

VOLUME 3

FEBRUARY, 1925

NUMBER 1

# Roosevelt Wild Life Bulletin

OF THE

Roosevelt Wild Life Forest Experiment Station

OF

THE NEW YORK STATE COLLEGE OF FORESTRY

AT SYRACUSE UNIVERSITY



THE BIRDS OF YELLOWSTONE NATIONAL PARK

By MILTON P. SKINNER

# CONTENTS OF ROOSEVELT WILD LIFE BULLETIN

---

(To obtain these publications see announcement on back of title page.)

## ROOSEVELT WILD LIFE BULLETIN, Vol. 1, No. 1. December, 1921.

1. Foreword.....Dr. George Bird Grinnell
2. Roosevelt Wild Life State Memorial.....Dr. Charles C. Adams
3. Appropriateness and Appreciation of the Roosevelt Wild Life Memorial.....Dr. Charles C. Adams
4. Suggestions for Research on North American Big Game and Fur-Bearing Animals.....Dr. Charles C. Adams
5. Theodore Roosevelt.....Sir Harry H. Johnston
6. Roosevelt's Part in Forestry.....Dr. Gifford Pinchot
7. Roosevelt and Wild Life.....Mr. Edmund Heller
8. The Present Economic and Social Conditions as Results of Applied Science and Invention.....Hon. George W. Perkins
9. Suggestions for Management of Forest Wild Life in the Allegany State Park, New York.....Dr. Charles C. Adams
10. Aims and Status of Plant and Animal Preserve Work in Europe, with Special Reference to Germany, Including a List of the Most Important Publications on These Preserves..Dr. Theodor G. Ahrens
11. Current Station Notes.....The Director and Editor

## ROOSEVELT WILD LIFE BULLETIN, Vol. 1, No. 2. August, 1922.

*(Out of print)*

1. An Opportunity for Great Public Service.....Col. Henry S. Graves
2. An Investigation of the Beaver in Herkimer and Hamilton Counties of the Adirondacks.....Dr. Charles E. Johnson
3. The Life of the Yellowstone Beaver.....Mr. Edward R. Warren
4. Current Station Notes.....The Director and Editor

## ROOSEVELT WILD LIFE BULLETIN, Vol. 1, No. 3. March, 1923.

1. The Summer Birds of the Allegany State Park...Aretas A. Saunders
2. The Ruffed Grouse, with Special Reference to its Drumming.  
Edmund J. Sawyer
3. Current Station Notes .. .The Director and Editor

## ROOSEVELT WILD LIFE BULLETIN, Vol. 1, No. 4. March, 1923.

1. Relation of Summer Birds to the Western Adirondack Forest.  
Perley M. Silloway
2. Notes on the Relation of Birds to Adirondack Forest Vegetation.  
Dr. Charles C. Adams
3. The Summer Birds of the Adirondacks in Franklin County, N. Y.  
Theodore Roosevelt, Jr., and H. D. Minot  
(Reprinted: original date of publication, 1877)
4. Current Station Notes.....The Director and Editor



# Roosevelt Wild Life Bulletin

VOLUME 3, NUMBER 1

OF THE

Roosevelt Wild Life Forest Experiment Station

OF

THE NEW YORK STATE COLLEGE OF FORESTRY

AT SYRACUSE UNIVERSITY



## ANNOUNCEMENT

The serial publications of the Roosevelt Wild Life Forest Experiment Station consist of the following:

1. Roosevelt Wild Life Bulletin.
2. Roosevelt Wild Life Annals.

The *Bulletin* is intended to include papers of general and popular interest on the various phases of forest wild life, and the *Annals* those of a more technical nature or having a less widespread interest.

These publications are edited in cooperation with the College Committee on Publications.

The editions of these publications are limited and do not permit of general free distribution. Exchanges are invited. The subscription price of the *Bulletin* is \$4.00 per Volume of four Numbers, or \$1.00 per single Number. The price of the *Annals* is \$5.00 per Volume of four Numbers, or \$1.25 per single Number. All communications concerning publications should be addressed to

DR. CHARLES C. ADAMS, *Director and Editor*,  
Roosevelt Wild Life Forest Experiment Station.  
Syracuse, New York.

[ 2 ]

COPYRIGHT, 1925, by

ROOSEVELT WILD LIFE FOREST EXPERIMENT STATION

Entered at the Post Office at Syracuse, N. Y., as second-class matter

# TRUSTEES OF THE NEW YORK STATE COLLEGE OF FORESTRY

## EX OFFICIO

Dr. CHARLES W. FLINT, <i>Chancellor</i> .....	Syracuse University
Dr. FRANK P. GRAVES, <i>Commissioner of Education</i> ...	Albany, N. Y.
Hon. ALEXANDER MACDONALD, <i>Conservation Comm'r.</i> ..	Albany, N. Y.
Hon. SEYMOUR LOWMAN, <i>Lieutenant-Governor</i> .....	Albany, N. Y.

## APPOINTED BY THE GOVERNOR

Hon. ALEXANDER T. BROWN.....	Syracuse, N. Y.
Hon. JOHN R. CLANCY.....	Syracuse, N. Y.
Hon. HAROLD D. CORNWALL.....	Glenfield, N. Y.
Hon. GEORGE W. DRISCOLL.....	Syracuse, N. Y.
Hon. LOUIS MARSHALL.....	New York City
Hon. WILLIAM H. KELLEY.....	Syracuse, N. Y.
Hon. EDWARD H. O'HARA.....	Syracuse, N. Y.
Hon. J. HENRY WALTERS.....	New York City

## OFFICERS OF THE BOARD

Hon. LOUIS MARSHALL.....	<i>President</i>
Hon. JOHN R. CLANCY.....	<i>Vice-President</i>



## HONORARY ADVISORY COUNCIL OF THE ROOSEVELT WILD LIFE STATION

### AMERICAN MEMBERS

Mrs. CORINNE ROOSEVELT ROBINSON.....	New York City
Hon. THEODORE ROOSEVELT .....	Washington, D. C.
Mr. KERMIT ROOSEVELT.....	New York City
Dr. GEORGE BIRD GRINNELL.....	New York City
Hon. GIFFORD PINCHOT.....	Harrisburg, Pa.
Mr. CHAUNCEY J. HAMLIN.....	Buffalo, N. Y.
Dr. GEORGE SHIRAS, 3rd.....	Washington, D. C.
Dr. FRANK M. CHAPMAN.....	New York City
Dean HENRY S. GRAVES.....	New Haven, Conn.

### EUROPEAN MEMBERS

VISCOUNT GREY .....	Fallodon, England
Sir HARRY H. JOHNSTON .....	Arundel, England

## ROOSEVELT WILD LIFE STATION STAFF

FRANKLIN MOON, M. F.....Dean of the College

---

CHARLES C. ADAMS, Ph. D., Sc. D.....Director of the Station  
 ALVIN G. WHITNEY, A. B.....Assistant Director  
 WILLIAM CONVERSE KENDALL, A. M., M. D.....Ichthyologist  
 WILFORD A. DENCE, B. S.....Assistant Ichthyologist

### TEMPORARY APPOINTMENTS\*

THOMAS L. HANKINSON, B. S.....Ichthyologist†  
 PERLEY M. SILLOWAY, M. S.....Roosevelt Field Ornithologist  
 CHARLES E. JOHNSON, Ph. D.....Roosevelt Fur Naturalist  
 ARETAS A. SAUNDERS, Ph. B.....Roosevelt Field Ornithologist  
 MILTON P. SKINNER, B. S.....Roosevelt Field Naturalist  
 BRADFORD A. SCUDDER .....Roosevelt Game Naturalist  
 ALFRED O. GROSS, Ph. D.....Roosevelt Field Ornithologist

### COLLABORATORS\*

EDWARD R. WARREN, B. S.....Roosevelt Game Naturalist  
 RICHARD A. MUTTKOWSKI, Ph. D.....Roosevelt Field Naturalist  
 GILBERT M. SMITH, Ph. D.....Roosevelt Field Naturalist  
 EDMUND HELLER, A. B.....Roosevelt Game Naturalist  
 MILTON P. SKINNER, B. S.....Roosevelt Field Naturalist

---

\* Including only those who have made field investigations and whose reports are now in preparation.

† Resigned as Station Ichthyologist October 1, 1921.

## NATIONAL PARKS POLICY AND WILD LIFE

"The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified, by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

*An act to establish a National Park Service,  
and for other purposes. Public — No.  
235 — 64th Congress; (H. R. 15522);  
1916.*

"For the information of the public an outline of the administrative policy to which the new Service will adhere may now be announced. This policy is based on three broad principles:

- first*, that the national parks must be maintained in absolute unimpaired form for the use of future generations as well as those of our own time;
- second*, that they are set apart for the use, observation, health, and pleasure of the people; and
- third*, that the national interest must dictate all decisions affecting public or private enterprise in the parks."

FRANKLIN K. LANE.

*Third Annual Report, U. S. National Park  
Service, p. 361; 1919.*

## RELATION OF BIRDS TO FORESTS

"Birds are not only essential to the welfare of the tree, but the tree is necessary to the life of the bird. Consequently, there has been established what is termed 'a balance of life' wherein there is the most delicate adjustment between the tree, the insect, the bird and the sum total of the conditions which go to make up their environment. . . . Birds are of value to the forest, however, not only as the destroyers of their insect foes, but the birds with the squirrels, help plant the forest by distributing seeds. The seeds which are encased in a pulpy covering, those of the berry or fruit-bearing trees, are voided unharmed by the birds often at a point far distant from the parent tree, the bird thus acting as their distributor. Acorns, beech-nuts, and chestnuts are frequently dropped or hidden by birds, and the seeds of pines are released and scattered by the birds that seek them in their cones. In short, we believe it can be clearly demonstrated that if we should lose our birds we should also lose our forests."

FRANK M. CHAPMAN.

*Seventh Report N. Y. Forest, Fish and Game  
Commission, pp. 117, 120; 1901.*



## CONTENTS

	PAGE
1. The Birds of the Yellowstone National Park.	
Milton P. Skinner.	11
2. Current Station Notes.....	The Director and Editor. 191

## ILLUSTRATIONS

### PLATES

#### Plate 1. BIRDS OF THE YELLOWSTONE PARK FORESTS

- 1, 2, Western Tanager (female, male); 3, 4, Rocky Mountain Pine Grosbeak (female, male); 5, Rocky Mountain Jay; 6, 7, Williamson Sapsucker (male, female); 8, Rocky Mountain Nuthatch; 9, Mountain Chickadee; 10, Nutcracker. Drawing by Edmund J. Sawyer.....Facing 11

#### Plate 2. BIRDS OF YELLOWSTONE LAKE

- 1, Canada Goose; 2, Osprey; 3, Bald Eagle; 4, 5, White Pelican; 6, Caspian Tern; 7, 8, Mallard (female, male); 9, 10, Green-winged Teal (male, female). Drawing by Edmund J. Sawyer .....Facing 60

#### Plate 3. BIRDS OF THE OPEN COUNTRY

- 1, Western Vesper Sparrow; 2, Western Meadowlark; 3, 4, Mountain Bluebird (male, female); 5, Western Red-tailed Hawk; 6, 7, Sparrow Hawk (male, female); 8, 9, Brewer Blackbird (male, female); 10, Richardson Grouse; 11, Desert Horned Lark. Drawing by Edmund J. Sawyer. Facing 110

#### Plate 4. BIRDS OF THE WOODED STREAMS

- 1, Gray Ruffed Grouse; 2, 3, Pink-sided Junco (male, female); 4, 5, Audubon Warbler (female, male); 6, Townsend Solitaire; 7, Audubon Hermit Thrush; 8, Water Ouzel. Drawing by Edmund J. Sawyer.....Facing 130

### FIGURES

The figures are from photographs by the author except where otherwise stated.

- Figure 1. The home of the Osprey, "Eagle Nest Rock", beside the Gardiner River and near the North Entrance to the Park. An adaptation to the Yellowstone environment, for the usual nesting site is the top of a tree..... 17
- Figure 2. Nest of a Water Ouzel or Dipper on the lower side of a boulder in midstream. Almost always the opening is over the water on the downstream side. In this case grass soon sprouted on the nest and helped to conceal it..... 18
- Figure 3. This grassy meadow spangled with beautiful iris, beside the Gardiner River, under the cliffs of Mount Evarts, is a favorite haunt of the Meadowlark ..... 23
- Figure 4. The Mountain Chickadee can be readily distinguished from other chickadees by the white bar above each eye. Photo by E. R. Warren . ..... 24

- Figure 5. Mountain Bluebirds nesting in the siding of a building. In the Park they sometimes nest under the eaves of log cabins. Photo by R. B. Rockwell..... 29
- Figure 6. The Western Robins build the same kind of nests on the same kind of sites as the eastern robins; in this case, under the edge of a thatched roof. Photo by R. B. Rockwell..... 29
- Figure 7. The Clark Crow, or Nutcracker, shows its characteristic bold disposition in most of its attitudes. It is conspicuous in color and in its habit of perching on the most commanding points. 30
- Figure 8. Nutcrackers are given to foraging about the kitchen doors at Mammoth Hot Springs, especially in severe winter weather. In this instance one bird is tearing a piece of raw meat from a bone while the other two await their chance..... 30
- Figure 9. A nest of the White-crowned Sparrow. These nests are the most frequent of all, especially in brushy parks and meadows. Photo by E. R. Warren..... 37
- Figure 10. A Broad-tailed Hummingbird on its tiny nest in a rose bush. Most of these birds breed at much higher altitudes, but occasionally a pair prefer the rose bush zone at about 6000 feet. Photo by R. B. Rockwell..... 37
- Figure 11. Here the Western Mourning Doves construct rather flimsy nests, just like other doves elsewhere. Photo by R. B. Rockwell . . . . . 38
- Figure 12. The Killdeer is always a conspicuous feature of its chosen home, especially because of its piercing cry, uttered almost incessantly. Photo by R. B. Rockwell..... 38
- Figure 13. The Rocky Mountain Screech Owl is rather scarce in the Park. It very much resembles its cousins elsewhere. Photo by R. B. Rockwell..... 44
- Figure 14. A young Western Horned Owl. Fortunately for the young grouse and ducks these owls are not numerous in the Yellowstone Park. Photo by R. B. Rockwell..... 44
- Figure 15. A Great Blue Heron. Wherever met with this bird is a picturesque addition to the scenery, although its long, dagger bill is deadly to small fishes and frogs. Photo by R. B. Rockwell . . . . . 50
- Figure 16. A Red-shafted Flicker and its young. While this flicker will frequently cross with the Yellow-shafted or Northern Flicker—hybrids being seen in the Park—a typical Northern Flicker has not yet been reported. Photo by R. B. Rockwell . . . . . 53
- Figure 17. When a family of Red-shafted Flickers is encountered, the birds are often as thickly clustered as this picture shows them. Photo by Frank N. Irving..... 54
- Figure 18. The Western Nighthawk nests on the geyserite formations near the celebrated geysers, laying her two eggs on the bare rock. Photo by E. R. Warren..... 58
- Figure 19. The Osprey nest near the Park highway between Gardiner and Mammoth Hot Springs. The nests are conspicuous, as they are perched on rock pinnacles or on the tops of trees. In the Yellowstone the Ospreys have been miscalled Eagles. Photo by Haynes . . . . . 65
- Figure 20. In some localities in the Park the Cliff Swallows stick their mud retort-shaped nests against a cliff or under a ledge like their ancestors. More up-to-date birds nest under the eaves of buildings. Photo by E. R. Warren..... 69

Figure 21. The Rocky Mountain Jay or "Camp Robber" is familiar to hundreds of tourists with whom he makes friends at their various camping places. Photo by R. B. Rockwell.....	70
Figure 22. A friendly Rocky Mountain Jay. A few crumbs scattered on the ground near a camp will usually attract these birds within range of the camera. Photo by E. R. Warren.....	70
Figure 23. Young Magpies. The Yellowstone Park lies at too high an elevation to harbor many Magpie nests, but occasionally one is found in the top of a thick clump of willow bushes. Photo by Albert Haansted . . . . .	77
Figure 24. Sometimes a very tame but alert Richardson Grouse is seen in the grass as one's automobile passes within a few feet...	77
Figure 25. The male Williamson Sapsucker, one of the handsomest and most conspicuous birds of the Yellowstone forests. It is most frequently found in the aspen and Douglas fir groves. Photo by Clark Blickensdurfer.....	78
Figure 26. A female Williamson Sapsucker. When first discovered, the female was described as a separate species, its brown, barred plumage being so very different from that of the male. Photo by R. B. Rockwell . . . . .	78
Figure 27. The Warbling Vireo, while not very common in Yellowstone Park, is a pleasing and conspicuous singer in early summer about Camp Roosevelt and Tower Fall.....	91
Figure 28. A nest of the California Gull, with young in the down, on Molly Island in Yellowstone Lake. This shows a typical nesting site on the low, stony shores.....	91
Figure 29. A California Gull. Gulls with snow-white under parts and black-tipped wings are a frequent sight, always reminiscent of the ocean a thousand miles from Yellowstone Park. Photo by California Academy of Sciences.....	92
Figure 30. The young California Gulls, in mottled, juvenile plumage, are able to forage for themselves before August 15. Photo by California Academy of Sciences . . . . .	92
Figure 31. Young White Pelicans. When the young on Molly Island are disturbed before they can fly, they enter the water and try to escape by swimming . . . . .	95
Figure 32. Wilson Phalarope on nest. Although the female lays the eggs, the male of this species, contrary to usual bird custom, does the brooding and takes care of the young. Photo by R. B. Rockwell . . . . .	96
Figure 33. Canada Geese, contrary to popular belief, are among the wisest and most interesting of birds. In the Yellowstone they are common and quite fearless. Photo by Milton J. Ray.....	96
Figure 34. Nest of Canada Goose on a beaver lodge, in a pond at Yanceys. Here, where predatory animals are rather numerous, the geese always select some small elevation surrounded by water. Occupied or abandoned beaver houses are favorite nesting sites . . . . .	100
Figure 35. The Western House Wren. These birds are not numerous in Yellowstone Park, and while occasionally seen, are more often heard. Photo by R. B. Rockwell.....	105
Figure 36. Although the nesting cavities of the Mountain Chickadee are to be found usually in dead trunks or limbs at a considerable height, they are sometimes quite low, or even in stumps. Photo by R. B. Rockwell . . . . .	105



- Figure 37. A Rocky Mountain Nuthatch at its nest in a tree cavity. The nuthatch nests appear to be placed lower, as a rule, than those of the Mountain Chickadee. Photo by F. C. Willard.. 106
- Figure 38. The Sparrow Hawks are small and handsomely mottled. They commonly select conspicuous perches along the roads, and as they are not molested in the Park, soon become very bold. Photo by R. B. Rockwell..... 115
- Figure 39. A juvenile Western Horned Owl. This owl nests so early in the year that the eggs are sometimes frozen during a temporary absence of the brooding parent. Photo by R. B. Rockwell . . . . . 115
- Figure 40. Nest, eggs and young of an American Coot. The fuzzy, black youngsters do not usually number more than three to the brood, although there may be as many as six eggs. Photo by R. B. Rockwell . . . . . 123
- Figure 41. Mallard drakes preening on a small mud island in a beaver pond near Lava Creek. For years the Mallards have nested in this beaver pond beside the Park highway..... 123
- Figure 42. The floating nest and eggs of the American Eared Grebe. This is the only grebe at all common in Yellowstone Park, and the only one found nesting there as yet. Photo by R. B. Rockwell . . . . . 124
- Figure 43. The Green-winged Teal. This beautifully mottled bird is the smallest of the ducks found in the Park. Photo by R. B. Rockwell . . . . . 124
- Figure 44. Young White Pelicans near Molly Island, Yellowstone Lake. A pelican colony requires for its nesting site a remote island near a good supply of fish..... 137
- Figure 45. California Gulls attempting to rob the nests of the White Pelicans on Molly Island, Yellowstone Lake. Photo by George Shiras, 3rd . . . . . 138
- Figure 46. White Pelicans, mostly adults, on Molly Island. The nests are constructed on the ground among the stumps and boulders at the right. Photo by George Shiras, 3rd..... 145
- Figure 47. Close-up view of White Pelicans on Molly Island. The young birds are not able to fly for several months, but they are excellent swimmers. Photo by George Shiras, 3rd..... 146

## MAPS

- Map 1. Yellowstone National Park, showing the highways and the localities mentioned in "The Birds of the Yellowstone National Park" .....Facing 183
- Map 2. The major faunal areas or "life zones" of Yellowstone National Park" .....Facing 183



*Drawn by Edmund J. Sawyer*

# PLATE 1. BIRDS OF THE YELLOWSTONE PARK FORESTS

- |  |  |
|--|--|
| 1, 2: Western Tanager (female, male).              | 6, 7: Williamson Sapsucker (male, female). |
| 3, 4: Rocky Mountain Pine Grosbeak (female, male). | 8: Rocky Mountain Nuthatch.                |
| 5: Rocky Mountain Jay.                             | 9: Mountain Chickadee.                     |
|  | 10: Clark Nutcracker.                      |

(All figure  $\frac{1}{6}$  life size)

# THE BIRDS OF THE YELLOWSTONE NATIONAL PARK

By MILTON P. SKINNER

*Roosevelt Field Naturalist, Roosevelt Wild Life Forest Experiment  
Station, Syracuse, New York*

*Formerly Park Naturalist, Yellowstone National Park*

## CONTENTS

	PAGE
1. Introduction .....	12
2. Getting Acquainted with the Park Birds.....	13
3. The Bird Life at Mammoth Hot Springs.....	22
4. Birds from Mammoth Hot Springs to the Madison River.	34
5. Birds from West Yellowstone, Montana, to Old Faithful Inn .....	47
6. Birds from Old Faithful to Yellowstone Lake and the Grand Canyon.....	59
7. Birds from Grand Canyon to Mammoth Hot Springs, by Way of Tower Fall.....	71
8. The Birds of Mount Washburn.....	75
9. Influence of Warm Springs and Gas Vents on Birds....	85
10. The Birds of Yellowstone Lake.....	93
11. The Birds of the Forests .....	102
12. The Birds of the Open Country and Its Small Ponds..	110
13. The Birds of the Brooks and Rivers.....	118
14. The Birds of Beaver Meadows.....	127
15. The White Pelicans of Yellowstone Lake.....	133
16. The Mallard in Yellowstone Park Waters.....	144
17. The Trumpeter Swan in the Yellowstone Park.....	153
18. Notes for Field Identification of the Birds.....	155
19. List of Birds of the Yellowstone National Park.....	170
20. Acknowledgments .....	176
21. List of References.....	177
22. Index .....	183



## INTRODUCTION

I am giving an account of a typical bird trip through the Yellowstone Park. Starting from Gardiner, the Northern Entrance to the Park, we go to Mammoth Hot Springs; thence to Madison Junction and the West Yellowstone Entrance; thence back to Old Faithful in the Upper Geyser Basin; thence to Yellowstone Lake and the Grand Canyon, returning over Mt. Washburn to Mammoth Hot Springs. As the Southern and Eastern Entrances present no unusual features in their bird life, I have not mentioned them especially. This gives the Park visitor a sketch of the bird life of the region that should be helpful on even the most hurried tour.

