

BURFORD LAKE, NEW MEXICO, REVISITED

WILLIAM S. HUEY AND JAMES R. TRAVIS

IN 1918 a comprehensive ornithological survey was conducted at Burford Lake by Dr. Alexander Wetmore (*Auk*, 37:221-247, 393-412, 1920). In March 1960 Dr. H. Albert Hochbaum suggested that a resurvey of the area, comparing present conditions with those recorded by Dr. Wetmore 42 years ago, might be of interest. The present paper is a report of such a resurvey.

The Burford Lake area of the Jicarilla Apache Indian Reservation has been included in a survey of waterfowl production in northwestern New Mexico for the past three years, as a contribution to the New Mexico Department of Game and Fish waterfowl investigations project. Some data collected for this project during the years 1958 and 1959 are also included in this account.

We were accompanied by George W. Merrill and Roy E. Tomlinson, of the New Mexico Department of Game and Fish, and were later joined by Mrs. James R. Travis.

The survey was planned as a part of the annual waterfowl study mentioned above; because of other activities it was limited to a one-week period. For purposes of comparison with the original survey the dates of 6 to 12 June were selected as most nearly approaching the peak of activity of Dr. Wetmore's four-week visit. The progress of the season upon our arrival indicated that this selection had been appropriate. Also included in the report are data relating to waterfowl production and summer visitors and data collected during duck-banding activities from 18 to 21 July 1960.

Stone Lake, Embom Lake, and Horse Lake are included in the discussion and the annotated list of birds. This was done so that any shift in waterfowl use, caused by a deterioration of habitat quality on Burford and Thompson lakes, may be accounted for in complementing Dr. Wetmore's work as completely as possible.

The cabin described by Dr. Wetmore and used as his headquarters exists now only as two deteriorating adobe walls. Through the kindness of the Jicarilla Apache Agency and the U.S. Bureau of Sport Fisheries and Wildlife, we used as a base of operations the headquarters of the Burford Lake Wildlife Area, located approximately three km (two miles) west of Burford Lake in a sparse but mature stand of ponderosa pine (*Pinus ponderosa*). A small pond formed by the overflow from a windmill at this location supplied an opportunity to

observe, at close range and with a minimum of travel, most of the passerine species that inhabit the pine-clad hills surrounding the lake.

To supplement field observations, trapping and banding of small land birds, using 10-meter, 4-trammel, 1-inch mesh, Japanese mist nets, was conducted at four typical locations near the lake. The following is a list of these banding sites, with the number of net hours noted:

1. Small pond near headquarters, 215 net hours in June, and 46 net hours in July.
2. Hayden Lake shoreline, 187 net hours in June.
3. Sagebrush flats near the north shore of Burford Lake, 32 net hours in June.
4. Spring in cottonwood grove described by Dr. Wetmore and pictured in Figure 3, 50 net hours in June.

During 530 net hours, over an eight-day period, 300 individuals of 27 species were banded. These records are included in the annotated list by species.

PHYSICAL FEATURES AND GENERAL CONDITIONS

The physical features of the area, as noted by Dr. Wetmore, have changed little during the past 42 years. As nearly as can be determined from his descriptions and from the photographs included in his text, the water levels of the lakes in 1960 are comparable to those of 1918. This similarity is due to a whim of nature, not to stability, as the annual variation is often quite pronounced. For the benefit of the reader to whom Dr. Wetmore's work is not available, a brief description of the lakes and the surrounding terrain is here included.

Burford Lake is located in northern Rio Arriba County of New Mexico on the Reservation of the Jicarilla Apache, near the Continental Divide at an elevation of about 2,300 meters (7,000 feet). To the east is the Chama River, a drainage of the Rio Grande, and to the west is the San Juan River, a drainage of the Colorado. Burford Lake is the largest natural impoundment in New Mexico, and at this time contains approximately 800 hectares (2,000 surface acres), two to three meters in depth—a water level that is about average or slightly above. The lake is constricted at its center by sandstone ridges so that the open, northern end is almost separated from the more-protected, southern end. During the early spring, lack of protection from the persistent west wind causes the northern portion to become quite turbid due to the incessant wave action on the unprotected silt bottom. As the season progresses, however, the intensity of the wind decreases and allows the growth of sago pondweed (*Potamogeton pectinatus*) to cover the lake's surface almost completely. In the southern end of the lake the water is less turbid, and sago pondweed is quite abundant.

The dense growth of roundstem bulrush (*Scirpus occidentalis*), described by Dr. Wetmore as nesting cover on the east side and south end of the lake, is much reduced. During the drouth of the early 1950's, and we may assume also during the 1930's, these rushes were left high and dry by the receding shoreline. Lack



Figure 1. The narrow center portion of Burford Lake. This photograph was taken about 100 meters south of the point from which photograph 1, plate 8, in Dr. Wetmore's work was taken. The pronounced reduction in emergent vegetation may be noted by comparing these two photographs.



Figure 2. The emergent aquatic vegetation is becoming reestablished after being reduced by drouth and overgrowing.

of moisture, coupled with intense grazing by cattle and horses, so weakened these stands that their recovery at this time is just beginning. At any rate, their sparseness during the past few years has afforded nesting cover to only the very late nesters.

The black and gray willows mentioned by Dr. Wetmore have evidently been completely destroyed as shoreline vegetation, since none are now to be found around the lake. Large trunks of cottonwood (*Populus* sp.) may be found lying around the shore, but only small, broad-leaved cottonwood (*Populus wislizenii*) are growing here. Thus, we may confidently assume that the shoreline flora is only now recovering from severe drouth. Substantial amounts of three-square (*Scirpus* sp.) are becoming established on the north and west sides of the northern portion of the lake.

One vegetative factor not mentioned by Dr. Wetmore is a good stand of smartweed (*Polygonum* sp.) located at the southwestern end of the northern section of the lake. The smartweed is host to small aquatic organisms, and its seed makes this species quite valuable to waterfowl.

Hayden Lake, a long, narrow impoundment lying about 300 meters east of Burford, covers perhaps 40 hectares (100 surface acres) and is about two meters deep. The central and southern portions are surrounded by dense stands of roundstem bulrush, which we imagine compare to those described by Dr. Wetmore on Burford in 1918. The value of this growth is supplemented by sago pondweed and smartweed to make this small lake quite attractive to the area's bird life. An inspection of the rushes revealed 43 coot nests that contained eggs, ranging from incomplete clutches, to one in which there were two newly hatched young. The nests of one Black-crowned Night Heron and one Pied-billed Grebe were also found in the same area. Although an exact count was not made, it was estimated that 100 nests of Yellow-headed Blackbirds occupied the rushes also.

