

## BIRDS OF THE GREAT SALT LAKE ISLANDS

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THE nesting colonies of birds on the islands of Great Salt Lake, Utah, are justly famous and have received considerable ornithological attention. Such publications as those of Behle (1935), Woodbury and Behle (1933), Palmer (1916), and Cottam and Williams (1939), deal almost exclusively with these rookeries. Little has been published on non-colonial birds of the islands since Ridgway (1877) visited certain of them in 1869.

During the summer of 1938, field work for the U. S. Bureau of Biological Survey provided an opportunity to obtain notes on birds of all the islands. Although the lists differ little from those for the mainland, they are of interest from several points of view, as for comparison with Ridgway's lists of 1869, for the complete counts of individuals on certain small islands, and for the correlation of bird occurrences with certain habitats. Most of the notes represent sight records, though, as indicated in the lists, all birds of doubtful field identification were collected.

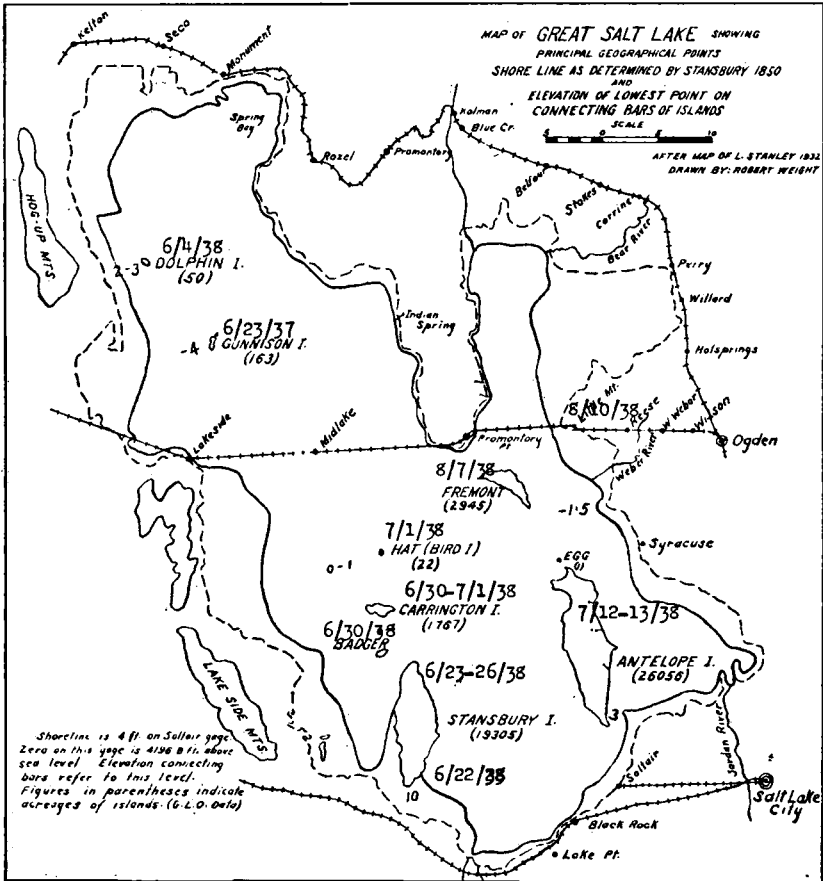
Acknowledgments are due to Dr. D. I. Rasmussen, of the Biological Survey, and to Lee Kay, Utah Fish and Game Commission, for initiating the senior author's interest in the islands on the annual bird-colony census of 1937, when Bird and Gunnison Islands were visited; to Professor T. C. Adams, of the University of Utah, who provided the data on acreages of the islands; and to A. D. Smith, of Utah State Agricultural College, who identified many of the plants found. Specimens prepared, as indicated in the lists, were identified by Drs. H. C. Oberholser and Clarence Cottam in Washington, D. C.

Text-figure 1 indicates the places and dates at which observations were made. Work in the field out of camp usually amounted to at least eight hours, and, of course, all daylight hours spent in camp provided some opportunities for taking notes. Marshall visited all the islands except Gunnison in 1938, and was on that island in 1937. Leatham was on Stansbury, Carrington, and Bird Islands. E. O. Chatelain and R. J. Jansen, undergraduate students at Utah State College, were on Dolphin and Fremont Islands, respectively.

