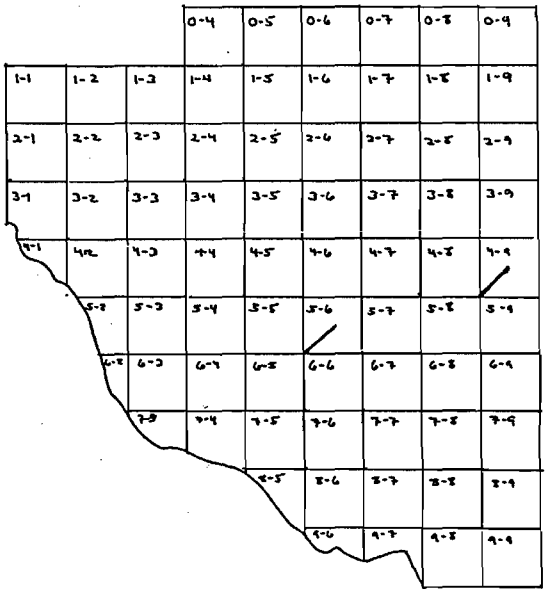
BROWN-HEADED COWBIRD



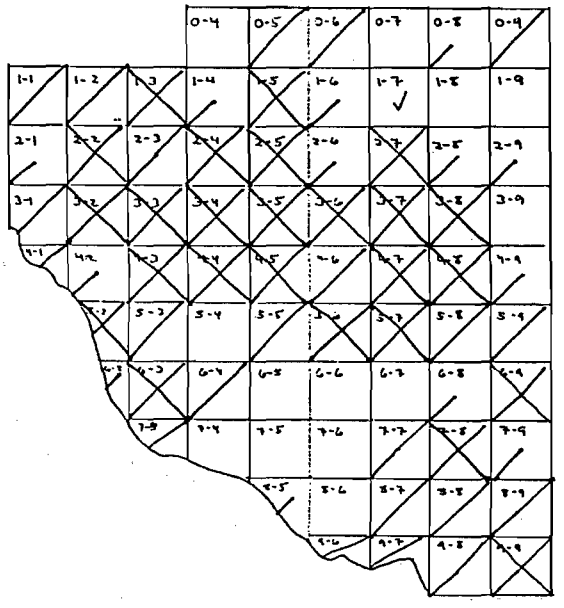
NORTHERN ORIOLE



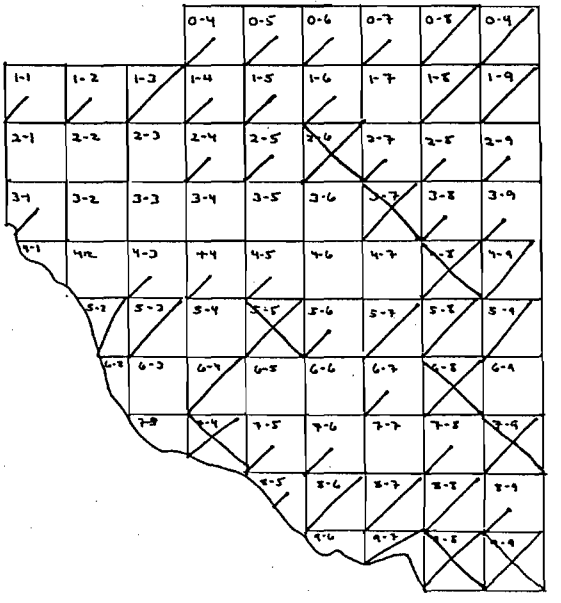
SCOTT'S ORIOLE



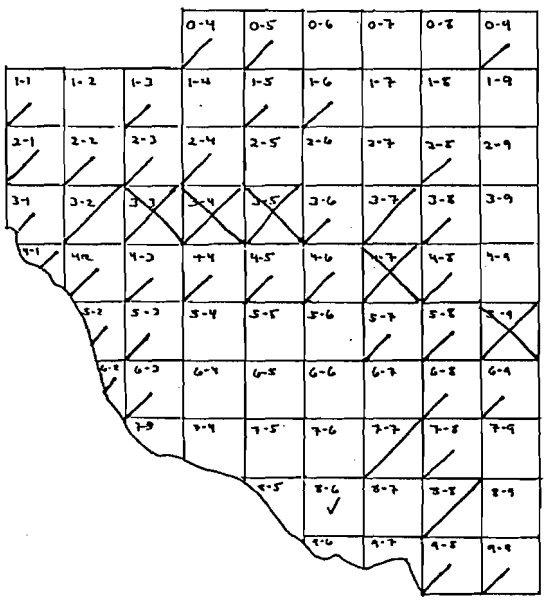
CASSIN'S FINCH



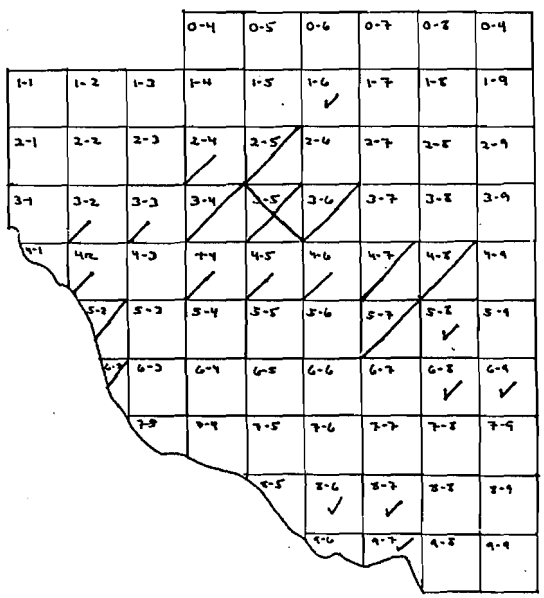
HOUSE FINCH



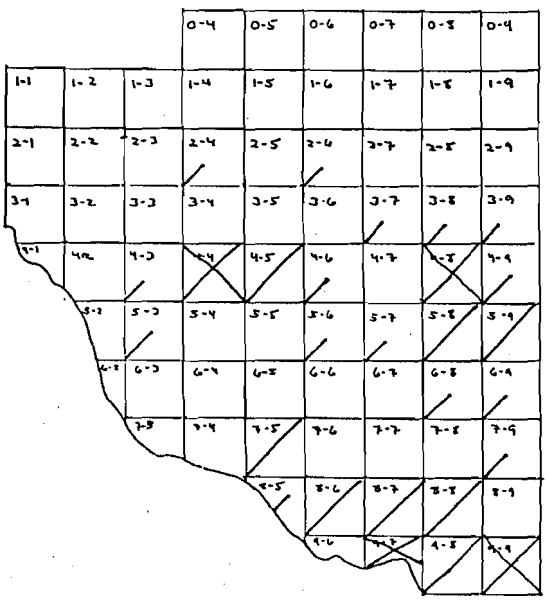
RED CROSSBILL



PINE SISKIN



LESSER GOLDFINCH



HOUSE SPARROW