Thompson Lake, often referred to as Laguna de la Puerta, into which Burford Lake overflows during extremely high water, has for the past few years been quite low to nearly dry and consequently very little use for nesting has been made of it by water birds.

Stone Lake, 11 km (seven miles) north of Burford, a natural impoundment of about 240 hectares (600 acres), is put to only limited use for breeding waterfowl due to the absence of shoreline vegetation, but is quite heavily used by waterfowl during the fall migration.

Horse Lake and Embom Lake are artificial impoundments 11 km north of Stone Lake. Horse Lake impounds about 80 hectares (200 surface acres) and Embom about 16 hectares (40 surface acres). These two lakes are quite similar in water quality, being considerably less alkaline than the four previously described.

Reference will be made in the annotated list to Apache Mesa. This mesa rises to the east of Burford Lake to a maximum elevation of about 2,700 meters.

The vegetative types described by Dr. Wetmore remain practically unchanged. Sagebrush (*Artemisia tridentata*) continues to dominate the landscape of the rolling hills surrounding the lakes. Saltgrass (*Distichlis stricta*) and foxtail (*Hordeum jubatum*) are common shoreline grasses. Another grass quite common in the area now, but not mentioned by Dr. Wetmore, is cheatgrass (*Bromus tectorum*). At the higher elevations around the lakes these species are replaced by pinyon (*Pinus edulis*) and juniper (*Juniperus monosperma*), with patches of Gambel oak (*Quercus gambelii*) on the open hillsides, and currant (*Ribes* sp.), chokecherry (*Prunus* sp.), and serviceberry (*Amelanchier* sp.) on the better-



Figure 3. The grove of narrow-leaved cottonwood (*Populus angustifolia*) described by Dr. Wetmore is still in existence, and was used as banding site No. 4 during the 1960 survey.



Figure 4. Hayden Lake located east of Burford Lake is host to a substantial stand of roundstem bulrush (*Scirpus occidentalis*). These rushes were used extensively by nesting coots during the 1960 survey period.

watered, more-protected areas. Above the pinyon-juniper is typical ponderosa pine bench country with an understory of the above-mentioned, deciduous species. Douglas fir is common on the north-facing slopes within three km of Burford Lake.

The mule deer is a common resident over the entire area, as are coyotes, skunks, badgers, porcupines, cottontails and jackrabbits. The wolf mentioned by Dr. Wetmore has long since departed from all of northern New Mexico. One colony of beaver now inhabits the southeastern portion of Burford Lake, and muskrats were seen in both Burford and Hayden lakes.

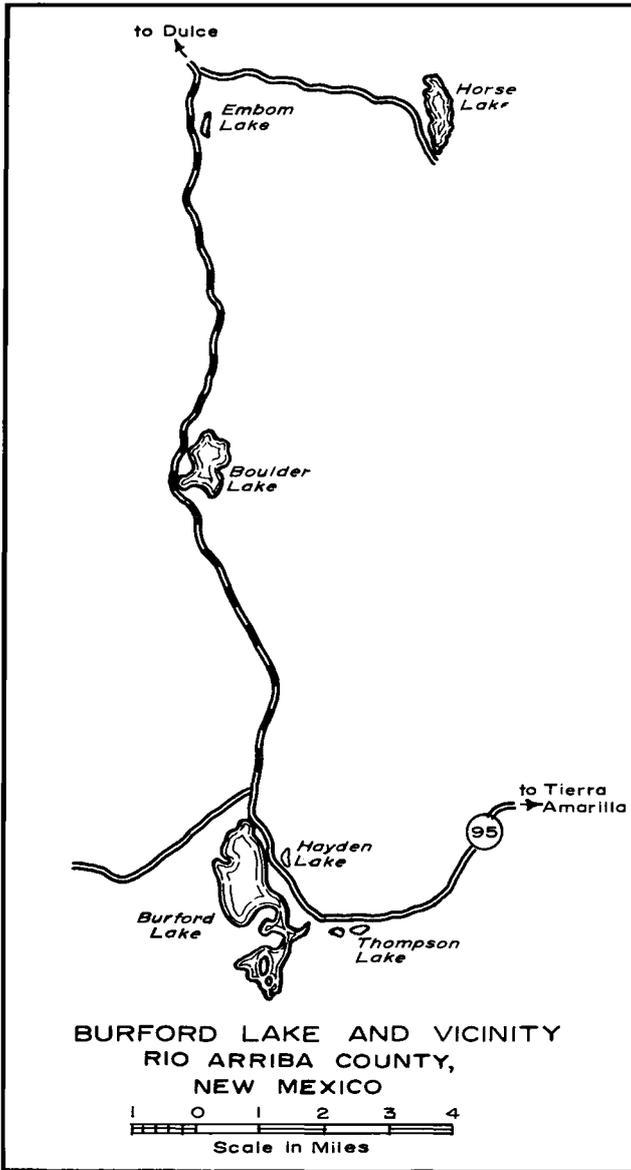
Fish life is still nonexistent in Burford Lake. Rainbow trout have been established by stocking in Horse Lake. This development has had an untoward effect on the value of this lake for waterfowl production. During the breeding season of 1958, approximately 54 broods of ducks were produced on Horse Lake. In 1959, after the stocking of trout, only nine broods were observed; and in 1960, a check revealed only one brood (on 8 June). Even this one brood may not have been raised to flying age on the lake; it could not be located on subsequent counts. These notes are not meant to indicate that trout and ducks are incompatible, but that the presence of fishermen is a source of never-ending disturbance to nesting waterfowl.

Burford Lake is still the host of thousands upon thousands of axolotl (*Ambystoma* sp.), commonly called waterdog, mud puppy, or guajalote. The condition mentioned by Dr. Wetmore during June of 1918 when "they began to die in considerable numbers" was perhaps due to low oxygen levels caused by the decay of submerged aquatic vegetation, or to an excessive level of carbon dioxide given off by this growth on cloudy days when the process of photosynthesis is disrupted. This is not an uncommon cause of fish mortality in shallow, heavily vegetated lakes of New Mexico.

GENERAL DISCUSSION

The Burford Lake area attracts many male ducks during the molting period now, as it did at the time of Dr. Wetmore's survey. It seems, however, that there has been a shift in the species involved. Not mentioned in his work, the Pintail is the dominant species. During the summer of 1959, 324 Pintails were banded on Burford, Hayden, and Horse lakes. Of these, approximately 90 per cent were adult males, and the number banded represented less than half of the total population. Total numbers of ducks and coots on Burford Lake during the molting period have approached 5,000 for the past three years.