The chapters following give additional information about the characteristic haunts of the birds in the Park and the conditions under which they must live, including such representative localities as those about the hot springs and the gas vents, Yellowstone Lake, the forests, the open prairie country, along the brooks and rivers, and in the beaver meadows. I have also added an account of the White Pelicans at Yellowstone Lake and of the Mallards and Trumpeter Swans in the Park waters. This brief guide concludes with the suggestions for the identification of these various birds.

It will be found helpful to consult the two sketch maps at the end of the book as one peruses the text. Map 1 indicates the itinerary of the regular Park tourist and locates all of the principal points mentioned. Map 2 is intended to show graphically the relative areas at different elevations, to be correlated with the discussion of habitats of the various species of Yellowstone birds.

The authority for the scientific names of birds mentioned in this paper is the "A. O. U. Check-List of North American Birds," 1910, with revisions through 1923.

## GETTING ACQUAINTED WITH THE PARK BIRDS

The inducements to study the birds of the Yellowstone are many. Here is a carefully protected tract of over three thousand square miles, well watered by many swift streams and several large lakes, with a surface well diversified into open range, meadows and forests, all at an elevation ranging from 5300 feet above sea level to well over 11,000 feet. With such varied conditions, the birds should well repay a careful study, especially as the Park is seen to be the borderland of the range of many species. The great elevation is favorable for a number of hardy alpine species; the open areas are suitable for those of the high plains; and the varied forest conditions are congenial for many others. Furthermore, the region can be easily reached, and transportation is readily secured to the various points of interest within the Park. There are good hotels at convenient intervals, and if hotel life palls, there are the permanent camps; or one can be still more independent and take his own camping outfit. And then there are the beautiful scenery and many wonders of nature to be enjoyed, should the birds cease to be of interest or fail to appear so as to fit one's schedule. The birds of the region had never been closely studied, although a few ornithologists had visited the Park and hastily noted the birds as they passed along. It was practically an unknown territory awaiting exploration by some bird enthusiast, and with a pioneer's joy I accepted the challenge.

The middle of June found me descending from the train at Gardiner, with expectations well whetted; for, from the train, I had already seen several strange birds, while many others looked familiar and yet were surely not those of my eastern home.

Stopping at the ranger station at the entrance and explaining my purpose, I readily obtained permission to walk to Mammoth Hot Springs, the headquarters of the Park. The keen, invigorating breeze sweeping down from the mountains was an irresistible call for me to begin work.

Just inside the boundary of the Park was an alfalfa field where the antelope range in winter, but across its dark green face were now darting the many graceful forms of old and familiar friends, the Cliff Swallows, with their pale rufous rump patches,—just as much at home amongst these magnificent mountains as over any

eastern barnyard. But a moment later a stranger appeared; a Tree Swallow, pure white below and glancing blue and green above; not a rare bird in the eastern states, but far from as abundant as here in the very center of its range. Two or three Bluebirds perched on the telephone wire, their blue throats and breasts proving them to be the Mountain Bluebird. As I looked out across the field, a movement in the grass caught my eye, and after a few minutes out stepped a Meadowlark. I thought I had found another old friend; but a second glance showed his upper plumage to be of an unfamiliar tone. When the bird flew to the top of a telephone pole and began to sing, I was astonished and thrilled! This rapid outpouring was not the song of our eastern Meadowlark, but far richer, more melodious, flute-like, and varied. It was, in fact, the Western Meadowlark, a quite different species. On another pole was a familiar-looking bird, but having just had an object lesson on the difference between eastern and western forms, I was now more cautious. The bird looked like one I knew and had a well remembered pose. Just then an insect passed and out he dashed with characteristic hovering flight that showed the white terminal tail band, identifying the Kingbird — a species as much at home here by this irrigated field as in an eastern apple orchard! His nest, as it proved, was in the brush bordering the irrigation ditch. Near it, on the ground, was a nest of grass containing seven gray-blue eggs, blotched with brown and lavender, belonging to a pair of Brewer Blackbirds. A bird with conspicuous yellow eyes, and walking about on the ground like a grackle, it is not strange that a male Brewer Blackbird is a bit difficult to name.

Another dweller by the ditch was a Song Sparrow, very similar to the eastern bird, and having the same sweet, cheerful song. During the latter part of March these tuneful little fellows arrive, bringing, amid the snows, the assurance that summer is coming. The Song Sparrow is well named and is among the singers who seem to most heartily enjoy their own songs; he does not run up and down or twitch himself about, but sits quite still and gives himself up entirely to the business in hand. He usually picks out for his perch a limb more or less bare of leaves and from ten to fifteen feet from the ground; he does not go higher, for his nest is either on the ground or at least very near it and his voice is not strong enough to carry far. He throws his head back, puffs out his little speckled breast, and pours forth his happy song. He does not greatly care whether the weather is clear or not, although he does like to have it warm. His song is one of the very first to be

heard in the spring and he keeps singing until the very last of July, when most of the other songsters have become silent. And now I felt that my fascinating work in this strange locality had begun; for I had seen and heard the particular sub-species of Song Sparrow that lives here! The bird itself is such a whole-souled little mite and puts such vim into his singing that it is hard to resist such winsomeness.

Going on up the road I discovered many strange birds and a few familiar ones. A Crow flew over, calling "caw, caw," and seemed curiously tame; a few minutes later another one came still closer, but this one gave a hoarse croak, seemed much larger than the first, and often extended his wings for a short glide like a hawk! It was, in fact, a Raven, a species that proved to be much more common among the mountains than the smaller Crow. A few Western Robins were running over a little meadow beside the road, and on the top of a dead pole of a tree was a Desert Sparrow Hawk watching the ground beneath for a possible grasshopper. After having been so nearly deceived on the Brewer Blackbird, I was a little cautious about naming the next birds I found, but they were really Red-winged Blackbirds, so nearly like our eastern bird of the marshes that only a pair of calipers could measure the difference. More Bluebirds, Robins, and Meadowlarks were seen, and just before entering the Gardiner canyon, a large gray bird flapped slowly across the river. I noted the heavy, crow-like flight and the flash of black and white from wings and tail characteristic of the Clark Nutcracker, a bird I had never seen before but with which I was soon to become well acquainted.

At the entrance to the canyon, one of the greatest curiosities among our mountain birds came flying downstream, and skimming close to the rapids tried to alight on a slippery rock, slid off into the water, unconcernedly swam ashore, and climbed briskly out. It was a small bird, almost black, carrying its tail perked up like a Wren. Indeed, the whole bird suggested a Wren. Although its feet were of the usual perching bird type it had just paddled across the pool, and a moment later it walked calmly down the stone into the next pool below. To my greater astonishment, this wonderful little bird not only walked into the water but continued right on down under the surface and across the pool bottom, and as it went, stopped an instant here and a moment there! Then it shot up to the surface with the buoyancy of a cork and swam to a nearby stone, up which it walked, shook itself, courtesied once or twice, and then proceeded to do the trick all over again. It was a Dipper,

or Water Ouzel, a perching bird like a thrush and a fine singer withal, although gathering its insect food from the bottom of a brook or river.

While I was meditating on the adjustments in nature that always provide for a bird a situation where food is to be had, a Kingfisher flew upstream uttering his rattling call. Just then another "familiar stranger" arrived; that is, he dropped onto a fir limb near the road in woodpecker fashion. The general coloration of a Flicker was apparent at a glance; but when he flew to his nest there was a flash of red instead of the yellow on the eastern bird. The nest in an upright dead limb of a fir on the bank of the river proved to be a characteristic Flicker nest, while the seven white eggs that it contained were evidently Flicker eggs. So this then was our Red-shafted Flicker of the West.

On nearing a small group of cottonwoods beside the river, to my delight I heard many warblers calling and singing. A familiar "wee, chee, chee, chee" was followed by a flash of yellow from the tree-tops, and down came a Yellow Warbler. It was pleasant to find this old-time friend; indeed, this little warbler comes very close to living in all parts of North America without having developed those minute differences that cause the naturalists to split up Song Sparrows into so many sub-species. Just then a "wreechity, wreechity, wreechity" came floating down the canyon and a few moments later this singer, a Western Yellow-throat, flew out from a limb in pursuit of a nimble insect. Many other birds, such as Robins, Flickers, Chipping Sparrows, Bluebirds, and Song Sparrows were seen and heard about this charming spot, where the bird songs made a medley with the murmur of the river that swept beneath the trees. A Western Tanager, with his head and neck as red as if he had inadvertently thrust them into a paint pot, darted across in a peculiar corkscrew flight that proved the fly he was after to be a past master in the art of dodging. But a past grand master was in pursuit and the fly soon went the way of many others before him. Idly watching the performance I wondered if the Tanager ever tired of his self-imposed task of fly catching, and, considering his gormandizing, if he ever had indigestion! Surely so active a bird, feeding on such small insect prey, must consume a vast number daily. As if to lend point to my musings, a flock of Tree Swallows appeared, flying down the canyon and back again, snapping up insects as they passed. Suddenly one of the flock that was flying low, so turned in his flight as to disclose a bottle-green back with touches of purplish iridescence. Never before had I seen his like, but later, upon



*Photo by M. P. Skinner*

Fig. 1. The home of the Osprey, "Eagle Nest Rock," beside the Gardiner River and near the North Entrance to the Park. An adaptation to the Yellowstone environment, for the usual nesting site is the top of a tree.





*Photo by M. P. Skinner*

Fig. 2. Nest of a Water Ouzel or Dipper on the lower side of a boulder in midstream. Almost always the opening is over the water on the downstream side. In this case grass soon sprouted on the nest and helped to conceal it.

looking into the matter, I found that he was the Northern Violet-green Swallow. These birds were afterwards found to be common and almost always in company with the Tree Swallows.

As I walked on up the road under the walls of the canyon, I searched for Eagle Nest Rock, so well advertised in the Park guide-books (figs. 1, 19). Soon I crossed a bridge, and there it loomed immediately above me, high up on the left, with one bird perching on it and the other hovering higher up, yet not as high as the canyon rim. But instead of being Eagles, the birds were Ospreys, much commoner birds but none the less graceful and interesting on that account. Most well informed persons would agree in thinking the Osprey a nobler bird than the Bald Eagle, robber and carrion eater that *he* is. Before seeing the nest, I had hoped it might prove to be that of the true hunter, the Golden Eagle, but soon realized that the location was far too exposed for that denizen of the wilderness.

Fortunately, in watching the graceful evolutions of the Ospreys, the possibilities of the lower plane (the roadway and the stream) were not overlooked,—I was dimly conscious of seeing a Dipper fly swiftly over the water and disappear! Forgetting the Ospreys, I scanned the water in bewilderment. No bird was on it or along the shores. But when I was about to give up hunting, the bird came out from a little patch of green moss and grass on a rock in mid-stream (fig. 2). An examination revealed a domed nest of moss, about nine inches across, with the nest proper inside on a little shelf; the roofed entrance was *below* the level of the inner nest. The house was cemented into a slight hollow in the rock with mud, a little of which was also used on the inside walls of the nest ball. While the outer nest was of soft, moist moss, the inner was woven of a coarse, dry, wiry grass and contained four white eggs. The opening was downstream and only two feet above the swiftly rushing water. As the ball of moss was fresh and green, and a few grass seeds on top had sprouted and were growing luxuriantly, it was evident that the spray from the water helped the color concealment. Other Dipper nests were found later and all were similar, although one was actually placed in the edge of the spray from a waterfall, and another under an overhanging bank. In every case the opening to these retort-shaped nests was below the rim of the nest proper and the nest was on the downstream side of the support.

About three miles from Gardiner and just before passing the hotel company's market garden—which, by the way, is located at the highest spot in the Park where vegetables will grow—a familiar "me-ow, me-ow" sounded from the dense willow thicket between

the road and the river. Sure enough, a Catbird, and nearby was the nest, a bulky mass of twigs and grasses, with a few leaves inside. As yet there were only three rich greenish blue eggs, but as the date was early, possibly another egg or two were added later. It was a rare find for the mountains; for this spot, fifty-six hundred feet elevation, and Mammoth, seven hundred feet higher, are its only known Park habitats, and this nest the only one I have ever definitely located there. As I emerged from the bushes, I noted a Spotted Sandpiper flying upstream, where it alighted, bobbing from a stone as if to prove its common name of "Tip-up." Along the road several Song Sparrows were singing their songs of welcome, each one perched on the very tip of a willow twig with his spotted breast turned toward the sun. A Kingfisher sitting on the rail of a foot-bridge, made a sudden dive into the water and returned with a two-inch trout held crosswise in his bill. A sudden jerk turned the fish around so that its head pointed down the gaping throat, the first gulp started it down, the second gulp swallowed it, and the third carried it to its proper compartment. From the bridge an Osprey was seen flying down the river, stopping now and then to hover and circle and then pass on.

At this point the road left the Gardiner River and commenced to climb up towards Mammoth Hot Springs. The country became noticeably drier, with sagebrush covering the rolling hills and other bushes growing in the moister gullies. A small blue bird, suggestive of an Indigo-bird, alighted on a sagebush; but when it turned, disclosing a brown chest band between the blue of the neck and the white of the belly, I recognized it as the dainty Lazuli Bunting! While quite common on the plains below, this is as far as it ever ventures into the mountains.

Halfway up to Mammoth, near a spring where a Yellow-throat or two were seen, my ear caught a song so surpassingly lovely as to command instant attention and search. It was melodious and very expressive, and the bird certainly had a wonderful vocal control to give all those delightful little trills and variations, each more beautiful than the last. A rather small bird he proved to be, with erect chestnut crest and gray-green back, sitting a-top of a sage bush and giving all attention to his singing, no doubt for the benefit of a demure little wife on her nest on the ground nearby. It was the Green-tailed Towhee. I was nearly misled by the name, for I had read much about this bird and its song, and was looking for a dull-colored bird with a bright green tail. The tail is green, to be

sure, but much less conspicuous than the beautiful chestnut crest. Not only was I pleased with this sweetest of all Yellowstone singers but I found him so delightfully tame as to admit of very close observation — one happy result of the "Rules and Regulations" that protect all wild life within the Park limits.

Having just enjoyed the strains of this mountain songster, I was treated next to the music of the master singer of the plains and meadows, the Western Meadowlark, which is more plentiful here than in any other place along the Park's tourist route. I now had the opportunity to compare the song of this westerner with that from the East; and what a difference! That of the western bird is remarkably fine, less shrill, more plaintive, and richer. This seemed to be exactly counter to the usual order of things, for it more frequently appears as if the eastern birds excel in song. Perhaps it happens that in the strenuous life of the West the birds do not find time to develop the singing powers of the easterners! This assumption may well be questioned, for we need not apply our human reactions to wild birds; but it was true, nevertheless, that I had formed little idea of the surpassing beauty and charming variety of the Western Meadowlark's song. On a number of occasions I have heard five and even six different tunes following one after the other.

The Meadowlarks, as I discovered when revisiting this avian concert hall in the early morning — the time to hear birds at their best — had made their nests amid the tufts of long grass. Several pairs of birds were present, and their nests, well separated, were scattered over a tract several acres in extent. The nests were constructed of coarse, wiry grasses and lined with finer and softer material of various kinds, and were placed on the ground in a position where it was possible to have a hidden, winding path leading away under the arched grasses. Usually a nest contained four white eggs, dotted with reddish-brown, and some sets were almost ready to hatch. It was a matter for surprise to find that while spring came late in the mountains and frosty nights were frequent through May, June, and even July, still, the majority of the birds nested as early and raised their young as soon as they would under what we might consider far more favorable conditions. Possibly the secret lies in the fact that where the summer season is so short, the insect life is more hardy and reaches the zenith of its abundance at an earlier period. Be that as it may, it is often amazing to see the quantity of insect life to be found in Yellowstone Park even before the last snows of

spring have disappeared. Indeed, these disappearing snowbanks provide a veritable feast for the passing birds; insects chilled and held by the snow, warmed to life in the midday sun. Nor are the birds and insects alone in their early development, for the meadows through May and June are spangled with many beautiful flowers, cinquefoil and iris (fig. 3) and shooting star, even when there was a heavy frost every night. The blooms of the mountain plants are so well inured to the cold that the morning sun is able to thaw out, unharmed, the blossoms that had been stiff with frost at dawn.

After my first visit to the Meadowlarks' nesting ground, and following up the road, a Raven and then a couple of Crows passed, the former being distinguished by its short stretches of soaring at intervals. Covering the slope of the last hill below Mammoth is a growth of limber pine mixed with cedar. Occasionally a Flicker or a Nutcracker (fig. 7) was seen in this grove. Beyond it a brilliant Western Tanager flitted by near the hospital; and just as I reached the bench on which the village at Mammoth is situated, a Yellow Warbler flew up into one of the shade trees.