A brief discussion of the islands as bird habitats may be of value in presenting the situation. It must be clearly stated that Gunnison is the only area that has been an island, in a strict sense of the word, continuously since 1850 (Adams, 1938). This fact is probably of small significance, however, to birds other than colonial nesters.

The habitats agree somewhat with those discussed by Linsdale (1938). The geologic basis of these, obvious in the field, suggests the following designations that are used in the text.

(1) *Sand bars*:—fringes of sand deposited around each island to



TEXT-FIG. 1.—Map of Great Salt Lake, Utah.

the height of about fifteen feet above the salt flats. These are water deposits of recent years. The abundant plants are *Sarcobatus vermiculatus* and *Atriplex confertifolia*, with *Chrysothamnus nauseosus*, *Oryzopsis hymenoides*, *Artemisia spinescens*, *Distichlis stricta*, and *Dondia* spp. also found in scattered spots. One area of high and apparently wind-deposited sands on Stansbury supported a grove of *Juniperus utahensis*.

(2) *Benchlands* (Gilbert, 1890):—gravel deposits at various levels of ancient lakes that support chiefly *Artemisia tridentata* and (or) *Bromus tectorum*, although a wide variety of other plants also occurs; from indications on Carrington Island such bunch grasses as *Oryzopsis hymenoides*, *Stipa comata*, and *Agropyron spicatum* may have been more abundant before recent fires and heavy winter use by domestic sheep.

(3) *Original islands*:—areas on Stansbury and Antelope Islands that were above the highest level of Lake Bonneville. These areas support extensive groves of the mountain mahoganies (*Cercocarpus montanus* and *C. ledifolius*) as well as some *Juniperus utahensis* and a few *Pseudotsuga taxifolia* (one small ravine on Stansbury). *Rhus trilobata*, *Agropyron spicatum*, and *Astragalus* spp. were also common on the highest areas.

(4) *Springs*:—fresh-water springs are found only on Antelope Island, where *Acer negundo*, *Populus nigra* var. *italica*, *Salix* spp., and a five-acre field of alfalfa are maintained by irrigation. This is the only permanent human habitation on the islands, and was used as a base by Ridgway in 1869, as well as by the senior author in 1938. *Acer glabrum*, *Salix* spp., *Rumex crispus*, *Urtica* spp., and other plants grow in the non-utilized spring areas. Brackish springs on the shores of Antelope, Stansbury, and Fremont Islands support dense growths of *Distichlis stricta* and *Scirpus paludosus*.

Antelope Island is the only one having all of these habitats; Stansbury and Fremont lack fresh-water springs; Carrington until recent years had a brackish spring, but now, like Dolphin, Gunnison, and Bird Islands, it has only sand bars and benchlands.

Badger Island (as locally known) is merely a large sand bar about midway between Carrington and Stansbury Islands.

Both the original islands and benchland areas have cliffs and talus slopes that are of significance to bird life.

For convenience, bird lists by islands, with comments where significant, will be presented. For the small islands, the total numbers of birds are estimated but no quantitative data were obtained for the larger islands.

#### DOLPHIN ISLAND

This northernmost and probably driest island is about fifty acres in extent. It was visited June 4 to 6, 1938.

PACIFIC NIGHTHAWK, *Chordeiles minor hesperis*.—Two birds were seen over the island in the evening. They might easily have come from the mainland, though there was suitable nesting habitat on the island.

AMERICAN RAVEN, *Corvus corax sinuatus*.—One dried-up body of an immature bird was found on the sand bar.

UTAH HORNED LARK, *Otocoris a. utahensis*.—A nest of four eggs was found in *Distichlis stricta*, and from six to eight adults were often seen feeding about the sand bars of the island.

SAGE THRASHER, *Oreoscoptes montanus*.—One pair with a nest (four eggs) in an *Atriplex confertifolia* bush was observed.

DESERT SPARROW, *Amphispiza b. deserticola*.—Two pairs noted in *Atriplex confertifolia*.

BREWER'S SPARROW, *Spizella b. breweri*.—Two or three breeding pairs were on the island, nearly always seen in *Atriplex confertifolia*.

On this small island, which was completely covered during two days, we found the following nesting densities.