As mentioned by Dr. Wetmore, this area plays an important role during periods of migration. The spring migration was over by the time of our arrival on 6 June 1960, and, unfortunately, no data are available regarding the numbers of land birds using the area during migration at this time. Dr. Wetmore reported a number of migrant species in May and early June that we did not see. Aerial counts of waterfowl, however, were made biweekly during the fall migration in 1959 and 1960. In 1959 the peak population of ducks, 26,474, and



coots, 8,275, was reached in mid-October. The count on 8 December 1959 revealed only 1,050 ducks, 29 Canada Geese, and 125 coots. In 1960 the peak of 35,428 ducks and 9,785 coots was reached in late September, and by 11 December 1960 the population had dropped to 1,297 ducks, 14 Canada Geese, and 555 coots. On the peak count, Pintails made up 7,430 of the total, followed in numbers by teal, chiefly Green-winged (6,374), and Mallards (4,610). The peak count of 3,050 Redheads also occurred during this same period, while the peak of 3,375 Canvasbacks was reached in late October. As Dr. Wetmore stated, the lakes become covered by ice during early December and remain frozen until March.

The annotated list shows that the general nature of the bird population in the Burford Lake area was much the same in the summer of 1960 as it was in the summer of 1918, with regard to species present. The annotated list contains notes on 126 species present at Burford Lake and vicinity during either one or both of the surveys. Of these, 21 were recorded in 1960 but not in 1918, and 26 of those species recorded in 1918 by Dr. Wetmore were not seen by our party in 1960. In most cases these were migrants in 1918, summer wanderers in 1960, or species of which only one or two individuals were seen.

The reduction of shoreline growth from 1918 conditions is strikingly reflected in the absence in 1960 of the Yellowthroat, Savannah Sparrow, Song Sparrow, and Virginia Rail, which Dr. Wetmore reported as fairly common nesting birds.

The bird populations of the open fields and sagebrush flats were essentially unchanged after 42 years. One additional species, the Horned Lark, not seen by Dr. Wetmore, was common along the dirt roads near the lake in 1960.

The other important changes in the avifauna were several additional species found in the forested areas. One of the commonest birds in the pinyon-juniper in 1960 was the Blue-gray Gnatcatcher. This species as well as the Scrub Jay, which was fairly common in this habitat, were not reported by Dr. Wetmore.

In the ponderosa pines on Apache Mesa, the Hermit Thrush, Olive-sided Flycatcher, and Gray-headed Junco were seen in 1960 but not in 1918. A more noticeable difference, however, was the presence of large flocks of Red Cross-bills, which were seen in all of the ponderosa pine areas. Also, Clark's Nutcrackers were fairly common in the pines. Neither of these species was reported by Dr. Wetmore. The Williamson's Sapsucker, which was reported as fairly common in this habitat by Dr. Wetmore, was not seen in 1960.

As was mentioned previously, the Pintail, now common in migration as well as during the breeding and molting period, was not recorded by Dr. Wetmore.

ANNOTATED LIST

Podiceps caspicus. Eared Grebe. Although no mention is made of total numbers, Dr. Wetmore states "the Eared Grebe was the most abundant of the breeding marsh birds at Burford Lake." During our survey in June 1960 there were 242 of these birds on Burford Lake, nine on Horse Lake, and four on Hayden Lake. Nesting activities had not yet begun at that time. When we returned in July for waterfowl banding, it was noted that two substantial nesting colonies were under construction in the southern portion of Burford Lake. In some of the nests one egg had already been laid, but no nests were found containing more than one egg. During banding activities in July 1959 two colonies containing approximately 100 nests each were found in the northern portion of Burford near the west shore. These two colonies were about 300 meters apart. Incubation was well advanced in most cases, and some broods had already hatched.

Aechmophorus occidentalis. Western Grebe. There is no mention made of the presence of this bird during Dr. Wetmore's survey, and none were seen during the June period of 1960. In July, however, one was seen on the north portion of Burford Lake.

Podilymbus podiceps. Pied-billed Grebe. These birds were found only on Burford and Hayden lakes during the 1960 survey. There were 30 on Burford and six on Hayden Lake during this period. One nest was found on Hayden Lake in June 1960, and one brood and two nests containing eggs were observed on Hayden Lake in July. The Pied-billed Grebe was listed by Dr. Wetmore "common at Lake Burford, and was breeding."

Pelecanus erythrorhynchos. White Pelican. Dr. Wetmore reported "a few were found in migration" in 1918. None were observed during our 1960 survey.

Ardea herodias. Great Blue Heron. Two summer wanderers were seen in July 1960, but none were seen in June. Dr. Wetmore reported several spring migrants.

Leucophoyx thula. Snowy Egret. Dr. Wetmore reported these in migration. We saw one on 19 July but none in June.

Nycticorax nycticorax. Black-crowned Night Heron. There were 15 pairs of these herons at Burford during Dr. Wetmore's survey. He states that these were preparing to nest in the rushes on Thompson Lake at the time of his departure. During June of the 1960 survey eight Black-crowned Night Herons were found on Hayden Lake and none were observed at any other location. It was common to see all eight of these perched on the posts of a fence, which crossed the south end of the lake. At least half were in subadult plumage. One nest of these birds was found in the bulrushes on the east side of Hayden Lake. In July several adult Black-crowned Night Herons were seen along the shore at Burford Lake.

Botaurus lentiginosus. American Bittern. Dr. Wetmore heard a bittern 29 May and found one 11 June. We found none.

Anas platyrhynchos. Mallard. Dr. Wetmore states that the Mallard was one of the most common species of ducks breeding at Lake Burford. He estimated that 40 pairs were preparing to nest there during the season of 1918. This condi-

tion of relative abundance still exists. It was estimated that 365 Mallards were present on the six lakes included in this survey during the week of 6 June 1960. During a comparable period of 1959, the Mallard population of the area was estimated at 627. An adult male duck, which was quite obviously a Mallard X Pintail hybrid, was taken at Burford Lake during banding activities in the summer of 1960. This bird had just begun the postnuptial molt and still retained the green feathering of the Mallard on the head, but with the white stripe up the side of the neck as on the Pintail. In all sections this bird appeared more or less randomly endowed with the characteristics of either one parent or the other.