### THE BIRD LIFE AT MAMMOTH HOT SPRINGS

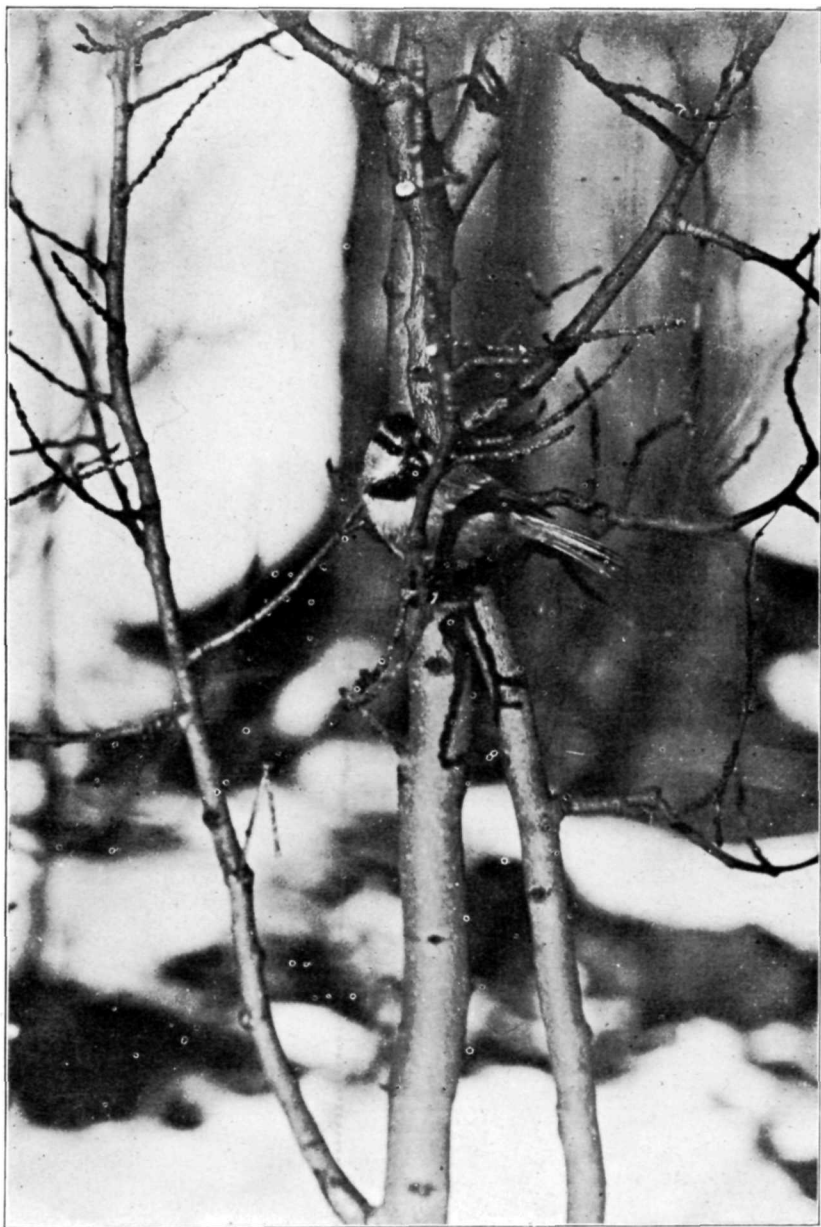
I had been told that there were few birds in the Yellowstone, but as I soon discovered, the visitors were too much interested in the larger wonders to pay much attention to the birds. Then, too, they looked for them in the heavy timber which birds avoid, instead of about the numerous openings, in the meadows, and along the streams, all of which they frequent in numbers.

My first afternoon at Mammoth was given up to the examination of the hot springs and variegated terraces that makes this one of the show places of the Park. But even while making my "tour" of the Hot Springs terraces with a crowd of visitors, I was aware of the presence of many birds. Occasionally a shadow would drift across the formation and a Red-tail Hawk or a Swainson Hawk would be seen circling high overhead. Again and again a chirp in the evergreens beside me or a flutter of wings through the trees lured me away from the party. Once I found a splash of blood and a little wad of hair beside it, and shortly afterwards a Great Horned Owl disappeared on noiseless wings into the dark screen of trees. At one point, a member of the party discovered a large bluish bird walking sedately up the hillside (see fig. 24). The guide was appealed to, and his group seemed very interested to



*Photo by M. P. Skinner*

Fig. 3. This grassy meadow, spangled with beautiful iris, beside the Gardiner River, under the cliffs of Mount Evarts, is a favorite haunt of the Meadowlark.



*Photo by E. R. Warren*

Fig. 4. The Mountain Chickadee can be readily distinguished from other chickadees by the white bar above each eye.



hear: "It is a grouse that lives in the forests of western America. The varying climate that it inhabits has led to certain variations in its color so that four geographical varieties are recognized. The Dusky Grouse is the southern variety and is found throughout the southern Rocky Mountains. The Richardson Grouse is the northern variety, extending well up into the Canadian provinces. The Pacific coast has a third form, the Sooty Grouse; and the interior of Oregon and California the fourth, the Sierra Grouse. The four different forms can be readily recognized only by the scientists. Here we are in the borderland between the southern and the northern forms and this particular bird shows the characteristic marks of both. It might be called either a Dusky or a Richardson Grouse, but it has been decided that the grouse here shall be considered the Richardson."

The evergreens scattered over the formation and up the hillside to the west were filled at times with the Mountain Chickadees (fig. 4) — dainty little fellows that have all the fascinating and confiding ways of the other members of the family. The song was somewhat different, "phee, phe-e-e, phe, phe," with the second note accented and slightly prolonged, and the whole having a dreamy and rather sorrowful tone. Once in a while a Rocky Mountain Nuthatch or a Rocky Mountain Creeper was with the Chickadees. Peculiar chirps and calls from the hillside beneath a big red fir led me to discover a small flock of Pink-sided Juncos busily gathering ants from the ground. As I was returning to the hotel a Sparrow Hawk darted out of the evergreens with a Robin in hot pursuit, a case of the hunter being hunted. What could have roused the Robin to such a fury? The hawk possibly had lost the usual good manners of his species and taken to nest-robbing!

The Mammoth Hotel proved to be delightfully located for bird study. At Gardiner and the North Entrance the elevation is 5300 feet; here it is 6300 feet, and in less than five miles farther up the road, at Swan Lake flats, it reaches 7300 feet, while the Bunsen Peak road is a few hundred feet higher. Within a five-mile circle, and hence within easy walking distance, rises Sepulcher Mountain to a height of 9500 feet. Then too, the Mammoth Springs lie on the borderland between the open country and the heavy forests, and mixed in the white pine and cedar belts there are numerous groves of quaking aspen. Hence the birds peculiar to each of these habitats were easily found from this center; indeed, I discovered no other section that could boast of so many species within



a limited area. To be sure, the water birds common to Yellowstone Lake were not here nor was there the great abundance of individuals often seen in the Madison valley. Mammoth is further blessed by having its best bird areas so easily accessible that a few minutes' walk suffices to reach some fine haunt. Many of the birds that seek the protecting neighborhood of man for their nests were here, as the Bluebirds, Robins, Swallows, Blackbirds, and that dainty little elf of the mountains, the White-crowned Sparrow. In addition, the formations and the marshy tracts below afforded nesting sites for the Killdeers and the Spotted Sandpipers. The marshes, especially the reedy ones bordered by quaking aspens, were also a paradise for warblers. From the Hot Springs an old road, used as a trail, led up through Snow Pass and the fir and aspen forests where the beautiful Williamson Sapsuckers had their nests.

Even before reaching Mammoth I had seen many of the pretty Mountain Bluebirds. Unlike the eastern Bluebird, I found the male pale blue with a curious greenish cast and lacking entirely the chestnut vest (pl. 3). But in all his habits he was an exact replica of the eastern species; song, food, and nest were all similar, although the eggs were a trifle larger. But the Yellowstone bird was not quite so "humanized" as the Massachusetts one. Presumably when the western states have been settled as long as the Atlantic seaboard, the Mountain Bluebird will adopt the ways of his dooryard relative and forsake his wilderness manners. It was observed that the Mountain Bluebirds were more apt to select a cavity in a tree for their nests; but like all bluebirds their bills are too weak to excavate holes for themselves, so they are forced to appropriate old woodpecker or Tree Swallow nests found most commonly drilled in the trunks of small quaking aspens.

But although the edge of the forest is the natural home of this mountaineer, there was generally a Bluebird nest or two somewhere about each hotel or permanent camp (see fig. 5). One pair built in a false rafter of the porch at Mammoth Hotel, and although within a few feet of the tourists getting in and out of the auto-stages, a brood of four was raised. It was a pretty sight to watch the parents catch insects for their brood; the wide, open lawn dotted here and there with cedars was their hunting preserve; and they were always busily at work in the clear, crisp mountain air of the early mornings swooping down upon the caterpillars and grasshoppers. Both parents fed the young, and when I timed them, I found that food was brought to the nest about every four minutes.

To accomplish this they had to fly two or three hundred yards, catch the prey, return to the nest, and give it to the always hungry youngsters. To save time and trouble they often brought in two or more bugs at a trip. Inasmuch as the diet consists mainly of injurious insects, it was easy to imagine the appreciable value of a pair of such birds on the premises of a rancher.

These lawns were shared with the Robins, known scientifically as Western Robins, although it is practically impossible to tell the two forms apart. Their calls and songs all sound the same and their habits are the same, but the Robins are like the Bluebirds in not being as thoroughly domesticated as their eastern relatives and are often found far from civilization. They made their nests in the shade about Mammoth and their "cheerily, cheerily, cheer-up" was frequently heard of a morning. Old birds and young spent their time running nimbly over the lawns. Often one had a tug-of-war with an earthworm that was both opponent and rope; but worms were not to be found elsewhere in the Park and the Robins had to depend mostly on insects.

Early in March, when this region is still in the grip of winter, one is often surprised to hear a prophetic Robin or Bluebird singing as gaily as though summer had already come. Of course, such a message from these spring heralds is as joyfully received by their human friends as in other regions, but it sometimes does seem as if they had been woefully mistaken, for the snow still lies deep and much cold weather and many storms may yet come; however, these birds are true mountaineers and cheerfully face weather that might easily daunt less venturesome spirits. While they may often be seen in spring looking as if they would enjoy a warm fire, it is doubtful if many are actually hurt. In the fall, however, it is a different matter, especially if a heavy snowstorm arrives early in the season before the young birds have all left for their winter homes in New Mexico and Arizona. In such storms hundreds of Robins and Bluebirds, perhaps enervated by the warm summer weather, perish miserably, though more from lack of food than from the cold itself.

While the Robins and Bluebirds preempted the lawns as a foraging ground, the White-crowned Sparrow, the handsomest sparrow of the mountains, was equally numerous in the low bushes and shrubbery at Mammoth. This was the bird heard singing everywhere in the Park, except in the gloomy pine forests, throughout June and well on towards the end of July. On my very first morning, as I stepped out on the porch, I was greeted with a loud

and very melodious song repeated by as many as three or four songsters, first from one bit of shrubbery and then from another, before a second strain came from the leader. While I noted this sequence of songs from several White-crowns on many different occasions and in many sections of the Park—and it certainly appeared like a game of “follow your leader”—still, it may have been that the first bird’s song merely suggested to the second that it was time he, too, was heard from. Because of his handsome crown and bearing the musician has well been called “the little prince with the snow-white diadem,” and his song voices the joy of the home of his princess. In passing a roadside bush under which a mother bird was brooding her eggs, I was fortunate enough to witness a pretty conjugal episode. The little princess was at home attending to her duties, and evidently her prince believed in courtship after marriage as well as before. His crown was held erect, his tail perked up in the latest fashion in sparrowdom, and his wings slightly extended and allowed to droop. First up onto a handy stone he flitted, to glide softly down again; then up an inclined branch and down again with movements indescribably dainty and graceful; then up again and down once more to his mate watching demurely from her nest. Finally, unable to contain himself, the proud little husband bird flew up on a branch where he poured out his joyous, melodious song again and again.

Another noted bird whose acquaintance I had made on the way up to Mammoth, the Clark Crow or Nutcracker, is a striking fellow dressed in black, white and gray who went flapping through the evergreens like an undergrown crow. While shy in places outside of the Park, these birds were so tame here that I made a special study of them, both on my first visit and on subsequent ones (see Skinner, '16). The Nutcracker is sometimes erroneously termed the “camp robber” because of a rather superficial resemblance to the more commonly called Camp Robber, the Rocky Mountain Jay (pl. 1). Here in the Yellowstone he is everywhere to be found; but when seen in the large open prairies and meadows, is only flying across to the heavy evergreen forests, his characteristic haunt. He is never met with in the large flocks reported elsewhere, the largest that I saw being loosely made up of only twenty-four individuals. Usually only one or two are seen at a time, or at most a half dozen. This is not a migratory bird, strictly speaking; in summer he is to be seen at all elevations from the lowest limits of the Park to well above timber line at 9500 feet; and one snowy day numbers



*Photo by R. B. Rockwell*

Fig. 5. Mountain Bluebirds nesting in the siding of a building. In the Park they sometimes nest under the eaves of log cabins.



*Photo by R. B. Rockwell*

Fig. 6. The Western Robins build the same kind of nests on the same kind of sites as the eastern Robins; in this case, under the edge of a thatched roof.



*Photo by M. P. Skinner*

Fig. 7. The Clark Crow, or Nutcracker, shows its characteristic bold disposition in most of its attitudes. It is conspicuous in color and in its habit of perching on the most commanding points.



*Photo by M. P. Skinner. Courtesy A. C. McClurg and Co.*

Fig. 8. Nutcrackers are given to foraging about the kitchen doors at Mammoth Hot Springs, especially in severe winter weather. In this instance one bird is tearing a piece of raw meat from a bone while the other two await their chance.

were observed passing the top of Mt. Sheridan in the storm at an elevation of 10,000 feet. But in winter he lives mostly below 7000 feet. Mammoth is a center of abundance both in winter and summer; it was estimated that twenty to thirty birds are constantly in the neighborhood, but as they are erratic wanderers this number varies considerably. Probably it was the large supply of pine cones that brought him here originally, but undoubtedly the discarded food from the kitchens have kept him, especially in winter.

My observations on the Nutcracker indicated that he ate anything and everything. He foraged about the stables for grain and came to the kitchen doors for scraps, especially liking bones with bits of meat attached (fig. 8); while in the mountains he picked off the cedar berries, tore the seeds out of pine cones, and devoured great numbers of insects. He was even seen to catch his prey on the wing, making very flycatcher-like sallies from the tip of a tall pine. Sometimes he walked over the ground like a crow, searching for ants and ground insects, and even the troublesome wood ticks; but the seeds from the limber pine cones were his favorite food. Sometimes he tore the cone to pieces, even while it was still fastened to the branch, perching perhaps at the very tip of a bending twig, or clinging underneath in a manner creditable to a Chickadee or a Nuthatch. More often, he broke off the cone and carried it to a limb where he held it by one foot while the pickaxe-like bill struck strong downward blows. At times he secured a seed at every second stroke, meanwhile tearing the cone to shreds. Being a bold, independent free lance he would vary his methods by robbing a pine squirrel; even going to the extent of suddenly swooping down upon him and knocking him from a limb. The squirrels knew him all too well. It amused me greatly to see a redcoat, whose own abilities as a robber were not small, glide into a protected nook and hurl vituperation at his enemy. At such moments the Nutcracker showed his superior ability in "sassing" back.

Always ready to come at the call of battle, the Nutcracker did not restrict himself to the troubles of his own species. One day two Bluebirds had "a little difference," and while they were hard at it, four Nutcrackers came to investigate, each one trying to mix in. One of the audience became so excited that in rising from the ground he struck a wire gate, knocking out several feathers and partially stunning himself. Nor was his interest confined to his small neighbors; let a large hawk appear and it was mobbed by all the Nutcrackers in sight as well as by all others within hearing of

the first outcry. They usually attacked a hawk from above, striking it between the shoulders; and generally the hawk tried to escape by circling up until he forced his tormenters so high that they were glad to raise the siege and return to earth. Occasionally the hawk escaped by diving into a thick tree-top where he could turn and drive off his pursuers. The Western Red-tail was frequently attacked, but the Swainson Hawk proved so inoffensive that the Nutcracker contented himself with a mild peck or two in passing.

The Nutcracker combined the peculiar habits of Crow, Jay and the woodpeckers. He would walk about on the ground like a Crow, he was always uttering very jay-like screams, and he would hammer on a limb and even jab his bill into crevices in the bark for insects. Like the talkative Jay, he was exceedingly quiet during the breeding season; that is, quiet for a Nutcracker; but at all other times the woods were filled with his harsh, strident, scolding notes. When he drank, he turned his head sideways and drank through the side of the bill. Habitually seeking the tip of a tall pine or fir, often at the very top of a mountain, or searching out some other commanding point, where he could survey the country for miles in every direction, he was always a most conspicuous bird (fig. 7).

The female Nutcracker has her own way of building her nest. Just think of a bird that builds in February and successfully hatches her naked young in March long before the snow has left the ground! Those that I watched were so secretive about their nests that in flying to them they stopped every fifty feet to survey the ground before flying the next fifty feet. The nesting site was chosen and the nest built for winter protection against wind and weather. The thick protecting top of a cedar was selected with a convenient crotch about twelve feet from the ground and beneath an overarching canopy of heavy foliage. First a rough platform of twigs was made from material broken off from a dead cedar by quick, wrenching jerks of the bill. They were piled in the crotch until the mass was nine inches in diameter and six inches high, forming a good mattress to keep out the cold from below. The nest proper was built on the platform, a deep cup with walls an inch thick made of cedar or pine needles and supported on the outside by cedar twigs. The inside lining was composed of grass stems and shreds of cedar bark, with the addition of a few horsehairs and bits of string. Four grayish green eggs with irregular grayish brown markings were laid between the end of February and the middle of March and brooded for twenty-two days. During this period the sitting bird



was subjected to all the vagaries of genuinely wintry weather except for the protection that the cedar roof above gave her. Often she sat through a raging snowstorm, and many times I found her on the nest with the thermometer actually below zero. Under such conditions she worked herself quietly down deep in the nest with only her tail and perhaps her bill showing above the rim. While brooding, she not only permitted me to approach closely but even to touch her, rather than leave the nest. The young birds were in the nest four weeks, but by May first were foraging for themselves, long before most other species had begun to nest at all.

It was not until the middle of July that the nesting season of the Brewer Blackbirds was so well over that they commenced to congregate about Mammoth, and then it was the usual thing to see as many as two hundred of them running about on the lawns and roads in front of the hotel in the early morning, nodding their heads at each step, here and there a bird flying a few feet; but the flock always moving forward. These gatherings were not peculiar to Mammoth alone, but were found later at Old Faithful, Lake and Canyon hotels also. While there were other varieties of blackbirds in the Park, this was the only one to gather in such large flocks; fifty Brewer Blackbirds were seen to every one of the Red-wings and Yellow-heads.

Several days were spent in the neighborhood of Mammoth Hot Springs with much pleasure. A White-crowned Sparrow's nest (see fig. 9) was found with four greenish blue eggs, spotted and blotched with red-brown, especially about the larger end. The nest was made of grasses and rootlets and placed on the ground under a willow bush. Calliope Hummingbirds came among the flowers about the buildings, and so small were these midgets that it was often impossible to satisfy one's self that they really were birds. Cassin Purple Finches gleaned the oats dropped on the roads; and the Pine Siskins flashed rapidly by from their feasts of dandelion seeds. A Pigeon Hawk swept across the lawns one afternoon, causing a flutter of excitement to run through the flocks of small birds. Tree Swallows, Northern Violet-green and Cliff Swallows tirelessly pursued flies and gnats in the evening; sometimes also, a Pacific Nighthawk or two. In the daytime Yellow Warblers were scattered through the shrubbery, and Wright Flycatchers, Olive-sided and Western Flycatchers skillfully caught their prey; while Marsh Hawks and Red-tail and Swainson Hawks circled and sailed about, ever watching for ground squirrels and field mice.



One day I found a Pileolated Warbler amid the shrubbery, and spent a half-hour watching this dainty bird with the black cap. Yellow-throats, Audubon Warblers, and Western Tanagers enlivened the somber firs with their quick movements, flashing colors, and characteristic calls. But one discordant note was heard — the too familiar "kis-sick" of the English Sparrow! Only a few of them, however, have reached the Park, and they keep modestly about the stables, making no attempt to disturb the native birds.