TABLE 1

<i>Species and number of nests</i>	<i>Total acres per nest<sup>2</sup></i>	<i>Acreage of nesting cover<sup>1</sup></i>	<i>Acres per nest<sup>2</sup></i>	<i>Acreage of feeding cover<sup>1</sup></i>	<i>Acres per nest<sup>2</sup></i>
Horned Lark 2	25	Distichlis $\frac{1}{4}$	$\frac{1}{8}$	Distichlis and flats 100	50
Sage Thrasher 1	50	Atriplex 5	2.5	Brushy 40	40
Desert Sparrow 2	50	Atriplex 5	2.5	Brushy 40	40
Brewer's Sparrow 3	16	Atriplex 5	1.6	Brushy 40	13

<sup>1</sup> Authors' estimates based on observations of nesting and feeding activities of this species on all islands.

<sup>2</sup> Result of dividing number of nests into estimated acreages.

#### GUNNISON ISLAND

While Dr. D. I. Rasmussen, Lee Kay, and the senior author were on this island on June 23, 1937, one family of Rock Wrens, *Salpinctes o. obsoletus*, was observed, and one pair of Prairie Falcons, *Falco mexicanus*, was noted.

On June 18 to 19, 1935, Dr. Rasmussen found two Prairie Falcons' (*Falco mexicanus*) nests and several pairs of Rock Wrens (*Salpinctes o. obsoletus*) which may be considered nesting birds. In addition seven American Ravens (*Corvus c. sinuatus*) and a small flock of Black-necked Stilts (*Himantopus mexicanus*) visited the island.

Dr. Alfred M. Bailey, Director of the Colorado Museum of Natural History, Denver, Colorado, has very kindly made available to the authors the following additional notes on the bird life of this island.

On May 28, 1937:

AMERICAN RAVEN, *Corvus corax sinuatus*.—A nest with five young found.

YELLOW-HEADED BLACKBIRD, *Xanthocephalus xanthocephalus*.—Six females observed.

COWBIRD, *Molothrus ater subsp.*—One pair observed.

On June 8, 1937:

(?) WRIGHT'S FLYCATCHER, *Empidonax wrighti*.—One pair collected.

BLACK-HEADED GROSBEAK, *Hedymeles melanocephalus papago*.—A female bird collected.

EASTERN YELLOW WARBLER, *Dendroica aestiva aestiva*.—One female collected.

WESTERN CHIPPING SPARROW, *Spizella passerina arizonae*.—One female collected.

Dr. Bailey's expedition was on this island during a very stormy period which may well explain the occurrence of these species on this, the most desert-like of the islands.

#### BIRD ISLAND

Area twenty-two acres; visited in the evening of June 30, 1938. One Prairie Falcon (*Falco mexicanus*) in the air and five Utah Horned Larks (*Otocoris a. utahensis*) on the sand bar to the south were seen. It is probable that the falcon was the same one seen on Carrington Island, and that the larks were visitors also. There is little, if any, suitable nesting area for these birds on this tiny island as the pelican, gull and heron colony utilizes most of the acreage.

#### CARRINGTON ISLAND

Carrington Island, with an area of 1,740 acres, was visited from June 29 to July 2, 1938, with the exception of the evening of June 30. The entire island was well covered during this period.

WESTERN RED-TAILED HAWK, *Buteo borealis calurus*.

MARSH HAWK, *Circus hudsonius*.

PRAIRIE FALCON, *Falco mexicanus*.

One individual of each of these birds was noted, but no hawk nest was found.

WESTERN MOURNING DOVE, *Zenaidura macroura marginella*.—Four mourning doves were seen.

SHORT-EARED OWL, *Asio f. flammeus*.—Two birds were often seen foraging during the evenings. They may well have nested on the island.

NUTTALL'S POOR-WILL, *Phalaenoptilus n. nuttalli*.—One bird was seen and collected.

UTAH HORNED LARK, *Otocoris a. utahensis*.—These birds were frequently seen on the sand bars; at least several families were represented.

ROCK WREN, *Salpinctes o. obsoletus*.—One pair was observed among the rocks at the west side of the island.

WESTERN MOCKINGBIRD, *Mimus polyglottos leucopterus*.—One family group of seven or eight birds was noted feeding over the *Sarcobatus* areas on the sand bars of this island.

SAGE THRASHER, *Oreoscoptes montanus*.—Two nests (containing four and five eggs) were found in *Sarcobatus* bushes. Several other pairs were noted.

CALIFORNIA SHRIKE, *Lanius ludovicianus gambeli*.—One family group of five was seen.

DESERT SPARROW, *Amphispiza b. deserticola*.—Common.