Broods Observed

	1960	1959	1958
Burford Lake	6		1
Hayden Lake	1		
Thompson Lake			2
Stone Lake	1		3
Embom Lake	1	2	2
Horse Lake		2*	8**

* Nine unidentified broods were observed during banding operations 27 July 1959.

** Twenty-eight unidentified broods were observed on Horse Lake on 9 July 1958. No doubt some of these were Mallard broods. Twenty-eight local Mallards were banded at Horse Lake on 22 July 1958.

Anas diazi novimexicana. New Mexican Duck. Dr. Wetmore mentions that on 25 May he observed in the company of a pair of Mallards a "large, very dark-colored duck," which he judged to be a Mexican Duck (*Anas diazi*). He further states that no other ducks of this type were observed. During banding at Hayden Lake on 18 July 1960 an exceptionally dark adult female duck was taken that resembled more nearly a female New Mexican than a Mallard. The bill in particular was distinguishing. Rather than being orange and black, as on the Mallard, it was dark olive-green with small black spots on either side near the base. In connection with a project to attempt the restoration of New Mexican Ducks through artificial propagation, a small number of New Mexican Ducks have been live-trapped by personnel of the New Mexico Department of Game and Fish. The bills of three females being held under this project are olive-green, but are not spotted. For these reasons this bird was considered to be a hybrid New Mexican X Mallard, rather than a purebred.

Anas strepera. Gadwall. It was estimated that 60 pairs of Gadwall were breeding at Burford Lake during Dr. Wetmore's survey. The Gadwall is still common in the area, and during our survey there were 261 Gadwalls present. These birds were mostly paired, but only one Gadwall brood was observed, and this was during banding operations in July 1960. Two Gadwall broods were observed in 1958, one on Thompson Lake and one on Stone Lake. In 1959 one brood was noted on Burford Lake.

Anas acuta. Pintail. No mention is made by Dr. Wetmore of the presence of Pintails in the area. During the past three seasons the Pintail has been an important species here. During the second week of June 1960, 65 Pintails, mostly paired, were present on the six lakes covered. In 1959 there were 375 pairs of Pintails on Burford Lake during the second week of June. There were also 24

pairs of Pintails on Horse Lake, five pairs on Stone Lake, and 29 pairs on Thompson Lake during this same period.

Broods Observed

	1960	1959	1958
Burford Lake	1		1
Hayden Lake			3
Stone Lake		1	4
Embom Lake			2
Horse Lake	1	1	13*

* Twenty-eight unidentified broods were observed on Horse Lake on 9 July 1958. Seventeen local Pintails were banded on Horse Lake and three on Hayden Lake on 22 July 1958.

Anas carolinensis. Green-winged Teal. The Green-winged Teal is common in the Burford Lake area. Approximately 180 were present in June 1960. In 1918 Dr. Wetmore saw five pairs, which he judged to be nesting at Burford Lake. Molting Green-wings are also common; 40 to 50 have been banded each summer since 1957.

Broods Observed

	1960	1959	1958
Burford Lake	2	1+*	1*
Hayden Lake			1
Embom Lake			1+*
Horse Lake		2	1+*

* Broods seen and identified only as teal broods. In all cases local Green-winged Teal were banded at these locations. In July 1958, 52 local Green-wings were banded at Horse Lake. In July 1959, 21 local Green-wings were banded on Horse Lake, and three on Burford Lake.

Anas discors. Blue-winged Teal. Dr. Wetmore estimated that four pairs of Blue-winged Teal were nesting on Burford Lake in 1918. During the 1960 survey only two pairs of Blue-wings were seen, but brood count records indicate that Blue-wings are more important than these numbers imply.

Broods Observed

	1960	1959	1958
Burford Lake	2		
Hayden Lake		2	1
Thompson Lake			6
Embom Lake	1		3
Horse Lake		1	

Anas cyanoptera. Cinnamon Teal. Dr. Wetmore described this species as common. It was estimated during our survey that 57 Cinnamons were present on the six lakes. Due to the difficulty of distinguishing between female Cinnamons

and Blue-wings at any distance, there is only one recorded instance of Cinnamon Teal production in the area. This brood, recorded in 1958, was trapped with the female on Hayden Lake. The female was judged to be a Cinnamon on the basis of bill size and body color. In addition to this, one pair of Cinnamons had been observed on the lake at regular intervals during the breeding season, and no pairs of Blue-wings had frequented Hayden Lake during this period.

Mareca americana. American Widgeon. Dr. Wetmore records two pairs of widgeon apparently nesting at Burford Lake, and single males seen occasionally. During June of 1960 only three widgeon were seen. During banding operations in July 1960 one brood of widgeon was seen on Burford Lake and one on Hayden Lake. These are the only broods of widgeons identified on the area during the past three seasons. Although they are not abundant, male widgeons are not uncommon during the molting period on Burford Lake.

Spatula clypeata. Shoveler. The Shoveler was listed as common at Burford Lake by Dr. Wetmore, and he estimated that 15 pairs nested there in 1918. During our visit in 1960 only seven Shovelers were observed, and brood counts over the previous two seasons noted only one brood in 1959 on Hayden Lake. From this brood two individuals were trapped and banded in July 1959.

Aix sponsa. Wood Duck. Dr. Wetmore did not record the presence of Wood Ducks during his survey, and due to the habitat type this is to be expected. On 18 July 1960, however, as preparations were being made to begin trapping on Hayden Lake, a duck was observed sitting on a post in the north end of the lake. Even at a distance it appeared to be a female Wood Duck, and after approaching unseen to a distance of about 25 meters we made positive identification with the aid of 7 x 50 binoculars.

Aythya americana. Redhead. Dr. Wetmore reported the Redhead as a common breeding bird: "30 pairs were located that seemed settled for the summer." Dr. Wetmore reports locating a Redhead nest containing eight eggs on 4 June 1918. This clutch had increased to 14 by 13 June and was being incubated by the female. During the past few years the Redhead has been common at Burford. Within the survey period of 1960, 111 were observed on the six lakes. Although a few adult males have been banded during the molting period, no broods have been observed, and due to the unique brightness of young Redheads it seems safe to say that no Redhead production has occurred during the past three seasons.

Aythya collaris. Ring-necked Duck. Dr. Wetmore does not mention the Ring-neck in connection with his survey, and no Ring-necks were identified during the 1960 survey. During banding in July 1958, however, three adult male Ring-necks were trapped and banded, and in 1960 another adult male Ring-neck was taken and banded.