### **BIRDS FROM MAMMOTH HOT SPRINGS TO THE MADISON RIVER**

Only the promise of more new birds ahead finally induced me to start on. To miss nothing by the way, I decided to walk up through the Golden Gate and Swan Lake Basin to a friendly camp just beyond. Starting in the early morning, I found the Tree and Cliff Swallows whirling and circling, and on reaching the reservoir at the foot of the Hot Springs terraces, was thoroughly waked up and tuned up for my trip, by discovering a Song Sparrow at the very tip of a cedar tree with his breast turned towards the rising sun, singing enthusiastically. A few Brewer Blackbirds were walking here and there in the road. On the formation just below Jupiter Terrace, a pair of Killdeers were announcing their presence in long, querulous cries (see fig. 12). Many Robins were running through the shallow water flowing down from the Terrace, catching the various insects that were breeding there. A flash or two of yellow was caught as an Audubon Warbler flitted through the scattered evergreens. I found later that Ruddy Ducks, Mallards and Barrow Golden-eyes sometimes came to the reservoir in the spring; but not finding any now, I concluded that the constant summer travel had driven them away, temporarily.

Passing on up the hill, I was entertained by the songs of the Green-tailed Towhees. One of them, with chestnut crest erect and tail twitching, was singing his best for his mate, while she, perhaps, was quietly admiring her gay troubadour; and, if so, she had ample reason. He was so debonair and his song so sweet and varied that I disliked to leave him. This bird was singing from the top of a bush about three feet high, and a few minutes later another was found singing from the tip of a pine only about seven feet high; as there were many higher trees, it was quite evident that the singers selected their perches from choice and not because no loftier perches

could be found. As I started on, a Mourning Dove drifted softly by, showing its white-edged tail fan as it alighted in the road,—another familiar bird whose slight difference had given it that burdensome prefix of “Western” (see fig. 11). Three Red-tailed Hawks flew by, fighting amongst themselves, and to me it seemed like a general mixup where each hawk fought against the other two. After passing a grove of aspens beside the road where two Audubon Warblers were singing a duet, I caught a movement in the brush and went to investigate. Instead of a robin or a sparrow flying away, before my astonished eyes out walked a brown bear! Not being in search of that kind of prize, I let him take his own path. The bear was inoffensive and paid no attention to me, going on about his business. Along the hillsides where the road climbed steadily upward through the remains of an old burnt forest of which nothing was left but the unsightly stumps, there were large numbers of White-crowned Sparrows. On all sides these indefatigable little fellows were singing over and over again their one cheery refrain. There are some bird songs of which one never tires, no matter how much they are reiterated, and that of the White-crown is among the number. It has not the melody of the Towhee and the Meadow-lark, nor the reminiscent quality of the Robin; yet it was sadly missed when the birds stopped singing in midsummer. Indeed, not until I missed the White-crown’s strain did I realize that the song season was over. While ascending the road through the burn, I had been starting up Pink-sided Juncos, usually one or two at a time. Sometimes a group of half a dozen were gathered together about a little pile of oats spilled in the road from some wagon going to stations farther up in the Park. Nor were the birds the only ones who benefited by these treasure-troves; there were chipmunks and ground squirrels of different kinds in great numbers, and two or three times that queer tailless animal with the big ears, the pika or little chief hare—or to use the local name, rock rabbit. Frequently a big, fat woodchuck waddled out of the way, gyrating his tail like a miniature windmill. It soon became evident that the only place where chipmunks and woodchucks were really numerous was along the roads. These wise little four-foots had learned that it was much easier to pick up oats and scraps in the road than to forage for their natural food in the wilds.

While passing through those strange freaks of nature, the huge tumbled rocks known as The Hoodoos, I saw very few birds, but there was a pair of Juncos right in the Silver Gate, and a little

beyond a Cassin Purple Finch lifted his crimson head and betook himself to a small cedar. Through the Golden Gate, only a Nutcracker or two flew slowly over and a few Tree Swallows swung to and fro on their tireless aerial search. This paucity of bird life gave me ample opportunity to enjoy the wonderful scenery, so strikingly beautiful that I did not miss the birds until a Dipper beside Rustic Fall caught my attention. He flew up the face of the waterfall seemingly never entirely out of the spray, and so close to the tumbling water that his black form was sharply outlined against the white foam. Either he, or another Dipper, appeared just beyond the Fall. Two branches of Glen Creek join on the flat just above, and it was very amusing to see the dark gray bird come flying down the center of one stream, make an acute-angled turn, and go buzzing merrily up the center of the other creek. It would have been much shorter to fly directly across from one stream to the other; but while a Dipper *can* make such a flight, he is opposed to it. It seems to be one of its unwritten laws to always fly over water if possible, and the little birds often go to considerable trouble to do this.

So intently had I been watching the Dipper that I failed to note the change in the scenery; a moment before I had been in a gloomy, impressive canyon shut in by perpendicular cliffs; but now, before me lay a wide, level, smiling valley with a chain of high snow-capped mountains on the far side, five miles or more away. It was Swan Lake Basin, although the lake was not in sight from this point; neither, so far as I could ascertain, had it ever had swans upon it. Therefore it was probably called Swan Lake to satisfy the namer's whim. But as I was enjoying the beauty of the valley, a vigorous quacking recalled my thoughts to the avifauna just as a Mallard sprang up and rose high in air from the slough where she was resting. She was soon followed by the drake whose quack was neither so loud nor so sonorous as hers. Why was it that with ducks in pairs, the females always took alarm and flushed before the drakes? I had noticed it in the case of the Golden-eye, Bufflehead and Green-winged Teal, as well as the Mallard. Was it because the duck was shyer and more easily alarmed. Or was the drake lazy and loath to start until there was danger of his better half deserting him? And why was the duck's quack loud and audible at a long distance, while the drake's note was soft and sibilant? Did she need it more because she had to warn her ducklings of frequent dangers?



*Photo by E. R. Warren*

Fig. 9. A nest of the White-crowned Sparrow. These nests are the most frequent of all, especially in brushy parks and meadows.



*Photo by R. B. Rockwell*

Fig. 10. A Broad-tailed Hummingbird on its tiny nest in a rose bush. Most of these birds breed at much higher altitudes, but occasionally a pair prefer the rose bush zone at about 6000 feet.



*Photo by R. B. Rockwell*

Fig. 11. Here the Western Mourning Doves build rather flimsy nests, just like other doves elsewhere.



*Photo by R. B. Rockwell*

Fig. 12. The Killdeer is always a conspicuous feature of its chosen home, especially because of its piercing cry, uttered almost incessantly.

When the Mallards had disappeared, my attention returned to Swan Lake Basin, which has an elevation of 7300 feet, and is typical of many superb valleys hidden away amid the mountains. Clear of timber except for occasional patches of lodgepole pine and aspens, with a little willow brush along the watercourses and about damp places, its floor is covered with low sagebrush and stretches away to the delectable mountains on either hand. Numerous Vesper Sparrows, with tails showing their characteristic white outer feathers, jumped up out of the sage and went flitting along just over its level top. The clear, open path apparently appealed to the Vesper Sparrow, for when flushed from it he would spring up and after flying a few feet alight in it again, repeating this until sometimes he had preceded me thus for a half-mile or more. Many of the Vespers were singing from a bush or slightly raised perch, but none were heard to sing from a really high elevation. They are among the few birds who sing better in the evening than in the morning, their sweet, simple lay becoming richer at the approach of sunset.

In one of the few clusters of trees among the sage, a Swainson Hawk was sitting calmly on the very tip of one, with a Vesper Sparrow just below him, the little bird showing not the slightest fear of its big neighbor, although a Meadowlark on the ground was perturbed about something and kept sounding his alarm note of "kip-kip-kip-kip-kip."

In some willow bushes, a glimpse of a small yellow bird darting about led to my discovery of three Pileolated Warblers, with black cap and bright yellow breast — birds whose beautiful plumage and piquant ways make them always welcome. They were very nervous, after the warbler fashion, and kept moving briskly about; but beyond a few chirps, they were silent. On one of the telephone wires that encircle the Park, affording comfort to both man and bird, a Sparrow Hawk that had just flown up was making much ado about getting his balance, teetering back and forth uncertainly until finally his long tail gave him the victory. Hardly was he settled before he spied a mouse in the grass; down he shot like an arrow, and after a moment flew off with the prey clutched in his talons. As if to show that *all* the hawks of the region were harmless, a Robin was perched near a Red-tail. It was quite safe, for where ground squirrels and mice are as abundant as they were here, the Red-tail is as inoffensive to the birds as the Swainson Hawk, and that is saying a good deal, too. About noon I arrived at the camp with its gleaming white tents set in a little meadow beside the rushing

upper Gardiner River, and here I found pleasant quarters with some friends until the next morning. They had just driven over the long trail from New York and were resting here in this charming spot and making the acquaintance of the trout of the rapid mountain stream.

From the camp it was only a short walk to Swan Lake, which I visited that afternoon, hoping to see ducks. None were in sight when I got there, at least not out on the open lake, and I was about to turn away. But a soft "quack-quack" close at hand led me to discover a pair of Mallards. I had forgotten the remarkable tameness of these protected birds and had been looking for them at long range, only to find them almost at my elbow. Just then the drake commenced his bath; putting his head under water he gave a sudden plunge forward, making the water run up over his back, assisted by the lifting action of the fluttering wings. After about five of these "showers" he stood erect on the bank and flapped his wings rapidly to throw off the surplus water. This done, he preened himself, dressing his feathers back nicely, after which he hoisted one foot and went to sleep in the warm sun. The duck did the same but I had a notion that she was "sleeping with one eye open"; at any rate it was open when I moved away, although she did not otherwise disturb herself. As I approached another slough there was a great commotion, a female Mallard clucking to her young and then blundering off with pretended broken wing. I knew the trick and set myself to find the youngsters instead of being led away by the ruse. Three ducklings were discovered hidden under fallen leaves and rushes, three more swam off under water, while a seventh clung to a grass stem a foot beneath the surface. He clung there just as long as he could, then came to the surface for breath and swam out to the mother who was circling about near open water. Judging from the broods found that afternoon, there must have been great variation in the nesting period of the Mallards; some youngsters were fully three weeks old while others were but just out of the nest, and one nest was found with eggs in it only partly incubated. This nest was on a little tussock of grass in the shallow water of the overflowed flat, built of weed stems, lined with a few feathers, and contained eight eggs of a dingy yellowish drab.

One brood of Mallards was seen swimming across a small pond, the mother ahead with the ducklings following at evenly spaced intervals as if tied together in tow. Suddenly a note of alarm, and the whole brood swung quickly away from the rushes on the far



side. A moment later a muskrat came gliding rapidly towards the ducklings. How they did swim! But they couldn't swim quite as fast as the oncoming rat. He was almost upon the last one, which now seemed lost, but the mother saw the danger and in an instant was there scooping water into the rat's face with her wing! The muskrat slowed up under this unexpected attack so that the duckling gained a little; but soon the race was on again, and again the mother hurried to the rescue. Twice more she gained a respite, and by that time the little Mallards had reached the reeds and shortly after were safely on shore. Happily for the family the water had been too shallow for the muskrat to dive and come up under them. Apparently the Red-tails never bothered the Mallard broods, for several of these large hawks sailed about while the ducklings swam fearlessly below.

At this time the moult was just beginning, and most of the drakes looked quite dejected and not at all fit for general society; for while the ducks are rearing their broods that strange moult occurs that leaves the males powerless to fly but provides a protective coloration equal to and resembling in dullness the coloring of the female. In late September they acquire their handsome dress once more.

Leaving the lake and its sloughs, I made my way to a grove of "quaking asp" as the people of this region call the common poplar or aspen. Here I found several Tree Swallows nesting. They were in abandoned woodpecker holes from six to ten feet above the ground, with openings an inch and a half across. The swallows very evidently preferred to have new, clean holes, for there were several older holes unoccupied. One pair had their nest in a hole in solid wood so recently excavated that the fresh chips still lay on the ground outside. As the swallow's bill is altogether too weak for carpentry, the little interlopers must have driven out the woodpeckers—Williamson Sapsuckers very likely—almost as soon as they had finished the place, unless perchance some accident had befallen the rightful owners. Be that as it may, the swallows were there and had a nest of grass and leaves in a beautiful new wood house, with four well-incubated white eggs. So engrossed had I been in the discoveries of the afternoon that before I realized the lateness of the hour, a Western Horned Owl came skimming across the sagebrush of the Basin, alighted on a low bush, looked about for a moment, and then pounced down upon the ground, from which he flew to a neighboring pine with a ground squirrel hanging below. It was surely supper time, and I took the hint and hurried back to camp.

During the night I was awakened by rain on the tent; but as I only intended going a couple of miles the next day, it did not disturb me. As a matter of fact it would give a fine chance to see how the birds comported themselves in threatening weather. Would they sing, or would they maintain a baffling silence? The question was answered before I was even dressed. A Robin commenced with his "cheerily-cheerily-cheer-up" and was followed by a whole chorus of White-crowned Sparrows. A low, trilling song was added which I afterwards found to come from the Lincoln Sparrow, a bird that looks very much like a Song Sparrow but whose song is far from measuring up to that bird's standard. He is a dweller of the brushy meadows above 7000 feet, but is so shy as to be seldom seen.

After breakfast the rain slacked up and I started for Apollinaris Spring camp ground where my friends intended moving their camp later in the day. Already the birds were taking advantage of the cessation of the storm; hardly had I started when I found a Swainson Hawk, balancing on the extreme tip of a pine, stretched up to his utmost with his wings spread, getting dried out, and on a limb only a few feet below was a Vesper Sparrow, also drying off. Further on, a Killdeer (see fig. 12) was heard and then seen flying up and down uttering the most mournful of distress calls. Possibly a couple of neighboring Crows had been after the young. If so, they did not get them all, for later in the summer near the muddy banks of a small shrunken pond, I found two downy chicks running about with the mother. At one time the mother crouched flat on the ground and lay motionless for a few moments, but could not have had much confidence in this manner of hiding for she was soon up and running again.

Now, as if to remind me in my preoccupation not to take too many liberties with the climate, a sudden hailstorm came sweeping across from the Gallatin Mountains. A Nutcracker who had mounted to the very tip of a pine at the clatter of the first hailstones, squawked defiance at the storm; but when the hail came thick and fast our Mr. Defiance was forced to seek a retreat. A Gray Ruffed Grouse had taken shelter in a small group of firs; and although, when I came up, he erected his ruff and strutted about, apparently he did not care to fly out into the storm. As I approached he did not seem unduly alarmed, but walked about within the confines of his shelter, now thrusting his head up to see better, then lowering it almost to the ground; and all the time uttering a series of low clucks.

Fresh from the East I had missed the familiar Blue Jay; but knowing that other species replaced him here in the Rocky Moun-

tains, I kept a close watch for them. Soon after leaving the Grouse, my search was rewarded by finding a Black-headed Jay. He was a handsome rogue, not so gaudy as the eastern bird, but still very attractive with his neat crest, his black head and neck, and the natty dark blue of the remaining plumage. He proved himself a true scion of the family by climbing a pine tree a branch at a time, giving a loud "chick-er-r, chick-er-r, chick-er-r" as he mounted. He had a great variety of calls and whistles, some of them so sharp and strident that they made a horse picketed out on the meadow uneasy. A second Black-headed Jay was seen on the bank of Obsidian Creek, presumably catching insects.

At Apollinaris Spring camp that evening, I made the acquaintance of the Camp Robber, or Rocky Mountain Jay. Near the cook's tent two of the big fluffy gray birds got to fighting so hard over some tidbit that they fell to the ground and the cook picked them up still fighting. Although at first apparently quite fearless, the birds began to utter piercing screams when they found themselves caught, and when released went crashing through the bushes almost blind with fright.

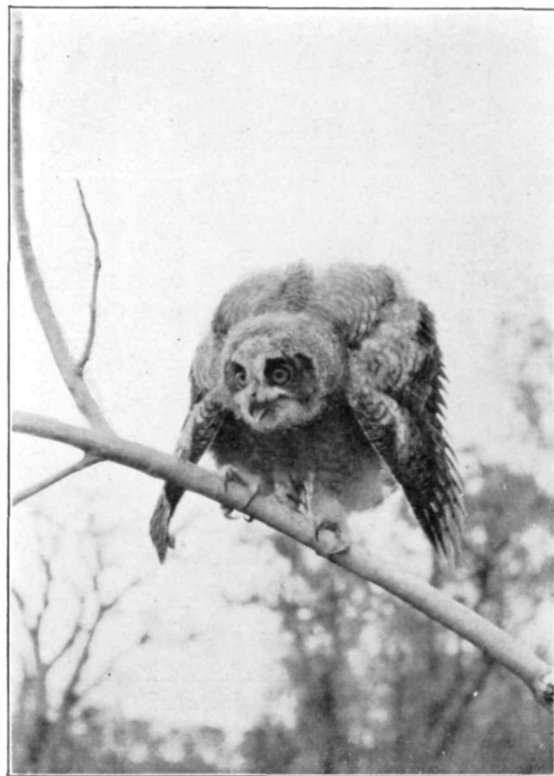
As I sat watching the campfire in the evening, I became aware of several owls about. A Short-eared Owl came flying in from the meadow in front, and a rare Screech Owl (fig. 13) darted through the trees. A Western Horned Owl (fig. 14) alighted in a tree overhead, and after staring a short time at the fire that had attracted him, his "mountain lion" call from so close at hand brought consternation to the fable-fed "dudes," as tenderfeet in the Yellowstone are termed.

Having a desire to see the Western Entrance and its birds, I took the regular tourist auto-stage on the next day for West Yellowstone. In spite of the noise of the heavy car we were able to pass close enough to a Robin to observe him enjoying his morning bath in the edge of a shallow pool. Many ducks were seen in passing, gliding among the beaver ponds; but although a sharp lookout was kept for the beaver themselves, the only possible ones seen by us turned out to be woodchucks taking their morning sun bath. Numerous broods of ducks prettily swimming, one behind the other, called out admiring exclamations, and a mother goose leading her eight accurately spaced goslings was enthusiastically watched across Beaver Lake. After entering the pine forests almost the only birds seen were the Pink-sided Juncos flying out of the road as we came along. Near the little park-like openings and meadows, Audubon Warblers were to be seen dodging about the tree-tops.



*Photo by R. B. Rockwell*

Fig. 13. The Rocky Mountain Screech Owl is rather scarce in the Park. It very much resembles its cousins elsewhere.



*Photo by R. B. Rockwell*

Fig. 14. A young Western Horned Owl. Fortunately for the young grouse and ducks these owls are not numerous in the Yellowstone Park.

At one of the short stops, near a marshy place, we witnessed an odd incident, the capture of a large frog by a Nutcracker. The bird struck quick downward blows at the frog and frequently tossed it high in air. The reason for the assault on the frog could not be ascertained; there would have been nothing strange if the bird had eaten the frog, but he did not. He left his victim long before my approach could have scared him away. The frog was quite dead although the skin was not punctured, so that the mere force of the blows must have done the work. On the shore of a small pond we saw an unusual and striking sight, a group of Mallards standing with one leg drawn up, sound asleep. Not only did these birds realize that they could sleep under the protection of the Park rules but they had apparently discovered that the constant passing of vehicles kept off their natural enemies, the mink, fox and coyote.

At Norris Geyser Basin there were no accommodations, yet it was an interesting place to stay, and I was fortunate enough to get permission to stop at the ranger station and arranged to be picked up by the auto-stage next day. Bluebirds and Robins were plentiful in the neighborhood; indeed, for many years a pair of Bluebirds had nested in a false rafter of the porch within less than four feet of persons passing in and out. The little family was a never failing source of interest; it was so close and could be heard so plainly that one could not miss it.

There was a small bird seen quite frequently picking up oats about the barns at Norris — a Cassin Purple Finch. He was a trim and attractive little fellow with his crimson crown, and red tingeing his otherwise sparrow-like dress. With his retiring ways, he was in danger of being overlooked. But not when he sang! Great was my astonishment when he mounted to the top of a pine and poured forth a peculiarly sweet and varied song. Fortunate indeed is one who hears the infrequent but memorable song of this finch.

Among the many Brewer Blackbirds at Norris was noticed an albino. He was pure white except for a slight smokiness about the head and shoulders. It was startling to see a white bird in a flock of forty blackbirds, so contrary to one's sense of the fitness of things that the man who first reported it did so with a half-apologetic smile as if he expected to be accused of color blindness. Nor was this the only case of albinism observed among the Brewer Blackbirds; two other albinos were seen that same season in the Park, though in neither case was the white so extensive. One, a male, had two white bars on his wings and a few white feathers on

his back; the other was a female with several white spots about the neck, breast and shoulders, a white feather or two in the wings, and two white central tail feathers.