BREWER'S SPARROW, *Spizella b. breweri*.—Abundant in the *Artemisia* areas.

It is of interest that members of Ridgway's party (Ridgway, 1877: 371) visited this island on June 17, 1869. They brought back eggs of Avocet, Canada Goose, and California Gulls and reported "various other waterfowl as breeding upon this island and a smaller one near by." According to sheepmen a spring flowed upon this island until 1925.

#### BADGER ISLAND

Badger Island is the local name for a sand bar about six acres in extent that lies midway between Carrington and Stansbury Islands. Its chief ornithological interest is as being the site of a previously unreported nesting colony of Treganza's Heron (*Ardea h. treganzai*). During the years 1871 to 1873 this bar was probably under water. From 1874 to 1902 and from 1907 to 1931, it has been surrounded by salt water. Two groups of heron nest platforms were found. One, numbering 105, was in a good state of preservation; while six obviously older platforms were found a short distance away. Sheepmen reported that herons and gulls nested here in the 1920's. It is thought that the well-preserved group of platforms represents this period, while the older group may be nests of the earlier period, 1879–1902. There were no occupied nests of herons or gulls on this island in 1938.

Birds noted here on the evening of June 29 and the early morning of June 30 were:

SHORT-EARED OWL, *Asio f. flammeus*.—One bird foraging over the entire island.

SAGE THRASHER, *Oreoscoptes montanus*.—Three birds noted, representing apparently two pairs at opposite ends of the island.

DESERT SPARROW, *Amphispiza b. deserticola*.—Nine adult birds noted, which may well have represented four or five nests on the area.

BREWER'S SPARROW, *Spizella b. breweri*.—About twenty birds noted, which apparently represented several 'family' groups.

On this island with an estimated five acres of exceptionally high and dense bushes of *Sarcobatus vermiculatus* and *Atriplex confertifolia* two pairs of Sage Thrashers, four or five pairs of Desert Sparrows, and probably four pairs of Brewer's Sparrows were found.

Thus a nesting density of 1 to 2.5 acres, 1 to 1 acre, and 1 to 1.25 acres respectively is recorded. These estimates coincide closely with those for Dolphin when the suitable nesting cover is considered (Table 1). The use of the feeding area is much more intense, possibly because the plant growth is much more dense on Badger Island.

#### STANSBURY ISLAND

Intensive field work from June 20 to 26, 1938, was carried on at the south and north ends of this large (19,305 acres) island. The lists are divided by 'habitats,' since these were apparently significant, although, of course, some birds overlapped.

##### *Sand Bars*

UTAH HORNED LARK, *Otocoris a. utahensis*.—Common; one bird collected.

WESTERN MOCKINGBIRD, *Mimus polyglottos leucopterus*.—One bird was seen a few times and frequently heard near the camp.

CALIFORNIA SHRIKE, *Lanius l. gambeli*.—One family of four young and two adults fed for two or three days near the camp. Two specimens were taken. This species and the mockingbird were seen only in the small grove of *Juniperus* at the north end of the island.

##### *Benchlands*

WESTERN MOURNING DOVE, *Zenaidura macroura marginella*.—Common.

PACIFIC NIGHTHAWK, *Chordeiles minor hesperis*.—One nest with two eggs was found under an *Artemisia tridentata* bush. The adults were commonly seen in the evenings.

AMERICAN RAVEN, *Corvus corax sinuatus*.—A few adult birds were observed.

SAGE THRASHER, *Oreoscoptes montanus*.—Common in the *Artemisia* areas.

WESTERN MEADOWLARK, *Sturnella neglecta*.—Common in the *Artemisia* areas.

WESTERN LARK SPARROW, *Chondestes grammacus strigatus*.—Rare in *Artemisia* areas; one bird was collected.

DESERT SPARROW, *Amphispiza bilineata deserticola*.—Common in the *Artemisia* areas.

BREWER'S SPARROW, *Spizella b. breweri*.—One bird collected; this species was abundant in the *Artemisia* areas.

##### *'Original Islands'*

WESTERN RED-TAILED HAWK, *Buteo borealis calurus*.—One pair of adults was observed at the north end of the island, where an old nest was found in a juniper tree.

PRAIRIE FALCON, *Falco mexicanus*.—A nest of these birds with young was found on the face of an inaccessible cliff at the north end of the island. An adult, which dropped a recently killed ground squirrel (*Citellus townsendi mollis*), was flushed on the south end of the island.