Aythya valisineria. Canvasback. Dr. Wetmore reports three pairs of Canvasbacks apparently nesting during his survey. Although he did not locate a nest, he does report having seen two females on different occasions that gave indications of being nesting birds. The Canvasback is now rare in the Burford area except during migration. Only two males were seen during the 1960 survey, and these were single birds on different lakes. No Canvasback production has been observed during the past three seasons.

Aythya affinis. Lesser Scaup. The Lesser Scaup was present at Burford Lake in 1918 but apparently not nesting according to Dr. Wetmore's survey. He reported 10 or 12 pairs present on Burford at that time, and 25 males and 23 females on Hayden Lake on 1 June 1918, but these "moved on at once and were

not seen again." At the time of our survey only nine scaup were seen on all six lakes, and no scaup production has been recorded during the past three seasons.

Bucephala albeola. Bufflehead. Only two male Buffleheads were observed during the 1960 survey; one on Stone Lake and one on Burford Lake. Dr. Wetmore does not mention the presence of these birds during his visit.

Oxyura jamaicensis. Ruddy Duck. The Ruddy Duck, according to Dr. Wetmore, was one of the commonest species on Burford Lake. He estimated that 55 pairs were breeding at the lake during his survey. The Ruddy is still one of the common species in the area; 121 were seen on Burford Lake, and the total for the six lakes covered was 169. Production by the Ruddy is probably limited by the amount of nesting cover available. There was a great deal of interspecific strife between coots and the Ruddy on Hayden Lake where nesting conditions were ideal for overwater nesters. Even though the Ruddy is a pugnacious little individual, he was evidently no match for the coot. As was mentioned earlier there were 43 coots' nests on Hayden, and no Ruddies had nested as of 22 July 1960. No Ruddy broods were observed during 1960; in 1959 one brood was seen on Hayden Lake, and in 1958 two broods were found on Stone Lake.

Mergus merganser. Common Merganser. Dr. Wetmore states that this species is found at Burford Lake during migration. He says "a small flock was seen on May 27 and 14 pairs were observed on May 30." No mention is made of nesting. Only 12 American Mergansers were seen during the 1960 survey. During banding operations in 1959 three adult females were banded, and in 1960 another adult female was banded.

Cathartes aura. Turkey Vulture. Although Dr. Wetmore reported vultures as fairly common, we saw only three at widely scattered locations (7, 11, and 12 June).

Accipiter striatus. Sharp-shinned Hawk. None observed in 1960. Dr. Wetmore reports them as nesting in small numbers.

Accipiter cooperii. Cooper's Hawk. One was seen twice (8, 12 June) near southeast shore of Burford Lake, both times harried by Brewer's Blackbirds. Dr. Wetmore saw one on the hillside east of Burford Lake.

Buteo jamaicensis. Red-tailed Hawk. One or two pairs nested in the rocky hills bordering the canyon below the lake in 1918. None were seen during the 1960 survey period.

Aquila chrysaetos. Golden Eagle. At least three (one adult, two immatures) were present in June 1960. A possible nesting pair was observed by Dr. Wetmore.

Circus cyaneus. Marsh Hawk. Several individuals were seen by Dr. Wetmore. Apparently this species did not nest. We saw none in 1960.

Falco mexicanus. Prairie Falcon. Dr. Wetmore reported one pair that nested on an inaccessible ledge in the canyon below the lake. None were seen by us.

Falco peregrinus. Peregrine Falcon. A successful nesting of a pair of Peregrine Falcons (duck hawks) was reported by Dr. Wetmore in the canyon south of Burford Lake. We saw one adult sitting on the Burford shoreline 7 June, and single birds were seen in flight on two other occasions.

Falco sparverius. Sparrow Hawk. Although one or two of these were seen daily by Dr. Wetmore, we saw them only occasionally; probably four individuals.

Meleagris gallopavo. Turkey. Dr. Wetmore reported seeing signs of Turkey east of the lake. We saw no evidence of Turkeys.

Rallus limicola. Virginia Rail. Dr. Wetmore reported hearing these rails on

five different occasions and suggested that possibly a pair nested. None were seen or heard by our party.

Fulica americana. American Coot. Dr. Wetmore states that "Next to the Eared Grebe and Yellow-headed Blackbird, the coot was the most abundant breeding species" at Burford Lake. He estimated that 150 pairs were nesting at the lake. The coot's relative importance remains about the same in the area, but the center of activity is on Hayden Lake, rather than Burford. As was stated previously, 43 coots' nests containing eggs or young were found on Hayden Lake. Coot nesting activities on Burford Lake, where 1,439 coots were counted, were just beginning at the time of the 1960 survey. It is estimated that there were not over 20 nests on Burford during the June survey. During banding activities in July there were probably as many nests, and numerous young were seen. The total count of coots on the six lakes surveyed in June 1960 was 1,659.

Charadrius vociferus. Killdeer. As during Dr. Wetmore's visit, a pair was seen, probably nesting, in June on the east shore of Burford Lake. Eight were seen along the shores of Lake Burford on 9 June.

Actitis macularia. Spotted Sandpiper. Dr. Wetmore observed 25 on 25 May, then single birds through 5 June. We saw none 6-12 June, but two were seen 19 July.

Catoptrophorus semipalmatus. Willet. One was seen by Dr. Wetmore on 27 May. We saw none.

Limnodromus scolopaceus. Long-billed Dowitcher. Two were seen feeding on a sandbar near the south end of Lake Burford on 19 July. These birds were not reported by Dr. Wetmore.

Recurvirostra americana. American Avocet. One avocet nest, a shallow depression lined with dead weeds, containing four olive-drab eggs heavily spotted with dark brown, was found 9 June. Eleven avocets were counted around the shoreline of Lake Burford. Dr. Wetmore did not report the presence of this species.

Himantopus mexicanus. Black-necked Stilt. Four were reported by Dr. Wetmore as present on the north shore of Burford Lake on 30 May 1918. We saw none.

Steganopus tricolor. Wilson's Phalarope. Present during migration, 1918. Two seen 19 July 1960 on Lake Burford.

Larus delawarensis. Ring-billed Gull. Immatures were present during Dr. Wetmore's entire stay. We saw 11, of which two were immatures, at the north end of Lake Burford, and 11 on Stone Lake on 7 June. They were also present in July.

Larus pipixcan. Franklin's Gull. This gull was "fairly common during migration" according to Dr. Wetmore. Flocks of 20 and 30 were seen on 13 and 14 June, respectively. We saw none.

Chlidonias niger. Black Tern. Dr. Wetmore saw three on 6 June at Lake Burford; we saw five on Stone Lake 7 June. Four were present on Lake Burford in July.