Along the Gibbon River that flows past Norris many Mallards and Teal built their nests and raised their families as unconcerned as though this was no "wonderland" with inquisitive tourists to pry into their affairs. The Spotted Sandpipers that flew up and down cried "feet wet" all day long, and fittingly, for they were in the water as much as they were out, even the babies still in the down entering the water and swimming short distances.

According to agreement, the auto-stage stopped next day and picked me up to continue my trip, after this delightful stop-over, to West Yellowstone. At Elk Park a small flock of Brewer Blackbirds arose from the low bushes overhanging their nests. Farther along the road, a pair of great Sandhill Cranes stalked majestically across Gibbon Meadows, and as the auto approached too closely, flew off with powerful, bugle-like cries growing mellow and mellow as the birds faded from view. Several Kingfishers flew up the Gibbon River or perched on an overhanging stub watching for their prey. Except for those noted above, the afternoon's ride was almost birdless until the Madison River was reached, but after that the ride along the river, with its varied prospects, was extremely interesting although no unusual birds were seen.

Near West Yellowstone, the river strongly suggested trout, so I got out my tackle to give them a try. As I stood on the bank joining my rod together, it suddenly became alive in my hands. On glancing up, to my delight I saw a Mountain Chickadee perched on the rod, looking up at me with his bright eyes alight with curiosity. As the bird was only a foot from my hand and turned his head from side to side, I had a fine chance to note the white stripe over the eye that distinguishes him from other chickadees (pl. 1 and fig. 4). As the fish were not biting well, I soon stopped fishing and lay down on the grassy bank. A Pigeon Hawk came flying over and about thirty feet above the meadow suddenly stopped, then plunged straight down at such speed that it seemed as if he would be dashed to pieces. Whether he secured his prey, a possible grasshopper or locust, one could not be sure.

## BIRDS FROM WEST YELLOWSTONE, MONTANA, TO OLD FAITHFUL INN

Early in the morning I was awakened by the "honk, ah-honk" of wild geese, and listening eagerly, I heard distinctly the flap of their big wings as they flew off to their morning feeding grounds. It was cold, so cold that the grass was covered with frost and the bright meadow flowers of the previous night were stiff with rime. But the morning sun soon thawed them out and they were as bright and as fresh as ever. Hardy flowers, these! But they *must* be hardy to live in a climate where a frost is likely to occur during any week in the year. As I looked about, a Pigeon Hawk came flying past. Was this the hunter of the previous afternoon? If so, he had gotten into trouble, for he was now being hotly pursued by a mother Robin with a half-dozen Tree Swallows trailing along in her wake.

When the auto-stage to Old Faithful Inn was ready, I boarded it for the return trip to Madison Junction and thence to the Upper Geyser Basin. We had scarcely started when a pretty scene was enacted before our very eyes. A mother Ruffed Grouse walked across the road, followed by thirteen downy little chicks! As we passed by, the mother clucked once or twice and the little fellows fluttered off on wings barely big enough to support them. Later, while my stage companions were inspecting hot springs and geysers, I found another brood and again the confident mother stayed calmly on the ground and permitted her young to fly off without once trying the broken-wing tactics usual with this species in other regions. Truly, these well guarded birds were full of surprises. At another stop a trustful White-crowned Sparrow was feeding her full-grown youngster in a willow bush beside the road.

The highway passed across a level plain, somewhat sandy in places but, on the whole, well covered with grass and flowers and dotted with groups of beautiful, well-shaped pines. This stretch is known as Christmas Tree Park. The Madison River was soon reached, and then came a beautiful drive along the shores over a good hard road that lasted for many miles. The river valley was alive with birds; and even omitting those peculiar to the lower altitudes, there were more species here than at Mammoth and a far greater number of individuals. On one occasion I counted over three hundred Robins in a short space of time; and yet I was often asked by people used only to the dooryard birds of the East whether there were any Robins at all in the Park.



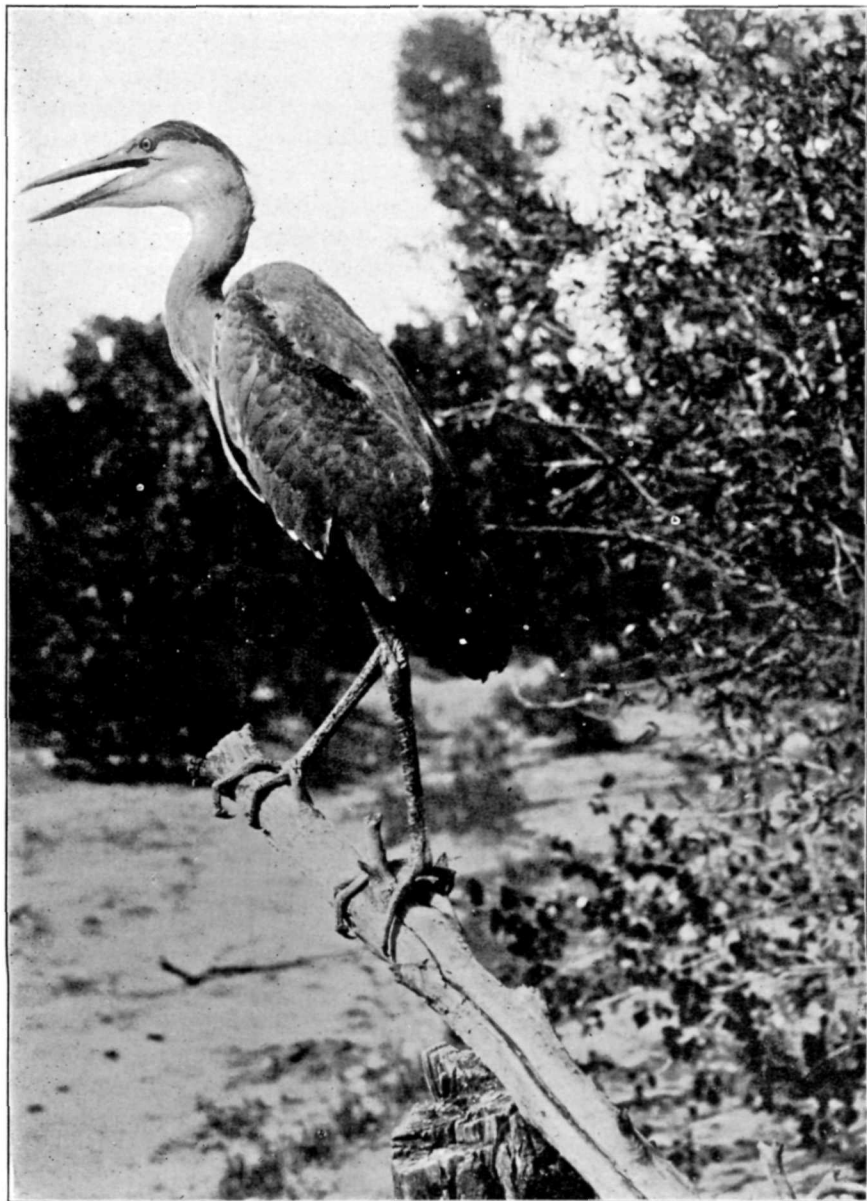
During the morning's ride it was the Audubon Warbler, which is the western form of the Myrtle Warblers and easily identified by yellow on crown, throat and rump (see pl. 4), that attracted my attention especially. They were everywhere, searching in the brush along the water's edge, darting here and there catching flies, and singing merrily from the tree-tops. The Audubon is about the only one of the warblers that can really be called common in the Park. He feeds largely on insects found about the tree-tops, yet he is seen oftenest about the low bushes, usually not far from water, looking for tiny water insects. His song is a weak little trill bearing some resemblance to that of the Junco; and his most characteristic habit is his erratic flight. To see him suddenly leave his perch, fly swiftly a few feet, dart off to one side in a series of zigzags, and then return unconcernedly to his former perch might well suggest that he was of unsound body or mind; but after watching him for a time his expertness in catching insects on the wing elicited our great admiration. While he does have the reputation of being so preoccupied with his hunting as to pay little heed to anything else, he finds time to get his nest built and raise a brood of young ones. The nest is attractively woven of grasses, strips of bark and pine needles, lined with rootlets, hair, and feathers; it is placed in a pine tree, sometimes close to the ground or again high in air, and usually has four greenish eggs somewhat speckled with brown.

Even while the birds were the chief attraction, I could not fail to notice the magnificent array of flowers in the meadows along the river. Dog-tooth violets and columbine were everywhere. Very often a dainty little harebell was seen nodding on its slender stem; but the only flower I found with a distinct fragrance was a mass of white phlox. At another place where the stage stopped I took the opportunity to search for what the birds might be eating, and found the ground covered with delicious wild strawberries. While I did not actually see any birds eating them, many birds do so, and I am sure it is an indication of their good taste.

As the stage proceeded along the river, a pair of Canada Geese that had been swimming there, on seeing us glided ashore and climbed the opposite bank. A little farther on, three or four Shoveller Ducks were dabbling in the shallow water near shore or preening on the bank. Suddenly one on the water made a vicious grab at his neighbor. But the other anticipated him and dodged quickly. Persisting, the belligerent one dove and tried unsuccessfully to catch its companion from beneath, and on rising to the surface saw him escaping up the bank.

A Great Blue Heron was seen on a marshy flat along the edge of the river (fig. 15), the only large representative of the heron family occurring in the Park; but there is the Sandhill Crane which might be confused with it, although the Crane has a brownish tinge that the Heron lacks. The Crane inhabits drier tracts of open land as a rule and yet it is often seen in the same places as the Heron. On the other hand, the Heron flies with neck folded back upon itself, and is usually silent; whereas the Crane always flies with neck and legs stretched out to their fullest extent and almost always utters a far-reaching, bugle-like call. On one or two occasions I found the nests and young of the Sandhill Crane, but I have never been able to learn where the Blue Heron breeds, if at all, in the Yellowstone Park. Whenever I came upon one of these Cranes stalking majestically across a meadow and lowering his head now and then as some tidbit caught his eye, it always seemed as if I had a glimpse of a still more original wilderness; and it was thrilling to hear his wonderful bugle calls, so powerful and ringing.

Ducks, particularly Mallards, and geese find a very congenial home in the many small ponds and sloughs dotting the Madison marshes, and showed as in other parts of the Park the confidence in man that protection has given all birds and mammals here. Those that spend the summer and breed here become very tame indeed. On this day, as usual, Mallards remained in their wayside pools and allowed the car full of merry, laughing tourists to pass within a few feet without showing alarm. At such times, especially near a hotel or permanent camp, it was hard to convince the traveler that the ducks were really wild. The cautious actions of the migrating birds that pass through in the spring and fall are very conspicuous, for of course these incoming Mallards have not been trained under Yellowstone Rules, and are literally as "wild as hawks" are — elsewhere, for even the hawks in this sanctuary are not wild. With the exception of the fiercer, rarer ones and the large Golden and Bald Eagles, I found the birds of prey so tame as to afford unusual opportunities for acquaintance. Outside the Park, they were so harried and hunted that it was difficult to acquire a satisfactory knowledge of them. Of course I had no great love for the destructive accipitrine hawks and the Great Horned Owl; but these are rare in the Park, and it is the Swainson Hawk that is most likely to be seen. My previous ideas of hawks were completely revised by the study of the gentle, tractable Swainson living in perfect harmony with the small birds about him, and devoting



*Photo by R. B. Rockwell*

Fig. 15. A Great Blue Heron. Wherever met with this bird is a picturesque addition to the scenery, although its long, dagger bill is deadly to small fishes and frogs.

all his energies to the catching of mice and ground squirrels. Nor was the quiet, well-behaved Osprey any more surprising with its irreproachable habits, from the bird lover's point of view. To be sure it caught trout. But what of that? There were enough and to spare for the few fish-eating birds as well as for human fishermen.

Everywhere along the stage road were swallows, particularly Tree Swallows. Watching the endless evolutions of these agile flyers, I wondered why they seemed more numerous over rapids and waterfalls in the daytime, but were apt to seek the quiet reaches in the evening. Insect larvae were often crawling up the rocks beside the falls and transforming into adults in the daytime, while the night-flying insects were mostly over the quiet water. Was this the explanation? My musings were broken by a large Richardson Grouse which walked across the road and, as the auto-stage passed, jumped up into a tree. He looked so large and so tame and unsuspecting that one of the passengers insisted on trying to get a photograph in spite of the driver's warning that the bird would fly as soon as the car stopped. When the brakes took hold the Grouse was off like a flash! Only a mile passed before another grouse was seen, but this one was wild. A few missing tail feathers hinted that he may have had a recent escape from a coyote and so wasn't taking any more chances.

Scattered along the meadows were small birds of different kinds, usually one or two individuals at a time. White-crowned Sparrows were singing from bush or tree, and once from the ground. A group of four Juncos and a Ruby-crowned Kinglet romped through the evergreens; Mergansers and Mallards were distributed over the quieter stretches of water; Spotted Sandpipers flew up and down or stopped to teeter on a stone; once a Red-tail sailed over, high up in the clear blue sky; and Chipping Sparrows and Bluebirds claimed one's attention here and there. The meadows seemed too small for Meadowlarks, but right where the Gibbon and Firehole Rivers combined to form the Madison, one was singing from a surveyor's stake. A Robin flew off squawking from a group of pines and we suspected that a guilty pine squirrel might have known the cause.

A stop was made at the Fountain Geyser and time taken for a short rest which I improved by looking leisurely for birds. Many Tree Swallows, and their constant companions, the Northern Violet-greens, were flying about. It was interesting to see one of the Tree Swallows fly up to the hotel eaves and disappear into a round hole

that looked from below no bigger than a nickel. Apparently the swallows found this a satisfactory substitute for the old woodpecker hole in an aspen which was used before the hotel people came along and provided this ready-made nesting site. Sometimes they crawl under roofing tiles and build their nests in the cavities there. It is an interesting study to see how far some birds will adapt themselves to conditions as changed by man; swallows, notably so. Barn Swallows now almost invariably use beams in the interior of barns or similar undisturbed buildings; the Tree Swallows and Northern Violet-greens are changing in some places to artificial nesting sites; and the Cliff Swallow, like the eastern birds of the same species, are plastering their mud retorts below the eaves of buildings in the Yellowstone. All swallows should prove most welcome guests about our homes and camps.

But the greatest attraction was that little feathered dandy, the Western Tanager (pl. 1). Discovered by Lewis and Clark on their memorable trip across the continent, he is the only Park member of the tanager family; but like the other species found elsewhere, he is gaily dressed with his yellow and black plumage, relieved by the red of the head and neck. The East has its Scarlet Tanager, the Southeast its Summer Tanager, and the Southwest its Hepatic Tanager, but the mountain region may be well satisfied with its representative of the group, the gay Western Tanager. Individuals were seen wherever there was an opening in the forests with water near, but they were never very common anywhere. Tanagers are a little too brilliant to be wasted on every bit of landscape, apparently. But the female is as inconspicuous as the safety of her home requires. Indeed it takes sharp eyes to make out her olive-green back and dull yellowish under parts, unrelieved by red, as she sits on her nest. She is a tidy little homemaker, building on some low branch of a pine tree, her nest of twigs lined with grasses and sometimes various mosses, to receive her blue-green eggs finely speckled with brown. The food habits of this beautiful little couple are very beneficial from our point of view, for while they spend most of their time gleaning from the higher foliage of the coniferous woods, and not about farms and ranches, their diet of insects and caterpillars is of protective value to the forests.

From Fountain Geyser it was a short drive to the Upper Geyser Basin, where the birds became of secondary interest to the tourists until the hotel and the marvelous aggregation of geysers and hot springs had been inspected. Old Faithful Inn is a huge hotel built



*Photo by R. B. Rockwell*

Fig. 16. A Red-shafted Flicker and its young. While this flicker will frequently cross with the Yellow-shafted or Northern Flicker—hybrids being seen in the Park—a typical Northern Flicker has not yet been reported.



*Photo by Frank N. Irving*

Fig. 17. When a family of Red-shafted Flickers is encountered, the birds are often as thickly clustered as this picture shows them.



of rustic materials that have been utilized in a masterful way, and provided with modern luxuries. Such an attractive place, operated by a management that looked after our every want, proved irresistible. During the few days of my stay, I enjoyed this most homelike hotel to the full. The afternoon of my arrival was given up to the geysers, and I realized as never before the wonderful sight-seeing possibilities of the region; for here I was on a trip to study birds, and actually seeing many interesting avian sights, yet by night I was glad to admit that the afternoon's exploration of the geysers had amply repaid me for the whole trip!

The next morning I was out bright and early for new adventures. Near the Inn a Bluebird was busy with his parental duties, so busy that he had drenched his neat blue suit in the dew-laden grass where he had been pouncing on chilled grasshoppers for his ever-hungry brood. Other bird youngsters were about, including two full-grown speckle-breasted Robins discovered near the Studio, still being fed by the mother.

Many of the birds already found were noted here at various times; Bluebirds, Robins, and White-crowned Sparrows all nested in the immediate vicinity of the hotel; the Nutcrackers were often heard scolding in the edge of the forest; the Brewer Blackbirds were already collecting in flocks; Cassin Purple Finches were frequent visitors; and sometimes Tree Swallows and Western Tanagers were seen. A pair of Flickers were nesting in a nook or cranny of the rustic work of a hotel dormer window. But how strange these flickers would be to eastern eyes. Here I had a much better chance to study them closely than I had had in the Gardiner Canyon and I found that they had the general color, shape, and habits of the eastern species (figs. 16, 17). The same ground color of brown, the same black crescent on the breast, the same black bars across the back, the same white rump, the same big round black spots underneath, and the black tail; but when these flickers were on the wing the red plumage beneath the wings and tail flashed out. Stranger still, throughout the edges of the Red-shafted Flicker's range, where it overlaps the range of the Yellow-shafted, there is interbreeding between the two species. It is held that the Red-shafted is a distinct species, and interbreeding on a large scale in such a case is most unusual. It is true that hybrids occur between

other species but not to such an extent. Here in the Yellowstone, the birds I have found showed all manner of gradations between the Red-shafted or Western, and the Yellow-shafted or Northern Flicker, with the "reds" predominating. On the other hand the ranges of the two Meadowlarks, the eastern and western, overlap for many hundreds of miles, and so far as the coloration goes there is only a slight difference in the shading; yet the two species are everywhere distinct, and as Ridgway's Manual of Birds states, there is an "excessive rarity of intermediate specimens."

Ever since first entering the Park, I had noticed the Juncos feeding all along the roads through the heavy timber, flashing their white outer tail feathers when they flew up in front of us. Very proud of these white feathers the Juncos seemed and it often appeared as if the male took particular pains to display them, especially when in company with the female, who did not seem quite so gaily adorned. These were the Pink-sided Juncos (pl. 4), Rocky Mountain relatives of the Slate-colored Snowbird of the East. Here the Junco is a summer resident, breeding and rearing its young without a thought of the wintry weather with which we always associate its eastern relative. But it does serve to help contrast the summer bird life of this greater elevation with that of the low-lying eastern country at the same latitude. Likewise the White-crowned Sparrow, which in the East is a migrant only, bound for his nesting grounds in the far north. Here in the Yellowstone, at an elevation of 7000 feet, both species find the conditions they require for raising their young. They were the two most common birds that I saw—the Junco in the evergreen forests, and the White-crowned Sparrow in the open uplands and mountain meadows. About the geysers the Junco appeared to be the most abundant bird. At first you did not see him so often as the Brewer Blackbird, nor was he so noticeable as the Robins and Bluebirds; but when one deliberately looked for him and learned his elusive chirps, he soon assumed his rightful importance in one's list. While our Junco is a summer bird, arriving about April first and staying until November, he surely finds plenty of snow. He often ascends high up into the mountains as early as the first of June, when the snow still lies so deep that not a blade of grass is to be seen. Occasionally he was observed at that season above nine thousand feet, singing as gaily as his brothers far below at the 7000-foot

level. Even the early Robins and the Bluebirds seek the high slopes; so evidently there is some strong impulse for this action, perhaps analogous to the "urge to migrate" northward and southward. Often the rangers have forced their horses up the heights until they could go no farther, only to see on the next rise beyond a beautiful little Bluebird, or hear the merry tinkle of the Junco.