NUTTALL'S POOR-WILL, *Phalaenoptilus n. nuttalli*.—One bird seen and heard at dusk on the north end of the island.

ROCK WREN, *Salpinctes o. obsoletus*.—Common.

ASH-THROATED FLYCATCHER, *Myiarchus c. cinerascens*.—Several adults seen and one specimen taken.

WESTERN GNATCATCHER, *Polioptila c. amoenissima*.—One family group seen and one bird collected.

MONTANA TOWHEE, *Pipilo maculatus montanus*.—One nesting pair was noted of which a specimen was taken.

HOUSE FINCH, *Carpodacus mexicanus frontalis*.—One adult bird was seen several times.

#### *Brackish Springs*

An interesting activity of the California Gull (*Larus californicus*) was noted at the large brackish spring on the northeast shore of the island. Throughout daylight there was a more or less continuous stream of birds going both north and south along the east shore, apparently to and from the nesting colony of Bird Island and the mainland. Many of them used these springs for a watering place; there were usually about one hundred and fifty birds on the water drinking, and individuals were flying in and out of the area almost constantly. About fifteen hundred birds rested on a nearby sand spit for most of the day. One Marsh Hawk (*Circus hudsonius*) was seen foraging over these springs.

Two earlier records of birds on this island have been found: Ridgway on June 12, 1869, reported the Catbird, *Galeoscoptes* (now *Dumetella*) *carolinensis*, and Stansbury (1852) mentions hearing the song of the Mockingbird.

#### FREMONT ISLAND

Captain John C. Fremont (1850) writes briefly of the birds seen on this island in September 1843, stating (p. 206) "a magpie and one larger bird . . . were the only living things" seen on the island. This apparently comprises the first recorded observation of animal life on any of the islands. The men in the party had dreamed of a game paradise on these isolated areas and were so bitterly disheartened that they named it Disappointment Island.

This island, with an area of 2,940 acres, was visited August 6 and 7, 1938, when only the western half was covered.

#### *Sand Bars*

MARSH HAWK, *Circus hudsonius*.—Five individuals were seen hunting over the extensive bar area at the west end of the island. These apparently were one adult female and four young.

SHORT-EARED OWL, *Asio f. flammeus*.—One bird was noted several times hunting over the same area.

UTAH HORNED LARK, *Otocoris a. utahensis*.—One group of seven birds was observed at the western extremity.

#### *Benchlands*

PRAIRIE FALCON, *Falco mexicanus*.—A recently used nest was found in the low cliffs at the north end of the island. One adult bird was seen.



MONTANA HORNED OWL, *Bubo virginianus occidentalis*.—One individual was flushed several times from the low cliffs on the north side of the island.

PACIFIC NIGHTHAWK, *Chordeiles minor hesperis*.—At least four adults were seen flying over the western extremity of the island.

ROCK WREN, *Salpinctes o. obsoletus*.—Two small groups of these birds were observed along the rocky cliffs of the north shore.

CALIFORNIA SHRIKE, *Lanius l. gambeli*.—One group of five birds, four immature, was noted in the sagebrush areas.

BREWER'S SPARROW, *Spizella b. breweri*.—Common in the *Artemisia* areas.

#### ANTELOPE ISLAND

This large island, area 26,056 acres, has the only fresh water and human habitation of all the group. It is particularly interesting because of the field work by Ridgway on June 4 to 8, 1869. He stayed at the ranch which was built in early pioneer times, the original buildings of which are still in use. Through the courtesy of John R. Dooley, of Salt Lake City, the same buildings were used as a base in 1938, from July 12 through July 14.

Ridgway (1877: 370) used nearly identical phrases to describe habitats as are used in the present paper. Hence the lists are directly comparable. A combination of the current lists for Stansbury and Antelope Islands duplicates the list of sixty-nine years ago except for two habitats, as pointed out later.

#### *Sand Bars*

Little time was spent in this habitat except at two previously unreported California Gull colonies, which as noted at Bird Island, are not suitable for passerine birds. One of the colonies, at the end of a sand bar about a mile north of the ranch, had an estimated 1,500 young. The other, at the south end of the island, contained approximately 300 young.

#### *Benchlands*

BLACK-CROWNED NIGHT HERON, *Nycticorax n. hoactli*.—One immature bird with a flock of California Gulls feeding on grasshoppers.