Zenaidura macroura. Mourning Dove. Although common in all habitats around Lake Burford, doves were never seen in the abundance reported by Dr. Wetmore, who sometimes saw two or three hundred in the canyon below the lake. Doves watered regularly at the pond near headquarters. Fourteen (3 males, 1 female, 10 immatures) were banded here, and one female was banded at banding site No. 4.

Bubo virginianus. Great Horned Owl. This owl was fairly common in the gulches above Burford Lake during Dr. Wetmore's visit. None were recorded by us.

Chordeiles minor. Common Nighthawk. Dr. Wetmore reported the arrival of the first nighthawk on 2 June. Nighthawks were abundant when we arrived on 7 June. Shortly after dark each evening they could be found resting on the dirt roads north of Burford Lake. Twenty were seen in four-fifth kilometer (one-half mile) on the north side of the lake on the evening of 7 June. Two were caught in dip nets from a jeep. Two more were caught in nets at the headquarters pond (site No. 1) in July.

Aëronautes saxatalis. White-throated Swift. Dr. Wetmore found swifts fairly common about the ledges of the high cliffs in the canyons near Lake Burford. This was also true during our survey; the greatest number seen was seven, above the east shore of Burford Lake.

Selasphorus platycercus. Broad-tailed Hummingbird. Seen daily by Dr. Wetmore in pinyons and pines. We recorded a few in the same habitat, but they were commonest along the edge of stream beds west of the lake; 12 were seen on 12 June.

Colaptes cafer. Red-shafted Flicker. Dr. Wetmore reported flickers spent much time feeding on the ground in the sagebrush. We did not see this, but found them scattered in the ponderosa pine and pinyon areas. Three were caught and banded at the headquarters pond.

Asyndesmus lewis. Lewis' Woodpecker. One seen on a ponderosa south of Horse Lake 12 June. None were recorded by Dr. Wetmore.

Sphyrapicus thyroideus. Williamson's Sapsucker. Dr. Wetmore reported this species to be fairly common among the ponderosa pines on the hills above Burford Lake. We saw none.

Dendrocopos villosus. Hairy Woodpecker. Reported as fairly common in the forested hills by Dr. Wetmore. We found this also to be the case. A family of four were seen 11 June along the stream bed west of the lake. One was banded at site No. 4 in June.

Tyrannus vociferans. Cassin's Kingbird. Dr. Wetmore reports these kingbirds as fairly common after 25 May, and nesting in scattered ponderosa pines on rocky hillsides. We saw only two in fields south of headquarters on 12 June.

Myiarchus cinerascens. Ash-throated Flycatcher. Dr. Wetmore saw only one, and so did we, on the oak-pinyon-covered slope near his cabin site.

Sayornis saya. Say's Phoebe. Fairly common on open flats during Dr. Wetmore's and our visits. One nest in a barrel in a shed attached to the headquarters building contained two young and one unhatched egg on 8 June 1960. Another nest was located under a bridge on the road near headquarters. One was banded in June and one in July at the headquarters pond (site No. 1).

Empidonax oberholseri. Dusky Flycatcher. Reported by Dr. Wetmore as common among junipers and pines at Lake Burford. We heard and saw them in June on the pine-covered mesas (assumed to be Dusky and not Hammond's, because of the habitat).

Contopus sordidulus. Western Wood Pewee. As reported by Dr. Wetmore, this pewee was common in hills above Lake Burford. On 7 June we saw at least 15. Five were banded at the headquarters pond (site No. 1), and one at site No. 4.

Nuttallornis borealis. Olive-sided Flycatcher. Two were heard and seen in

the ponderosa pines on Apache Mesa, northeast of Lake Burford on 7, 10, 11, and 12 June 1960. Not reported by Dr. Wetmore.

Eremophila alpestris. Horned Lark. These birds were flushed regularly from roads around Lake Burford (at least 12) in June 1960. They were still present in July. Dr. Wetmore reported none.

Tachycineta thalassina. Violet-green Swallow. Dr. Wetmore recorded flocks of these swallows about his cabin during May. By 2 June "they had retired to the hills." After 7 June few came down along the lakeshore. Violet-green Swallows were present in large numbers in the Burford Lake area 6 to 11 June 1960. They would appear at Hayden Lake just before a rainstorm and feed low over the water, apparently catching insects at or near the surface. Several thousand were seen at Hayden Lake 6 June. Other small flocks were seen near the headquarters pond. In June, 26 were banded at the pond (site No. 1), 115 at Hayden Lake (site No. 2), and in July, three more were banded at site No. 1.

Iridoprocne bicolor. Tree Swallow. One adult Tree Swallow was carefully identified in the large flock of Violet-green Swallows on 6 June 1960. Two more were seen at Horse Lake 8 June 1960. Dr. Wetmore reported none.

Stelgidopteryx ruficollis. Rough-winged Swallow. Dr. Wetmore saw individuals on 24 and 25 May and a pair on 8 June near his cabin. We saw at least 20 in the large swallow flock on 6 June. Seven were banded at Hayden Lake (site No. 2) on 6 June, and one was banded at the headquarters pond (site No. 1).

Hirundo rustica. Barn Swallow. Dr. Wetmore reported one near his cabin on 10 June and a pair on 14 June. We saw only two on 6 June at Hayden Lake.

Petrochelidon pyrrhonota. Cliff Swallow. One Cliff Swallow was seen 25 May 1918 by Dr. Wetmore, and he goes on to report that on 26 May a flock of 25 appeared and that they were common from then on. They began building nests on the sandstone cliff above the Laguna de la Puerta on 9 June. We saw old nests on cliffs near the east side of Burford Lake, but there was no evidence of recent nesting. A few were seen at Hayden Lake on 6 and 7 June, and seven were banded.

Progne subis. Purple Martin. Migrant birds were observed by Dr. Wetmore above Burford Lake on 8, 13, and 19 June. No martins were observed during the 1960 survey period.

Perisoreus canadensis. Gray Jay. "One was seen on a high hill east of the lake on June 16" by Dr. Wetmore. We saw none.

Cyanocitta stelleri. Steller's Jay. This jay was common among the yellow pines above Burford Lake in 1918. We found it common also, especially west of the lake.

Aphelocoma coerulescens. Scrub Jay. Although Dr. Wetmore saw no Scrub Jays, we found them fairly common on the pinyon-juniper hillsides about the lake.

Pica pica. Black-billed Magpie. Dr. Wetmore reported that one or two pairs nested near the eastern shore of Burford Lake in 1918. Two were seen east of Thompson Lake on 6 and 7 June in 1960.