The Juncos pair off late in May, and by the middle of June have made their nests of grass stems, lined with finer grasses, on the ground under some sheltering plant or tree root. They are very adept at finding shelter. On one occasion I was so absorbed in watching a pair and listening to the song that I did not notice an approaching storm until it actually burst over our heads. Then I surely wished I could find shelter from the pelting hailstones as readily as they did under a ledge overhung with low-growing juniper. On another occasion during a heavy snowstorm, a flock of Juncos flew under some brush over which the wet, clinging snow had formed a perfect canopy. During such storms, the Juncos grew very tame indeed, coming about the buildings, and especially the stables, to pick up waste grain; even at other times they often became friendly enough to fearlessly enter my tent.

Another noticeable bird was the Pacific Nighthawk. The western form is somewhat lighter in color than the eastern, in accordance with the law that birds are lighter colored in an open, dry climate than in the damper coastal regions. Still darker than the eastern birds are those inhabiting the more humid, forested Pacific coast. Here, about the Geyser Basin the Nighthawks laid their eggs and fed their young (fig. 18). Unlike most birds, they construct no nest and the young get very little attention. Two speckled, creamy eggs are laid upon the bare ground, both eggs and young so closely resembling the surroundings that it always was a mystery to me how the parents ever relocated them. Nighthawks would scarcely have time to build a substantial nest, in addition to rearing a family; for being dependent on flying insects for food they do not reach the Park until about June 15 and must leave again late in August or early in September. Perhaps such Spartan bringing up makes the young better fitted to shift for themselves! Certainly for birds that only lay a single pair of eggs a year something unusual is needed to keep up the vigor of the race.



*Photo by E. R. Warren*

Fig. 18. The Western Nighthawk nests on the geyserite formations, near the celebrated geysers, laying her two eggs on the bare rock.

## BIRDS FROM OLD FAITHFUL TO YELLOWSTONE LAKE AND THE GRAND CANYON

My stay at Old Faithful having ended, I took the regular auto trip over the continental divide to the West Thumb of Yellowstone Lake. The ride was not especially interesting, ornithologically speaking, only the usual Juncos, Audubon Warblers and Sparrows, varied by an occasional Dipper, being observed. But the forest scenery with its nestling lakes was memorable. The first view of Yellowstone Lake proved so attractive that I boarded the boat then operating and let the car go on over a rather dusty road to the night's stopping place. Such a large sheet of water might well have a distinctive bird population, and this proved to be the case. Not only were there the usual ducks and geese, but also White Pelicans and gulls (see fig. 45). At the first sight of pelicans my fellow-passenger raised the cry of "Swan! Swan! See 'em right over there!"—and all eyes were fixed eagerly on the great white birds swimming along so majestically. Next to the Pelicans the graceful gulls attracted the most attention (fig. 29). The very name of "Sea-gull" brought to one's mind the huge open reaches of sea and sandy beach, and the screaming, diving birds of familiar harbors. Yet here were California Gulls at home on a lake, 7741 feet above sea level and a thousand miles inland. The boat ride was all too short, for I made the acquaintance of some people from my former home who were travelling via the permanent camps. If it should prove possible, I determined to go on with them; accordingly I sought the Lake Camp and found that I could rejoin my friends for the next day's ride to the Grand Canyon.

At the Lake, "going out to see the bears" was the special thing to do. It was never thought necessary to mention the word "bears" in conversation. Everyone was thinking of them all the time. At supper a woman would ask: "Have you seen them?"—going on in eager excitement: "I did; there was a great big black one, and then a yellow one came down and drove him off." "Did you see the twin cubs?" "I did; and didn't they look cute up in the tree?" With so much excitement in the air, in self defense I had to go out to see the bears, and behold, there were birds, too! Great flocks of Gulls were flying about and screaming when the bears were present; at other times they were on

the ground getting their share of the garbage. But I wasn't allowed to forget the bears for the birds. Not until I could talk learnedly on both the wild bears I had known and those I hadn't known was my conversation tolerated. Then, having seen the Pelicans and Gulls and bears, I was allowed to wander off in search of small fry like ducks and geese once more. They were as tame and easily approached as elsewhere in the Park, and I never tired of seeing them so close.

The Lake, and especially the Yellowstone River just below the Lake outlet, was frequented by countless waterfowl, although they were not so plentiful now as they would be on the approach of cold weather. Golden-eyes, Mergansers and Buffleheads dotted the river's surface, while Mallard and Teal swarmed in the quiet ponds and sloughs. Even Baldpates and Pintail Ducks and their broods were sometimes to be seen.

The Raven was a common bird about the Lake, and but for its larger size and its hoarse, croaking note would have been taken for a Crow. The latter, while seen commonly about Mammoth, was comparatively rare on the higher parts of the Park plateau. In the East the favorite amusement of the Crow, next to pulling corn, is to mob an owl. Here we found the Ravens paying similar attention to the great Golden Eagles that sometimes came down from the high peaks. The larger, more awkward Eagle seemed to have no defense against the Raven while in flight; his only safety was in alighting somewhere. But at times when he had alighted, he would be kept under surveillance by the patient Ravens for a long period. While riding across the open country of the northern section of the Park, I have often seen an Eagle on the ground surrounded by a circle of Ravens, each party apparently watchfully waiting for the other to make a move.

But if the Eagle could not drive off the Ravens, the Brewer Blackbirds could effectively enough. Just as the Raven torments the Eagle, so does the Blackbird torment the Raven. Similarly, the larger bird cannot escape by flight, but must alight to protect himself. One day, eight of the Blackbirds pursued a Raven. The latter, in order to defend himself, alighted in the top of a thick pine where he kept the marauders off by frequent lunges and snaps of his bill. But what did they care for what he evidently was saying "he'd do to 'em when he caught 'em." They had plenty of time and could afford to wait to resume the

sport. He attempted to escape once or twice, but after a short flight returned, minus a few feathers, to the pine-top again and was still there when I left.

Sometimes the Raven followed bigger game than Golden Eagles. While crossing Hayden Valley one day I noted a flock of thirty-eight Ravens, some circling in the air and some on the ground. Ravens in flocks were unusual, so I investigated. On the side of a hill was a big, healthy grizzly bear asleep, with the Ravens all about him. Perhaps they were waiting for scraps from his next dinner.

The morning after my arrival at the Lake, I was out bright and early in order to walk along the lakeshore to the outlet and back before breakfast. As I crossed a meadow, a Brewer Black-bird jumped up from under foot, flying away so reluctantly as to indicate that its nest was near. Upon searching about, I soon located it on the ground under a sage bush. There were six youngsters almost ready to leave the nest; but even at that they were late, for I had already seen young birds flying with the flocks about Old Faithful Inn.

As I looked up, suddenly the sun arose from behind the Absaroka Mountains on the far side of the lake. The morning was clear and cold, the lake's surface unruffled by any suspicion of a breeze, and what few clouds there were only lent additional beauty to the scene by their brilliant coloring. Mountains and lake and forest composed such a picture as our early pioneers must have seen often and with inspiration; for there was absolutely nothing of man's destructive handiwork to mar it. The meadow was alive with flowers of blue and red and yellow. A Savannah Sparrow was trilling his song from a low sage bush. On the lakeshore a Spotted Sandpiper and two downy chicks ran here and there, even the little fellows showing signs of the family teeter. Out over the lake a flock of California Gulls was wheeling and circling, while a few rested lightly on the surface of the water. Just beyond them an Osprey plunged for his breakfast with a mighty splash; and toward the beach a score or more of Golden-eyes were swimming contentedly, or else skittering gaily over the surface. And there (I rubbed my eyes with amazement) was an elk drinking at the water's edge! It was a scene that one could never forget.

As I walked on down the shore, a Raven stalking sedately and quietly across the beach, let me come up within ten feet of



him, merely moving out of the way with a peculiar sidewise hop. Some Robins flew down, but as they did not drink, were evidently after the flies and other insects along the shore. One of the Robins was very light in color; you could not call it an albino, and yet it came very near to being that. The upper parts were light gray; underneath, the breast and the other parts were a straw color, but the head was normal and the eyes dark brown. A couple of Gulls flying past seemed to be just the ordinary California Gull, but—the underside of their tails was black! Here was something new, surely; never before had I seen or heard of a black-tailed gull. They alighted just beyond and gave me the coveted chance to observe them. Very carefully I withdrew from the shore; more carefully yet I made my way around opposite them, and still more carefully approached the edge of the bank above. Still too far for the eye to see, the powerful binoculars brought out every detail of the plumage; but the tail feathers were normal on top and the underside was not often in sight. Patient waiting had its reward at last, a good view was obtained, and the tail was seen to be—smeared with mud! That was luck; but it does not dim the fact that only careful observation brings the best discoveries to the watcher of birds.

But it was getting late and I must needs hurry back. On the way, two Chipping Sparrows were encountered engaged in a battle all by themselves beside the road, tumbling about in the dust and fighting as fiercely as if the welfare of the whole sparrow world depended on them.

A generous breakfast tasted good after the morning walk. Then the auto-stages were loaded up and we were off to the Canyon Camp by a magnificent scenic road lying along the Yellowstone River through Hayden Valley. While largely engrossed by the scenery and the conversation of my friends, I nevertheless kept a sharp lookout for birds and caught many an interesting glimpse. An Audubon Warbler flew overhead, singing his flight song; another Audubon flew out from the extreme tip of a pine after insects and returned to his perch, quite in the manner of a flycatcher. On the edge of a gravel bar stood a row of fish-eating Mergansers with their prominent white breasts gleaming in the morning sun. One that was in the water caught a trout; on the instant, a passing gull with a fierce swoop made

the fisher drop his catch, picked it up himself, and flew off with it, screaming in triumph over his ill-gotten feast.

Pelicans were frequently seen swimming across the river like ships under full sail; and they appeared still more stately when sweeping across the sky. It is an accepted fact that the White Pelican, unlike his cousin, the Brown Pelican, does not usually dive for his fish. Yet I had the pleasure of seeing one dive that morning. It was not a rough-and-tumble from above, but a neat, clean dive from the surface of the river. Another interesting diver was a Barrow Golden-eye. There were a good many of these ducks on the river, and one dove from a flock near shore where the water was so clear that every motion could be seen. The bird moved slightly forward in diving the five feet from surface to bottom, then remained almost motionless except for the sidewise motion of the head as he fed on the bottom.

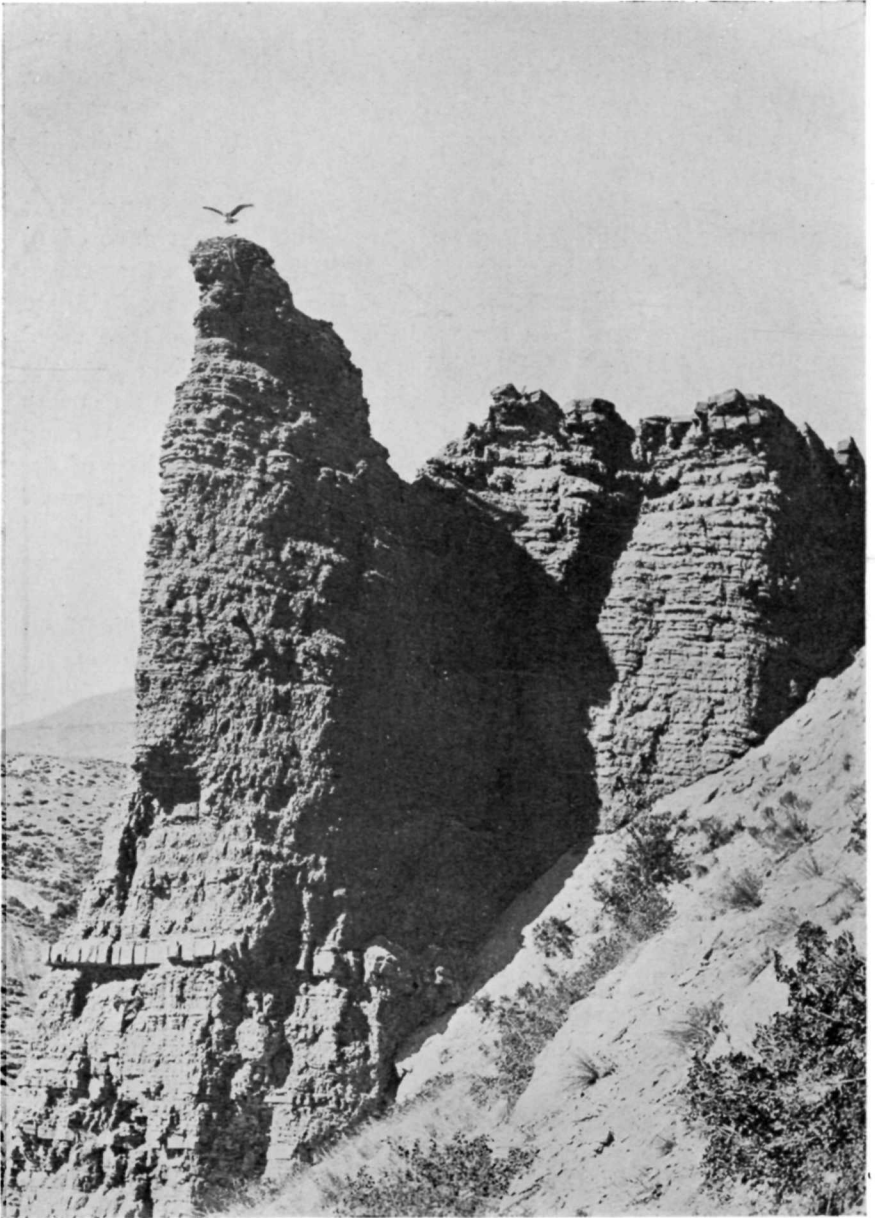
Hayden Valley, a tract of open, rolling prairie, exhibited such birds as are characteristic of the open country. Savannah Sparrows and other small kinds were noted, but the hawks, because so easily seen, were the dominant bird feature of the landscape. The larger ones were usually Swainsons, and varied from a light shade to a dark phase that was almost black; indeed, the darker birds seemed to predominate. All were equally tame and equally inoffensive. The smaller hawks were Marsh Hawks, easily identified by the conspicuous white patch above the tail and their habit of flying low, usually just skimming the tops of the bushes and tall grass in their search for mice. One suddenly shot to earth without apparent halting; another flew by with a mouse in its claws. But although the greatest mouse catcher of all the hawks, the Marsh Hawk does not disdain a frog or a small snake. They were noted in all the open parts of the Park, and it seemed immaterial whether the hunting grounds were down at 6000 feet or high up on bare mountain-sides and above timber line; but they were not to be seen over the forested sections.

During the latter part of the drive, while passing through lodgepole pine forest, flashes of brilliant color came from Western Tanagers. They were seen darting here and there through the trees or flying across the river; and at other times their voices could be heard in the pine-tops.

On reaching Canyon Camp I found it remarkably well situated scenically, with plenty of birds in the immediate vicinity. In fact I noted Juncos, Purple Finches, Brewer Blackbirds and

Rocky Mountain Jays amongst the tents, while Ravens and Gulls frequently passed overhead. But as at the other points of great scenic interest in the Park, before looking for birds I paid homage to the other natural wonders. Here it was the Grand Canyon, and the Falls! In writing and talking about the Yellowstone it is the custom to lay so much emphasis on the geysers that the Canyon is often lost sight of. But to the majority of sight-seers the Grand Canyon of the Yellowstone is one of the most thrilling scenes in Nature. While not so vast and awe-inspiring as the Grand Canyon of the Colorado, it is still large enough to command the wondering admiration of all. Its beauty combined with the perfectly proportioned falls at its head is enthralling—language fails—one stands silent before its splendor.

But even while I was viewing the Canyon, I became conscious of birds enlivening it; for here was a remarkable collection of nesting Ospreys. While usually breeding singly in isolated localities (fig. 19), here the combination of fish and ideal nesting sites has attracted a great many pairs. Finding the slender pinnacles rising from the depths of the Canyon safe and convenient, the Ospreys had taken possession, building their nests on the flat-topped spires. Year after year the same sites are occupied, presumably by the same pairs, for the birds are believed to mate for life. Here was an instance of a bird changing his nesting habits to suit conditions; about Yellowstone Lake, as in many localities outside the Park, the Osprey still keeps to the ancestral custom of building his nest on the top of a tall tree. But between the Lower Fall and Inspiration Point, a distance of about two miles, it was estimated that there were twenty-five nests on the rock pinnacles. The majority of the Ospreys arrive from the south in early May and begin inspecting all available sites; then return to their old homes, seeming to say, "the old place is the best after all"; and begin repairing the annually renovated nests. The nests are built of sticks larger than one's finger, piled together in a mass often five feet or more in diameter. Upon this platform are placed coarse grasses, pine needles, pieces of bark, and other rubbish. Perhaps a low circlet of tough, crooked sticks is placed about the space to be occupied as the nest proper. The three or four eggs vary greatly in color, from almost white, through tawny, to a reddish ground color with markings of brown or lavender, sometimes lightly and again heavily blotched. Incubation commences early in June and continues four weeks.



© Photo by Haynes

Fig. 19. The Osprey nest near the Park highway between Gardiner and Mammoth Hot Springs. The nests are conspicuous, as they are perched on rock pinnacles or on the tops of trees. In the Yellowstone the Ospreys have been miscalled Eagles.

I have observed that after the young were hatched, they remained upon the nest from forty to fifty days, being fed during that time on bits of trout given them usually by the mother. During the incubation and early life of the young, the mother was almost constantly upon the nest. The male bird did the hunting and brought the fish to her and she tore it to bits for the nestlings and for herself. The home life of the Osprey was very pretty to watch; not only were the parents devoted to each other and to the young, but the little Ospreys themselves were models of deportment. When the father came flying in with dinner, there was none of that hurly-burly of the usual bird nest, but each small bird took his bit of fish from the mother's bill quietly and in an orderly way. Should an enemy approach, the old birds set up a shrill whistle, to which the young ones responded by throwing themselves flat on the floor of the nest. There they would remain, even for hours, until reassured by the cluck of the mother. At such times they could be picked up and placed in any position without a sign of life save the occasional winking of an eye.

The Ospreys are very inoffensive, seldom even showing fight amongst themselves. Seemingly they never molest the smaller birds, some varieties of which even build their nests in the interstices of the big birds' "wood pile." On several occasions an Osprey was seen to plunge for a fish within a few feet of a brood of Mallards without either the mother or the ducklings showing the slightest alarm. As the Osprey lives entirely on fish, which he captures himself, his feet and his plumage are especially adapted to the work. The plumage is dense and very oily; the feet are strong, with long talons and peculiar pads to help hold the fish. The trout are always grasped with one foot in front of the other and carried through the air head foremost. Apparently it is immaterial whether the fish is right side up or not, but he always goes head first, at any rate. Often the struggles of a large fish makes it a question whether he will go at all. The Osprey is strong and sometimes carries quite large fish for long distances.