WESTERN RED-TAILED HAWK, *Buteo borealis calurus*.—Two adults seen.

CALIFORNIA GULL, *Larus californicus*.—Several large flocks seen feeding on grasshoppers.

#### *'Original Island'*

PRAIRIE FALCON, *Falco mexicanus*.—One adult seen.

AMERICAN RAVEN, *Corvus corax sinuatus*.—Two adults seen.

This list is quite incomplete and probably should be comparable to that for the same habitat on Stansbury Island.

*Brackish Springs*

KILLDEER, *Oxyechus v. vociferus*.—Common.

SHORT-EARED OWL, *Asio f. flammeus*.—Abundant.

UTAH HORNED LARK, *Otocoris a. utahensis*.—Common.

BREWER'S BLACKBIRD, *Euphagus cyanocephalus*.—One group of six birds seen.

Ridgway recorded observations at the ranch, used as headquarters, separately from the other habitats. Since these notes represent the area of greatest amount of fresh water and plants dependent on it, they were compared with the 1938 list for 'Springs—fresh water' which is as follows:

CALIFORNIA QUAIL, *Lophortyx c. californica*.—One covey seen.

RING-NECKED PHEASANT, *Phasianus c. torquatus*.—Two males noted.

BARN SWALLOW, *Hirundo erythrogaster*.—Abundant.

ENGLISH SPARROW, *Passer d. domesticus*.—Very abundant.

BREWER'S BLACKBIRD, *Euphagus cyanocephalus*.—One small flock seen.

A comparison of the recent lists with those of Ridgway showed three striking points: (a) the number and kinds of waterfowl using the islands have been greatly reduced; i. e., Carrington notes; (b) the species of birds found on the 'original-island' and benchland areas are practically the same; (c) a pronounced reduction of native song-birds such as Warbling Vireo, oriole, Redstart, and Catbird at the ranch headquarters has taken place. In their stead were found an enormous number of English Sparrows that swarmed in large numbers in the shade trees and about buildings.

A comparison of these lists with that of Stanford (1932) indicated that most of the birds seen on the islands have also been reported from areas to the north of the Great Salt Lake. Thus, as far as birds other than those nesting in the rookeries are concerned, the avifauna of the islands is considered as typical of the desert areas of northwestern Utah.

The lack of a permanent fresh-water supply on most of the islands presents an interesting problem as to water requirements of these nesting birds.

Weather Bureau records of ten years, 1911–20 (Alter, 1926), show the following conditions for the nesting season at Midlake (see map, Text-fig. 1).

TABLE 2

	Average monthly precipitation	Average number days with .01 precipitation or more	Average maximum temperature	Highest recorded temperature
April	0.43	2	57.1	78
May	0.38	3	66.1	88
June	0.50	2	76.9	94
July	0.32	2	83.0	92
August	0.09	0	81.6	90

The series of records shows that three times in June, twice in July and four times in August there was no recordable precipitation. Evaporation from an open-water surface has been between 12 and 13 inches during July at the Salt Lake airport. These records, while not directly applicable to all the islands, indicate climatic conditions on the lake in general and Dolphin, Gunnison, Bird, Carrington, and Badger Islands in particular.

Dolphin, Gunnison and Bird Islands are fully fifteen miles from the nearest fresh water during these months; while Carrington and Bird are approximately six miles from the brackish springs of Stansbury Island. Thus these birds nest without a certain supply of fresh water since flights of six and fifteen miles for water are improbable for small passerine species.

#### SUMMARY

(1) Environmental conditions on the islands in the Great Salt Lake of Utah are presented briefly and lists of birds for each island are discussed in relation to the 'habitats.'

(2) For certain smaller islands complete counts of individuals are presented with data as to nesting densities.

(3) One previously unreported Treganza's Heron colony and two recently established California Gull colonies are noted as well as the possible water supply for the large California Gull colony of Bird Island.

(4) Comparison of lists with those of Ridgway for sixty years previous indicates the deleterious effect of recent droughts and of the introduction of exotics upon birds of Carrington and Antelope Islands, although the lists of birds not directly dependent on fresh-water springs are practically identical.

(5) Lists of non-colonial nesting birds are identical with those for northwestern Utah, except for being less varied.

(6) The severity of water conditions on the small isolated islands indicates the tolerance of certain desert species to lack of water during the nesting and brooding season.

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