Corvus corax. Common Raven. Ravens were common around Burford Lake in 1918. They nested on cliffs in the canyon below the lake and fed daily along the shore. They were seen only occasionally during our survey. Two were seen soaring over the bluffs east of Burford Lake on 6 June.

Corvus brachyrhynchos. Common Crow. Dr. Wetmore reported that several

pairs nested about the lake and came daily to the shore. We saw none at Burford Lake, but three were seen at Thompson Lake on 8 June.

Gymnorhinus cyanocephala. Piñon Jay. The Piñon Jay was reported as common among the pines and junipers on the hills about the lake by Dr. Wetmore. A flock of 100 fed among the sage-covered knolls 14 and 17 June 1918. We found them common around the lake in June and July. A flock of 85 was seen in the ponderosa pines near the headquarters cabin.

Nucifraga columbiana. Clark's Nutcracker. Dr. Wetmore reported no nutcrackers. We saw them regularly in the pines on the hills about the lake in June. Six were near the cabin 19 and 21 July. Two were netted and banded at the headquarters pond (site No. 1).

Parus gambeli. Mountain Chickadee. Chickadees were reported by Dr. Wetmore as fairly common in the ponderosa pines about Burford Lake. We noted four on Apache Mesa on 8 June. Two were banded at the spring (site No. 4).

Sitta carolinensis. White-breasted Nuthatch. This nuthatch was fairly common in the pines above the lake in 1918. We found it restricted to the ponderosa on the mesa tops. Three were observed on 12 June.

Sitta pygmaea. Pigmy Nuthatch. Reported as breeding and fairly common in the ponderosa pines by Dr. Wetmore. They were well distributed throughout the pines during our visit. Twenty were recorded on one mesa on 12 June 1960.

Troglodytes aedon. House Wren. Fairly common in the wooded areas on the hills above the lake during Dr. Wetmore's visit. We saw a few in brushy areas.

Telmatodytes palustris. Long-billed Marsh Wren. Only one was reported by Dr. Wetmore, and none were recorded in 1960.

Catherpes mexicanus. Cañon Wren. Dr. Wetmore discovered and investigated a nest on a ledge in a canyon east of the lake. It was empty 9 June. On 16 June it contained four eggs. We heard only one bird singing in a canyon in the same area on 12 June.

Salpinctes obsoletus. Rock Wren. As reported by Dr. Wetmore, we found Rock Wrens common in the rocky areas about the lake. It is the typical bird of the broken rock edges. A family of four were seen on 9 June.

Mimus polyglottos. Mockingbird. Dr. Wetmore reported mockingbirds fairly common in the junipers and in the canyons near the lake. We saw a few regularly in the sagebrush at the north end of Burford Lake.

Oreoscoptes montanus. Sage Thrasher. This species was fairly common after 29 May in sagebrush about the lake during Dr. Wetmore's visit. Singing thrashers were scattered in the areas covered by sagebrush during our visit in June. We banded one, caught in the sagebrush (site No. 3) on 10 June 1960.

Turdus migratorius. Robin. Dr. Wetmore reported that "the Western Robin nested commonly in the gulches around Burford Lake, and one or two pairs were found in the grove of cottonwoods near the spring." We found a nest with young in a juniper near the spring. Several were seen daily near our cabin. Eleven robins, seven at the headquarters pond (site No. 1), two at Hayden (site No. 2), and two at the spring (site No. 4) were banded, including the female of the above-mentioned nest. She was caught at Hayden Lake, four-fifths kilometer (one-half mile) away on 8 June, then renetted at the spring, 9 and 10 June.

Hylocichla guttata. Hermit Thrush. Although Dr. Wetmore reports none, we heard two singing in the ponderosa on top of Apache Mesa on 8 and 12 June.

Sialia mexicana. Western Bluebird. A few of these bluebirds were observed

at frequent intervals by Dr. Wetmore. Only three pairs were seen near our cabin, but nine were caught and banded at the pond (site No. 1) in June, and four more (immatures) were banded at this location in July.

Sialia currucoides. Mountain Bluebird. Dr. Wetmore reported the Mountain Bluebird as common, ranging from the lakeshore to the tops of the hills. We observed them mainly about the cabin area and in the streamside area south of our cabin. A pair nested in the wall of the pumphouse at the cabin. The female was feeding young and dodged the nets beside the pond (site No. 1) some three meters away. Two adults were banded here in June, and five immatures in July.

Myadestes townsendi. Townsend's Solitaire. Dr. Wetmore did not record this species. We saw four in the ponderosa pine on Apache Mesa on 12 June.

Polioptila caerulea. Blue-gray Gnatcatcher. This bird, not recorded by Dr. Wetmore, was common in the pinyon-juniper on the low hills around the lake. Four were seen in the area near Dr. Wetmore's cabin site on 7 June.

Sturnus vulgaris. Starling. No starlings were present at Burford Lake in 1918. We saw two on 7 June and two on 11 June, but noticed no nesting activity.

Vireo solitarius. Solitary Vireo. Dr. Wetmore reported this vireo as common in the ponderosa pine in the hills above the lake from 26 May to the end of his stay. None were around our cabin area in June, but they were scattered in the pine on top of Apache Mesa, 12 June. Four were noted near the headquarters cabin on 20 July.

Vireo gilvus. Warbling Vireo. First seen by Dr. Wetmore, 2 June. They were found in thickets lining the gulches and among the aspens. We recorded no warbling Vireos.

Vermivora celata. Orange-crowned Warbler. These warblers nested in small numbers in gulches below the lake in 1918. We observed no Orange-crowned Warblers during our survey.

Vermivora virginiae. Virginia's Warbler. As during Dr. Wetmore's visit, Virginia's Warblers were common among the thickets of small oaks in the gulches and on the higher slopes around the lake. One was banded at site No. 4 on 9 June.

Dendroica petechia. Yellow Warbler. This warbler was found by Dr. Wetmore only as a migrant; single birds were seen on 23 May and 1 June 1918. We banded one at the headquarters pond, 7 June 1960 (site No. 1). No others were seen.

Dendroica auduboni. Audubon's Warbler. Fair numbers nested in the ponderosa pine areas about the lake in 1918. We found them common in these areas in 1960. Three were banded at the headquarters pond (site No. 1).

Dendroica graciae. Grace's Warbler. Dr. Wetmore found a few at the head of one of the gulches east of the lake on two occasions, 9 and 16 June. We found them scattered in the ponderosa pine areas, generally foraging near the tops of trees.