Besides affording such intimate studies of the Osprey, the Canyon was good to the ornithologist in another way. From its rim, as the Violet-green Swallows flew past below us, the beautiful, glossy green and purple tints of their backs, rarely looked at from above, were distinctly seen and admired. These Swal-

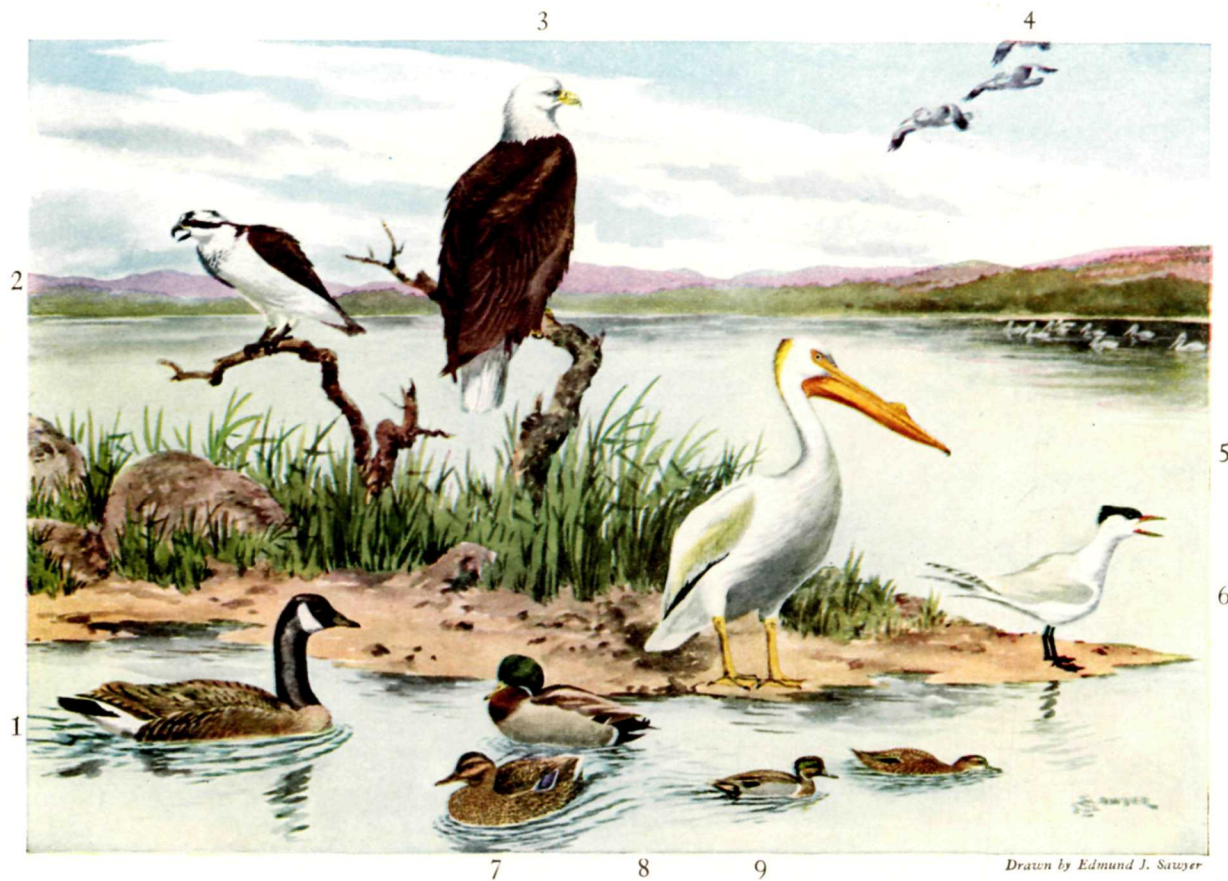


PLATE 2. BIRDS OF YELLOWSTONE LAKE

- |                         |  |
|-------------------------|--|
| 1: Canada Goose.        | 6: Caspian Tern.                         |
| 2: Osprey or Fish Hawk. | 7, 8: Mallard (female, male).            |
| 3: Bald Eagle.          | 9, 10: Green-winged Teal (male, female.) |
| 4, 5: White Pelican.    |  |

*Drawn by Edmund J. Sawyer*



lows were abundant all through the Park but it was only under such peculiar conditions that the purple and green could be clearly distinguished.

After my friends left, I moved over to the hotel. This was truly magnificent, not built of rough logs and rustic material like Old Faithful Inn, but still well conceived to fit in with its surroundings. The striking feature was the lounge, a spacious room with a series of large plate glass windows that afforded a glorious panorama of forest, meadow and mountain range.

Under the hotel eaves, the Cliff Swallows built their retort-shaped nests of mud, the process being most interesting to watch. Most of us have noticed many of these Swallows about muddy places, alighting for a moment with wings raised high above their backs, then flying away to their nests in a steady stream of birds. And yet how few of us are aware of what they are doing,—collecting pellets of mud for their nests, and flying swift and straight to put them in place. Industrious as we know most birds to be, it gives us new respect for their abilities to watch this swift journeying of a pair of Cliff Swallows to and fro for a week or ten days before the nest is done. Here in the Yellowstone the first Cliff Swallows arrive during the last days of May; spend a few days repairing their nests and lining them with grass, feathers and other soft materials, and raise their young during June and July; so that by August 10 the young birds are on the wing. On cold mornings after frosty nights I have often found the Swallows lined up on the telephone wires, waiting for the sun to warm them. In the same way they lined up on late August mornings two or three times just before leaving for the south. Small wonder that their disappearance was considered so mysterious in the old days before migration was understood so well as it is to-day! Certainly the long, difficult migration and the return each year to the same places, show that a bird's sense of location is well developed. Yet on one of the barns near the Canyon where there was a Cliff Swallow nest in the peak of the gable at one end and no nest at the other, this swallow was often seen to carry food up to the wrong gable. These birds usually breed in a large colony and must have some way of locating their own nest; yet birds with food were often seen to fly up to a nest only to be driven away by the rightful occupant! Sometimes Cliff Swallow nests are found here in their original setting on some cliff where the overhang protects them



(see fig. 20); but such places are not numerous in the Park at the present time.

A bird that was seen occasionally about each of the hotels, except at Mammoth, and still more frequently about the camps, was the Rocky Mountain Jay (pl. 1 and fig. 22), which I had first met with at Apollinaris Spring. Many were the tales told of its familiarity about camps. Mrs. Florence Merriam Bailey expresses it well when she writes: "As it lives all the year in the deep coniferous forests where it is rarely shot at, it seems to regard the few campers who comes to its preserves as fellow foresters who should naturally share their living with it." At one point my notes read: "As I went into camp, a Camp Robber and a pine squirrel decided to camp at the same time I did. By a curious coincidence we all selected exactly the same camping ground. 'Hello,' thinks I, 'Here's where I will have to watch my bacon pretty closely!' I did; I saved the bacon and the frying pan, but the Camp Robber, or the squirrel, got the bacon rind." When the Jays come about camp this way, they can be easily tamed and persuaded to take food from the fingers. One, so tamed, got the habit of coming at dawn for breakfast; if the camp did not happen to be awake, he would commence to call softly. Having attracted someone's attention he would begin a low chatter, as if stating his strictly confidential opinion that "it was a very poor season for bird feed but that now he hoped conditions would be better." He finally got so well acquainted that if he did not see his favorite among the campers, he would go and hunt up his friend and accompany him back to camp. He seemed to prefer cold baked beans, and would gulp down from one to three before he thought to fly off and cache the next, but a piece of bacon rind would keep him busy for a long time.

The flight of the Rocky Mountain Jay is short, usually merely from tree to tree. At the first part of the flight he flaps his wings and is carried up at a slight angle, then he sails down again at about the same angle. While on the ground, instead of walking they go along with rather long hops. In spite of coming about camp so fearlessly, a breeding pair are so adept at hiding their nest that it is seldom found. When I approached a tree with a nest in it, the birds left the nest as I came in sight and without a sound made their way upward limb by limb to the top of the pine where they would sit in apparent ignorance of the nest below. These Jays build in late March or early April, making



*Photo by E. R. Warren*

Fig. 20. In some localities in the Park the Cliff Swallows stick their mud retort-shaped nests against a cliff or under a ledge like their ancestors. More up-to-date birds nest under the eaves of buildings.



*Photo by R. B. Rockwell*

Fig. 21. The Rocky Mountain Jay or "Camp Robber" is familiar to hundreds of tourists with whom he makes friends at their various camping places.



*Photo by E. R. Warren*

Fig. 22. A friendly Rocky Mountain Jay. A few crumbs scattered on the ground near a camp will usually attract these birds within range of the camera.

their nests of grass and weed stems, in a crotch of a tall pine, half-way up to the top and about thirty feet from the ground. About three gray-white eggs, blotched with brown, constitute a clutch. The young are often hatched out into a snowy world and are flying about early in May.

The Jay was like the Nutcracker in having a whole repertoire of cries and calls, mostly strident and harsh; but he had one quite pretty whistle, "ker-wheet, wheet, wheet, wheet," which he was rather chary about using. When hungry his notes acquired a coaxing or wheedling tone.

A close relative of the Jay is the Magpie (fig. 23), a striking bird peculiar to the West. He is quite common all through the Park from mid-September to the first of the following May, but during the breeding season he disappears. Where does he go? He breeds high in the mountains to the south of us and also on the plains surrounding the Park, but whichever way he goes, he is absent just when the tourists want to see him.

Many delightful days were spent at the Canyon and many wild animals besides the birds were enjoyed; chipmunks, squirrels, and woodchucks were everywhere, and extremely tame! Mule deer were frequently seen from the windows, and often bears. Yet the real bear spectacle was back in a retired opening in the woods where the garbage was thrown out for them; there, black bears were common and the much rarer grizzlies were numerous enough. And once or twice, when well back from the tourist route, I had a view of some majestic elk.

## **BIRDS FROM GRAND CANYON TO MAMMOTH HOT SPRINGS, BY WAY OF TOWER FALL**

While at the Canyon Hotel, I was unexpectedly called back to Mammoth, which was disappointing, as I had planned for a slow trip in, and much "birding" along the way. Later, however, I was able to return and make a leisurely study of the birds and flowers of Mount Washburn, the forest and the open country.

A regretful farewell was given the Canyon and we boarded an auto-stage in the afternoon of a beautifully clear day. As the stage was loading up a White-crowned Sparrow was heard singing his merry song, followed by another down the road. After going about a mile, the long, open meadow of Cascade Creek was entered. Here a small pond, at the time not much more than a mud-hole, had proved an attractive nesting site for a Spotted Sandpiper, whose

offspring, two little balls of down, pattered along the shore, their twinkling legs moving so fast they could hardly be seen. A Swainson Hawk of so dark a color as to seem almost black flew across the meadow, while a Marsh Hawk swept low over the grass in never-ending search for his prey — the unlucky meadow mice dodging through their grassy runways.

To my great pleasure I discovered a female Rocky Mountain Pine Grosbeak, a large gray bird with a tawny wash, which sat quietly on the lowest limb of a pine and allowed the car to pass almost underneath. Sometimes this quiet, gentle bird is met with in the heavy growth of lodgepole pine above 7500 feet, and in the spruce forests up to 9000 feet. It is not abundant; but, as if in compensation, those I encountered were unusually tame and unsuspicious. It is a summer resident of these cool mountain heights. When the female gets ready to nest she picks out a pine, or Engelmann spruce, and constructs a platform of twigs and branchlets about twenty-five feet from the ground. On this platform a neat little nest of finer materials is arranged, and in it are usually laid four greenish blue eggs. While his mate is brooding, from some elevated perch the male often pours out a sweet, rolling song that is delightfully melodious. So accomplished a musician is this roseate bird that, outside the Park, he is sometimes caught and kept in a cage as a songster; but that is deplorable. To hear him at his best is to come upon the unconscious minstrel on a still, dewy morning in one of the lovely meadows that abound along our Rocky Mountain streams. I know of no finer melody, nor one so well suited to the hour and the enchanting scenery which this beautiful songster chooses for his setting. Not often does one see the brilliant red, full-plumaged males; they are much more apt to be tinged with yellowish and much less beautiful and striking against the dark green foliage (see pl. 1). While a few of the Pine Grosbeaks remain all summer, they are so much more numerous in spring and fall that I had thought of them as migrants, and for a long time I found it difficult to regard them as summer inhabitants as well.

After we left the meadows well behind and began ascent through a forest of lodgepole pine, spruce and white-barked pine near Dunraven Pass, Nutcrackers and Rocky Mountain Jays were observed to be quite common, but usually only one or two were seen at a time. Sometimes the Nutcrackers were quiet and then again they flew noisily past, or scolded vigorously from the tip of a tall spruce tree.

As higher and higher altitudes were reached the magnificent view to the south began to unfold. Everyone was in ecstasies, and rightly so, for on a clear, bright day there are few scenes as lovely as this. The unbroken forest at one's feet leads away to Cascade Creek meadow, farther on to Hayden Valley, and finally in the far distance to charming Yellowstone Lake with its glancing sheen. To the east the mountains in front of us extended to the very brink of that wonderful chasm, the Grand Canyon of the Yellowstone; to the west extended the same range beyond our view. The slopes of these mountains became more and more open as the eye followed up toward the crests; and the groves of graceful spruces and well-formed white pines were interspersed with lovely mountain parks, dotted and spangled with the yellow and white and blue and dark purple of buttercups, white phlox, forget-me-nots, purple asters, and deep blue lupines, often making great masses of glorious colors. Above all rose the dark, frowning cliffs of ancient lava flows from the old volcano of which Mount Washburn's peak is the highest remaining fragment.

Across the open parks and intervening groves of trees swept a large Red-tail Hawk. I could not see what game this hawk was hunting, but apparently it was not grouse, for almost at the same time an undisturbed Richardson Grouse and seven little fluffy chicks were noted in the grass. The mother Grouse flew up into a small sapling, and from there clucked loudly to her brood, while the youngsters tried their best to fly up to her, one at a time, on very shaky little wings.

After crossing Dunraven Pass the road wound up through a forest of fir and spruce where Mountain Chickadees and Pink-sided Juncos were heard at intervals, as usual in the forested areas, and Black-headed Jays showed themselves occasionally. Soon the character of the country changed, the road leading out onto a ridge and disclosing a magnificent view to the northward. The beautiful open valley of Antelope Creek lay immediately below, and the bare, wind-swept heights of Specimen Ridge and Amethyst Mountain far beyond, with loftier peaks on the horizon in Montana. A pretty little fox darted away from the road where he had been hunting chipmunks, and rushed pell-mell for the shelter of the willow brush down along Antelope Creeek. On the open part of the ridge were a few birds, chiefly Nutcrackers and Rocky Mountain Jays, and at one point there were four Pipits — hardy residents of the stormy upper slopes and mountain crests — running with nodding heads

through the short grass. Across the valley, high up on the distant ridge, twenty-one elk were feeding quietly in a grassy park surrounded by pine timber. With our field glasses we could plainly distinguish among them a noble bull elk with five-point horns almost completely developed, although the velvety skin probably was still adhering.

Below us, over the meadows along Antelope Creek, Marsh Hawks to the number of an even dozen were coursing to and fro on their tireless mouse hunting, while scattered through the grass beside the road were the usual familiar ground-haunting birds.

At the platform near Tower Creek, where the car stopped to allow the passengers to view the exquisitely beautiful Tower Fall, was another grouse walking quietly and unalarmed through the mixed groves of fir and aspen. Farther on, a mile north of the Fall, near a small pond on which a pair of Mallards were swimming, two statuesque mule deer watched the car go by.

On the road in front of the Tower Fall Ranger Station we scared up a flock of thirty-two Brewer Blackbirds that were already gathering, preliminary to their southward migration. In the heavy timber through which the road ascended Crescent Hill, we heard the strident voices of jays and Nutcrackers. Beyond the summit there was a steady descent westward through more or less open, rolling country with groves of quaking aspen, all the way to Mammoth Hot Springs. Most of the hills had their northern slopes heavily wooded with fine large Douglas firs. On emerging from Crescent Hill gulch a Sparrow Hawk was seen poised in one spot on quivering wings some twenty feet above the ground; just beyond, a Bluebird was hovering in much the same way, and doubtless for a similar purpose, over a little level of grass interspersed thickly with lupines. In a grove of aspens, two more handsome bucks were quietly "chewing the cud," while far out on the prairie was seen the white flaring of speeding antelope.

On the heights to the west of the Blacktail Creek valley, seven of these pronghorn antelope were observed lying on an open hillside far above the road, watching the passing cars with evident curiosity. With the descent into the drier and hotter lower altitudes of the Gardiner valley, birds became fewer, or less noticeable. But just before the final pitch downward, at a point where the road passed through a small, sunny gulch whose crumbling, rocky walls spread just right to catch the warm western sun, I discovered a pair of small brown Rock Wrens, shyly watching us. Though wrens by



every pose and motion, they differed widely from the eastern House Wren, being dotted instead of barred on the back, and showing a striking black crescent on the spread tail. A wonderful little musician is the Rock Wren, his song ringing out cheerily amidst the bleak, rocky wastes. These wrens are birds of the lower altitudes, ordinarily; but on this rocky slope they had found a cosy place between the angular rocks for a home, two thousand feet above the usual limit for the species. This was not a record height, however, for on similar sunny slopes of slide rock other pairs were later found clear up to timber line.

At the mouth of Lava Creek a beaver pond attracted both Tree and Cliff Swallows which went circling and whirling over the water near the beaver lodge. From the water weeds came the mocking, cackling call of that weird sounding dweller among the reeds, a Carolina Rail, who was now well hidden by the rank vegetation, but who sometimes comes north in May before his reeds and rushes have got well started. As we watched, we were lucky enough to see this unusual little bird emerge from his protecting cover and go swimming in and out with his head bobbing rapidly up and down after the manner of his larger cousin, the Coot.

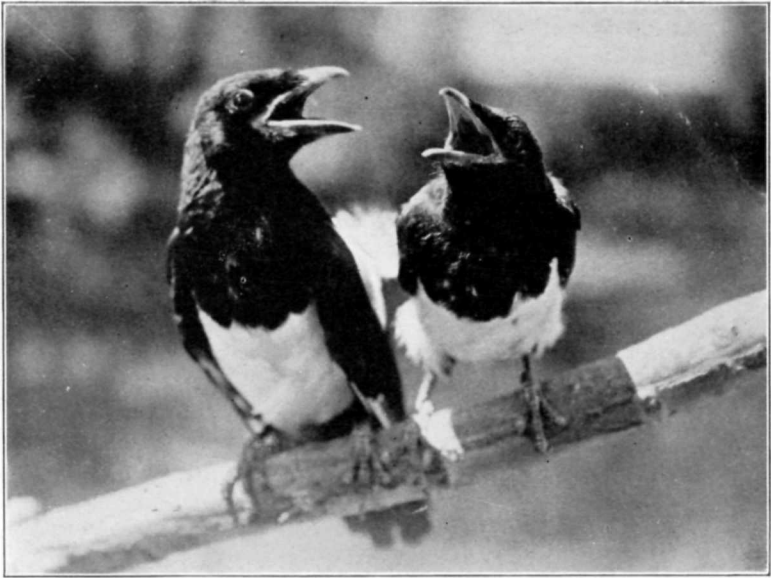
Descending to the Gardiner River bridge, we returned momentarily to some of the birds of the low country, but as we climbed from the canyon up to Mammoth, an Audubon Warbler and a Nutcracker welcomed us back to the white pines about the buildings. When the Mammoth Hotel came in view I thought the interesting sights of the trip were certainly over. But no! A mother black bear and her three cubs (one black and the others brown) ambled slowly across the road and climbed up a large pine set in the middle of a green lawn. At first I could not guess what they wanted in that particular tree. But as we drew near the mystery was explained, for there sat our four bears on a limb half-way up, full in the falling spray from the nozzle of a large sprinkler! The cubs were highly hilarious over their artificial shower bath, and even the mother was evidently enjoying the novel experience hugely.

## THE BIRDS OF MOUNT WASHBURN

Mount Washburn is in the north central part of Yellowstone Park, rising from the Lamar Valley on the north at an altitude of 6500 feet, and from the Park plateau on the south at an altitude of 7500 feet, with the top a little over 10,000 feet above sea level. Its slopes are well watered, with frequent springs on all sides,

although it boasts no large streams, and the Yellowstone River sweeps around its base on the southeast, east and northeast in a stupendous canyon. Much of the north side of the mountain is bare of trees except for detached groves of fir near its foot, lodgepole pine and quaking aspens on the slopes, and white-barked pine and spruce near timber line at about 9800 feet. The southern slope starts from the lodgepole pine plateau at the base, and the slope itself is covered with a heavy growth of grasses and flowers interrupted by groves of Douglas fir, spruce, and again white-barked pine near timber line. Above timber line the slopes are steep and formed of volcanic breccias and conglomerates. So diversified are the slopes of the mountain that except for the water birds of Yellowstone Lake, every variety of bird in the Park can be found here. Two other advantages that it possesses are the rather contradictory ones of being remote and yet easily accessible. All its different levels are crossed by a road that is a remarkable piece of engineering, leading up its southern face to the extreme top, then over the northwest shoulder and down a gradual slope to Tower Fall. In spite of this accessibility, the mountain is wild and secluded because the travelers are always in a hurry and seldom get away from the road.