Seiurus noveboracensis. Northern Waterthrush. Dr. Wetmore reported, "one was observed at the spring on May 23 and 25." None were seen during our survey in 1960.

Geothlypis trichas. Yellowthroat. Dr. Wetmore estimated 15 pairs were breeding in the tules in water next to the shore of Burford Lake in 1918. None were seen or heard during June and July 1960.

Wilsonia pusilla. Wilson's Warbler. Dr. Wetmore saw a few of these warblers during migration. We saw none.

Sturnella neglecta. Western Meadowlark. Dr. Wetmore reported, "Meadowlarks were fairly common in open localities about the shores of the lake," in 1918. We found them fairly common throughout the sagebrush areas.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird. Dr. Wetmore found this blackbird to be the most abundant breeding bird, next to the Eared Grebe. He estimated 210 pairs were nesting. We estimated that there were 100 nests at Hayden Lake in June 1960. Another colony was found nesting at Embom Lake, but none were nesting at Burford Lake. Young were out of the nest in July, clambering about the bulrush. We caught six young in a dip net from a boat and banded them at Hayden Lake, 20 July. Nine adults and sub-adults, three males and six females, were trapped and banded at Hayden Lake (site No. 2) in June. These blackbirds fed among the sagebrush around Burford Lake. One male was caught in a net in the sagebrush (site No. 3) on 11 June 1960.

Agelaius phoeniceus. Red-winged Blackbird. "The redwing was abundant at Lake Burford and it was estimated that 20 pairs were nesting here, scattered along the shore of the lake among the abundant yellowheads," according to Dr. Wetmore. A few were present only on Hayden Lake in 1960. Three (two males and one female) were caught in nets and banded at Hayden Lake (site No. 2).

Euphagus cyanocephalus. Brewer's Blackbird. Dr. Wetmore reported only one pair that nested near a hayfield below Laguna de la Puerta. In 1960 an estimated 20 pairs were present around the Laguna. One female was banded at Hayden Lake (site No. 2) in June 1960.

Molothrus ater. Brown-headed Cowbird. Dr. Wetmore observed one mated pair plus an additional male and female. One sight record, a male at Hayden Lake, was made on 7 June 1960.

Piranga ludoviciana. Western Tanager. Fairly common among the ponderosa pines in 1918 and 1960. One was banded at the spring (site No. 4) in June, and one at the headquarters pond (site No. 1) in July 1960.

Pheucticus melanocephalus. Black-headed Grosbeak. As Dr. Wetmore observed, this grosbeak was rather rare about the lake. He saw males on 2 and 9 June, "in a gulch in the hills." We saw one in the stream bed south of the cabin on 11 June, and two on Apache Mesa on 12 June.

Carpodacus cassinii. Cassin's Finch. Dr. Wetmore saw one male on a high hill east of the lake on 9 June. We saw none.

Carpodacus mexicanus. House Finch. One House Finch was observed by Dr. Wetmore on 16 June 1918. We saw a male and female near the cabin on 6 June.

Spinus pinus. Pine Siskin. Siskins were seen by Dr. Wetmore in the hills above the lake on 26 and 28 May and 16 June. We saw none in 1960.

Loxia curvirostra. Red Crossbill. Dr. Wetmore reported no crossbills. In 1960 they were common in the ponderosa pine areas. A flock of 25 immatures, and adults of both sexes, frequently visited the headquarters pond. Eleven were banded at the pond (site No. 1).

Chlorura chlorura. Green-tailed Towhee. This towhee was reported as "fairly common on the sage-grown slopes above the lake" by Dr. Wetmore. We saw

four individuals in June at scattered locations. An adult seen near the spring (site No. 4) was carrying insects in its beak.

Pipilo erythrophthalmus. Rufous-sided Towhee. This towhee was common in thickets, on the slopes, and in gulches above the lake during Dr. Wetmore's visit. We found them scattered in the same habitat.

Passerculus sandwichensis. Savannah Sparrow. Small numbers were found by Dr. Wetmore in dead growths of three-square near the open shores on the northern and southern sides of Burford Lake from 28 May to 6 June 1918. We saw none.

Pooecetes gramineus. Vesper Sparrow. The Vesper Sparrow was common through the sagebrush on the flats and knolls surrounding the lake in 1918. This and the Brewer's Sparrow were the commonest birds of the sagebrush during 1960. Singing birds were heard everywhere. Six were caught and banded in the sagebrush (site No. 3) and five at the headquarters pond (site No. 1).

Chondestes grammacus. Lark Sparrow. Dr. Wetmore reported only one pair that was nesting on an open flat above the grove of large cottonwoods (site No. 4), but that they were common near El Vado, approximately 10 kilometers (six miles) to the east. We found them fairly common on the sagebrush flats. One was banded at the headquarters pond (site No. 1) in June.

Amphispiza belli. Sage Sparrow. Dr. Wetmore reports this sparrow as "locally distributed and breeding in the sage grown areas." We saw three individuals in the sage on 7 June and three on 12 June.

Junco caniceps. Gray-headed Junco. Although none were reported by Dr. Wetmore, we saw a few in the ponderosa pines on Apache Mesa on 12 June 1960.

Spizella passerina. Chipping Sparrow. The Chipping Sparrow was fairly common in junipers near the lakeshore and was found also among the pines covering the hills back from the lake during Dr. Wetmore's stay. We found them common in those areas also. Twelve were counted in our cabin area on 7 June. Thirteen were banded at the pond (site No. 1), and five near the spring (site No. 4) in June.

Spizella breweri. Brewer's Sparrow. This sparrow was reported by Dr. Wetmore as one of the most common breeding birds in the sagebrush areas. We found them very common; singing birds were distributed regularly throughout the sage. Four were banded at the pond (site No. 1), and four in the sagebrush (site No. 3) in June 1960.

Zonotrichia leucophrys. White-crowned Sparrow. "These sparrows appeared in migration in the bushes near the lake on 28 May and remained until 4 June. During this period they were fairly common," reported Dr. Wetmore. We saw none.

Melospiza lincolni. Lincoln's Sparrow. No Lincoln's Sparrows were reported by Dr. Wetmore. One was caught and banded at the headquarters pond (site No. 1) on 10 June 1960.

Melospiza melodia. Song Sparrow. The Song Sparrow nested near Burford Lake in 1918, and Dr. Wetmore reports young birds common after 4 June. We saw no Song Sparrows in 1960.

P. O. Box 4201, Santa Fe, New Mexico, and 4258 Fairway, Los Alamos, New Mexico.