Nor are the birds and the wonderful scenery the only attractions; for the slopes are covered with flowers of every shape and hue, in spite of the popular conception of a mountain as being a bleak, wintry place where only rocks and snowbanks can exist. There are many sheltered nooks and ravines that the winds seldom reach, and the very presence of inexhaustible snowbanks above them guarantees a supply of water even when the plains and meadows below are parched. The great advantage that the mountain flowers do enjoy is the sun; the air is pure and rarified and permits the hot sun rays to reach the flowers without being cut off by the lower layers of air that are so often filled with haze or smoke clouds in more settled areas. Then too, these mountain-tops are less often covered by clouds. Here, then, we have the conditions of hot sun, abundant moisture, and clean, pure air, against the disadvantages of a short season and cold nights. That the flowers are able to adjust themselves to these disadvantages is shown by the very fact that they grow in abundance and blossom luxuriantly. Often the slopes of Mt. Washburn will be a mass of Indian pink, fringed gentian, lupine or aster, when the vegetation of the lower open slopes is dry and withered. To be sure, there are numerous other alpine



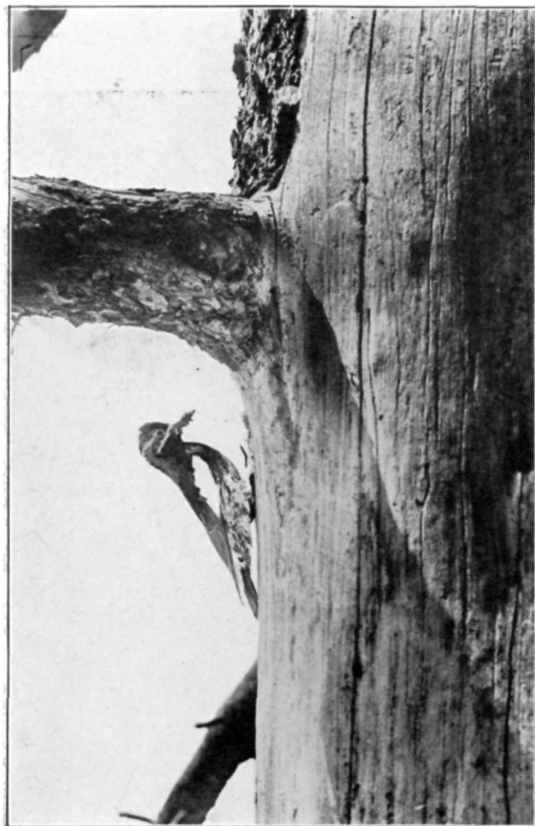
*Photo by Albert Haansted*

Fig. 23. Young Magpies. The Yellowstone Park lies at too high an elevation to harbor many Magpie nests, but occasionally one is found in the top of a thick clump of willow bushes.



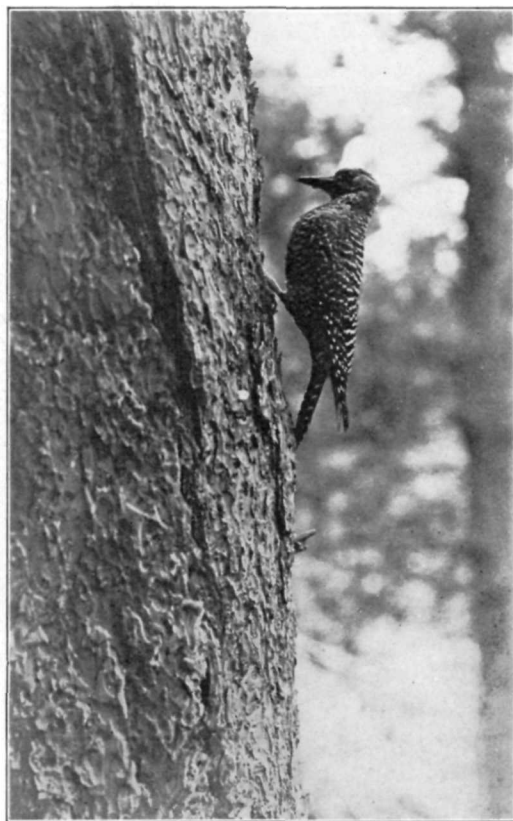
*Photo by M. P. Skinner*

Fig. 24. Sometimes a very tame but alert Richardson Grouse is seen in the grass as one's automobile passes within a few feet.



*Photo by Clark Blickensdurfer*

Fig. 25. The male Williamson Sapsucker, one of the handsomest and most conspicuous birds of the Yellowstone forests. It is most frequently found in the aspen and Douglas fir groves.



*Photo by R. B. Rockwell*

Fig. 26. A female Williamson Sapsucker. When first discovered, the female was described as a separate species—its brown, barred plumage being so very different from that of the male.

flowers here and the visitor will be delighted to find many of these in full bloom through July and early August.

The lowest belt, containing groves of fir and aspen, with open grassy parks, will be found to be a favorite home of the woodpeckers. Here especially do the Williamson Sapsuckers choose to live. The males are among the dandies of the woodpecker tribe. The female is daintily clothed, but so differently that for many years she was considered a different species (see pl. 1 and figs. 25, 26). It remained for Dr. H. W. Henshaw to discover the ornithologists' mistake by finding the two mated and raising a family.

These sapsuckers are quite common, arriving about the first of May and remaining four months, during which time they mate, build their nests, and rear their young. The courtship is a curious performance, although quite typical of the woodpecker family. The sapsucker has no song and therefore must invent something to take its place. He is resourceful; he hies himself to some bare, dead limb that he has found suited to his purpose and there hammers out a series of high and low notes that must seem a wonderful melody to his lady. He is reported to sometimes utilize tin roofs and rain pipes for his drumming, but here in the solitudes of Mt. Washburn such modern improvements are happily out of the question. Yet it is the sapsucker's "dancing" that is most curious. It may be witnessed during the early mornings in the early part of May, sometimes on a horizontal limb but more often on the bare upright trunk of a dead fir; and it is performed by the male although the female often accompanies him. There is no music except a soft, low cooing from the suitor; but the birds have their own way of keeping time and when they dance together they keep their movements in perfect accord. There is not much motion of the feet; but the male moves his body up and down, bowing his head at the same time, possibly so that his lady can see the beautiful iridescence on his back. As he straightens up again his bright red necktie flashes out. He lowers his wings and bends from side to side with dainty, sinuous motions, his head and neck constantly moving up and down and in and out. Then he spreads his wings (and tail, if he is on a horizontal branch) and bows; and all through the dancing the soft, low cooing is heard.

The female is undoubtedly a little coquettish and does not believe in being too easily won, but after a time they pick out a quaking aspen with a trunk seven to nine inches in diameter in which they excavate a room. The male selects a spot five to eight feet from the

ground and marks out a circle about an inch and a half across. If satisfied, he goes ahead cutting the circle deeper and then scales out the bark. After that the real hard work begins; about four times a day from a half-hour to an hour at a time they dig into the solid wood, the male doing possibly a little more than half the work. The hole runs into the center and then downwards a few inches, where it is enlarged sufficiently to make a comfortable chamber for Madame Sapsucker and her brood. From ten days to two weeks are consumed in preparing the cavity. No nesting material is used; the chamber is ready for use as soon as hollowed out. There is some variation in the length of time before nesting begins, but usually five beautiful white eggs are laid on the clean chips during the latter part of May or early in June. The young are born naked, with eyes closed, but develop so rapidly they are ready to leave the nest in from two to three weeks. The male is a most exemplary husband, having done more than half the excavating, half the incubating, and possibly more than half the feeding of the young.

In the fir and aspen belt I also found Red-shafted Flickers, Mountain Chickadees, and Rocky Mountain Nuthatches nesting in much the same way as the sapsuckers except that the chickadees and nuthatches were rather more apt to use a fir than an aspen. The Mountain Bluebirds and the Tree Swallows were also present in these localities, for they both appropriated old woodpecker holes for their nests. It is a pretty sight to see the bluebirds hunting for a vacant house in the spring. The male appears to act as scout; he reconnoiters, finds a woodpecker hole, and then fetches his wife to look at it, no doubt dilating upon the great advantages of the location. She hovers in front for a few minutes, inspecting the hole, the tree and the surroundings carefully, and if they do not suit her, will have nothing to do with the place. Then the husband shows what a good fellow he is; he does not sulk, but immediately flies off to find another place over which he becomes just as enthusiastic. When she is satisfied, they both begin bringing nesting materials to line the cavity; and it is likely that she arranges most of the furnishings.

The Mountain Bluebird does not confine himself to these low altitudes, but pushes rapidly up the heights after the melting snow until sometimes he overdoes it and has to return. After the nesting season, the Bluebirds go in flocks to the summits, doubtless to take advantage of the grasshopper feast there spread out for them. They are not alone in this either, for the Robins do the same thing.

The Robins enter the Park about the middle of March and by June first are at the 8500-foot level; the White-crowned Sparrows arrive about May first and in a month are even with the Robins; and in late June attain the 9000-foot level. In other words they follow up just behind the melting snow. This early vertical migration is most interesting. If the bird student is inclined to mountaineering, here is his chance; elsewhere he must cover long distances north and south to observe migration and its related movements, but here he simply moves up and down the mountainsides, noting birds and conditions at each level. The birds evidently follow up the melting snowbanks for the same reason that their brothers go farther north. But why? Is it a matter of food? Do these alpine heights and the boreal regions attract a peculiar kind of insect or give them a special flavor? In the case of the Bluebirds and the Robins, as we have just seen, it was apparently the grasshoppers; but why were the "hoppers" of the mountain-tops more attractive than those of the lowlands? Were there more of them because fewer birds? Hence, are birds pushed out of the lowlands — and possibly the tropics — by competition? Bird students commonly ascribe to the influences of the glacial epoch, and the resulting periodic changes in food supply, the inception of the migratory habit. Here we have a similar movement, and whether due to food conditions we can only conjecture.

Still, it is hard to account otherwise for the early movement up the mountains; each of the belated storms drives down hundreds of birds that have sought the heights. Particularly is this true of the Juncos, Pipits, and Horned Larks. In the fall many of the birds are just as reluctant to leave as they were eager to reach these places in the spring; the Coot, driven down from its colder resorts, stays in the Lamar Valley ponds until they actually freeze over; and the Pipits when forced down off the mountains manage to linger a little longer under the lee of the river banks. Neither species leaves the region until its food is killed by the severe frosts. The Juncos and White-crowned Sparrows also remain through the early storms of fall as long as there is food obtainable. If there is any bird that we might accuse of being a vagrant without love of home, it would be the Brewer Blackbird after the nesting season; and yet this bird remains until the weather gets so cold as to force it to roost on the warm ridgepoles of the houses at Mammoth to keep its toes from freezing. Regardless of food there is surely an irresistible attraction in these mountains; we all feel it, and why should not the more sensitive birds have it in even greater degree!



On the fir slopes of Mt. Washburn, along with the Chickadees and the other nuthatches, is found the Red-breasted Nuthatch. A dainty little midget it is, seen running up and down the tree trunks and hunting industriously for its insect prey. If not satisfied with its first search, it starts again and goes all over the trunk once more. The nuthatches differ from the other tree trunk foragers here in depending entirely upon their feet in clinging to the bark of trees, instead of bracing with the tail as do the woodpeckers and true Creeper. No nests of the Red-breasted Nuthatch have been reported in the Park, but it is one of the permanent residents. In the spring, before there are many of the summer birds present, it is as cheering as a chickadee. You will often hear a "yeng-yeng—yeng-yeng," and on glancing up, find a small flock of these busy little fellows right before you. In March, when the hibernating insects and their eggs have been pretty well gleaned from the tree trunks, this nuthatch and his companions the Mountain Chickadees, may be found busily catching ants on the ground at some spot the sun has warmed. No doubt these two little birds are often hard put to it to get their living during the rigorous winter weather; but they are always bright and cheery and always on the go. In spring the Red-breast is often seen whirling around rapidly on a fir trunk like a pinwheel. Can it be that the female is attracted by such antics?

Another habitant of these mountain forests is the Townsend Solitaire, a singer par excellence, but like some other artists, chary of being heard. When you are fortunate enough to hear him, you have listened to a song you will never forget. He is a bird of the wilds; and his strain, heard in the solitude of the somber forests, or perhaps in the desolation of the songless autumn, stands apart in your memory. All the solitaires, of which there are a dozen species, mostly tropical birds, are wonderful singers; and our bird, the Townsend, ably represents his gifted family. Since a few individuals remain all winter in the lowest parts of the Park, we must accord this bird status as a permanent resident; and one is very ready to grant him the title of "mountaineer" when he is seen on a bright morning taking his bath in a pool of snow-water caught in some rocky basin.

Another songster of the fir timber, although more likely to be found where the forest gives way to an open meadow than in the deep woods, is the Ruby-crowned Kinglet, a tiny bird whose notes are so loud and ringing that it is difficult to connect the two. A novice may well spend many minutes craning his neck and straining

his eyes before discovering this mite of a musician. If he be asked what he is looking for, he is likely to describe a bird as big as a Crow, at least! But once located, the notes are unforgettable and this tiny songster of the tree-tops can be readily identified forever after. If not singing, he can be told by his scolding chatter and the peculiar lift of his wing as he industriously searches out his prey.

At the other extreme, both of size and habitat, is the Richardson Grouse. He is both large and a ground dweller. But he, too, lives in the firs, although found in any woods, even to the boreal white pine at timber line. Sometimes he wanders out into the open, but he never gets very far from the shelter of the trees, to which he quickly retreats in time of danger. Somewhat larger than the Ruffed Grouse and of a general dark blue color, he can be confused with no other bird here. When exploring the forest one often has an opportunity to study him, for he has a way of sitting quite still, craning his neck first one way, then the other, as long as he thinks himself unobserved; but the instant he becomes convinced that he is seen, off he goes on thunderous wings. While he has no ruff, there is a sac on each side of the neck, ordinarily hidden by feathers, that can be filled with air. In the spring mating period the air is expelled from these sacs with a peculiar booming sound that can be heard for a long distance. Although resident here, spending the winter in the tops of evergreen trees, this grouse is not often seen between November and March. Sometimes during heavy snowstorms, he descends to the ground and tunnels into the soft snow for protection. When skiing through the timber I have had one jump up right under my skis from an unbroken expanse of snow, a startling experience. The Richardson has many habits in common with the Ruffed Grouse. Both nest on the ground, usually at the foot of a tree or under a convenient bush. The Richardson's nest is a rough affair of grass, pine needles and leaves, and contains from seven to ten creamy eggs speckled and blotched with brown. The little chicks are hatched about July 1 and can run about quite nimbly as soon as they are out of the shell. The mother takes good care of them, but the father pays no attention whatever to his family. During the summer the birds wander through the timber wherever the supply of food calls them; and in the fall they are frequently found in the roads taking dust baths.

These mountain heights are good stations from which to note the flight of birds. Although the migration routes across the Park

follow the river valleys, still at times, especially in the fall when the birds are going south, an almost constant stream of birds can be seen passing the summits. Through the summer, many birds can be watched from above. Here again the peculiar and beautiful tints of the swallows can be seen, the soaring flight of the Raven can be contrasted with the flapping of the Crow; and sometimes, even in daylight, a Great Horned Owl may fly rapidly past with steady, noiseless wing beats.

Snowy Owls should be found resorting to the slopes of this mountain in winter, but as yet none have been noted. No doubt they come, but the deep snows and heavy drifts have prevented my spending much time in observation there. But other winter birds are common on the mountain slopes. The Waxwings wander about Mt. Washburn at the very opening of winter; so also do large mixed flocks of the three different Rosy Finches—the Gray-crowned, the Hepburn, and the Black. But the Rosy Finches might be seen almost anywhere in the Park, especially at Mammoth Hot Springs, when severe storms drive them down about the stables. It is even possible that some remain in summer and nest above timber line, but as yet their nests have not been found. However there is one bird, the Pipit, that does nest and bring forth its young upon these wind-swept heights. Often this hardy bird will arrive and go to nesting so early that the last wintry storms will catch him and force him to lower altitudes. Undismayed he will return to the heights just as soon as the storm passes.

Wonder is often excited as to how these small birds can alight on the soft snow without sinking in. To such a hardy little Northman as the Pipit the problem is simple; for as his feet and legs sink in, he spreads his wings to sustain his weight, and flutters about for his food. When the warming sun consolidates the snow, he is all right again.

It is not often that an Eagle is seen on this mountain, but across the valley to the north lies a range of rugged granite peaks where the Golden Eagle is fairly common, as eagles go. Along the northern boundary of the Park there are at least five pairs of these noble birds, far nobler and more deserving of the honor of being America's national emblem than the robber Bald Eagle. Unlike the Bald Eagle, the Golden builds her nest on some ledge of the granite cliffs, assembling a rough pile of sticks. If there was anything in the old Spartan theory, then these birds should be hardy indeed. Hatched in such a cradle during the cold and snow of early May,

the two eaglets thrive so well the only wonder is that the species does not become more plentiful. It has no dangerous enemies but man, the annoying Crows and Ravens serving only to keep this lordly bird from becoming too proud and haughty.

## INFLUENCE OF WARM SPRINGS AND GAS VENTS ON BIRDS

In describing the effects of the warm springs on the birds, I am letting that term include all the various agencies known as hot springs, geysers, solfataras, and gas openings. The warm springs act in three ways: on the one hand causing sickness and death, and on the other, helping the birds directly by providing warmth and moisture; and indirectly by furnishing conditions advantageous to insects, and by keeping the streams and ponds open in winter.

It must be said that the direct loss of birds from the heat is very small. While birds are all about the hot springs and geysers, they are seldom caught in them. Yet, curious to relate, the first bird record we have for the Yellowstone, from Mr. Langford's diary of the discovery expedition in 1870, describes just such an accident. Speaking of Prismatic Lake of the Middle Geyser Basin he says: "As we stood on the margin of this immense lake a small flock of ducks came sailing down as if to alight; but as they skimmed the water a few inches above the surface, they seemed to scent danger, and with rapid flapping of their wings, all except one arose into the air. This one, in his descent, had gained too great an impetus to check his progress, and came down into the water, and his frantic efforts to arise again were futile."

Many of the openings on the Mammoth Hot Springs formation and in other parts of the Park, give out carbonic acid gas, which quickly proves deadly to any birds that get into it. Odorless and not directly poisonous, it kills by suffocation, shutting off the necessary supply of oxygen. These openings are usually the old tubes, or craters, of extinct springs, and the gaseous emanation is the last effort of the dying spring. The death list of birds years ago became so great that the largest and deadliest openings were covered with wire netting. It has been assumed that the birds sought these openings for warmth, and no doubt in some cases the warm vapor might have some attraction; but in other places there is very little, if any, warmth. At the worst of the "caves" there is considerable water trickling down the rocks, and now that the opening below is covered the birds regularly resort to the water-covered rock above to drink

and bathe; so it would seem that the water might have enticed some of the victims to their death. Another attraction is the insect life which flourishes near the caves, some insects at least being apparently unaffected by the gas; and no doubt some of the birds followed the insects into the openings and were overcome.

The caves catch most of their victims during the cold spring and fall migrations, which no doubt led to the idea that it was warmth which attracted them; but it is now thought probable that the birds were simply seeking a protecting nook or cranny as they do elsewhere.

The remains of the victims disappear very rapidly and it has been suggested that this might be due to sulphurous acid in the gases. But sulphurous acid has a villainous odor and it is the odorless gases that appear to be most deadly. Undoubtedly the water found in these openings does in some cases contain acid, and in others alkaline matter; and it seems probable that these acids and alkalies in solution, together with the excessive moisture, cause the rapid decomposition.

Sometimes these gas caves afford records of birds whose presence had not before been suspected. A specimen of the Calaveras Warbler once found there dead, is the only Park record of this bird (T. S. Palmer, '07); and the first Townsend Warbler to be reported was picked up at Stygian Cave, though this species has since been found in fair numbers elsewhere in the Park. The species that suffers most at the gas openings is the Pink-sided Junco, no doubt because this is the most abundant of the birds that frequent the old evergreen-covered formation, and also because it is a ground-loving bird. The list of birds found dead from this cause includes the Magpie, Clark Nutcracker, Cassin Purple Finch, Pine Siskin, Junco, Western Chipping Sparrow, Green-tailed Towhee, Western Tanager, Warbling Vireo, Audubon Warbler, Townsend Warbler, Calaveras Warbler, Macgillivray Warbler, Rocky Mountain Creeper, Rocky Mountain and Red-breasted Nuthatches, Mountain Chickadee, Townsend Solitaire, Audubon Hermit Thrush and Western Robin (cf. Mearns, '03).

There are some poisonous springs and deposits in the Park, but so far as is known they have had no bad effects upon the birds.

That the birds do seek the neighborhood of thermal springs for warmth alone is an undoubted fact. During cold, raw days in springtime many species are drawn about both springs and geysers. One cold morning a Say Phoebe was perched all huddled up in

the steam from the Black Grouser at Norris. On a frosty morning in May, with the thermometer at fifteen degrees above zero, no birds at all could be found about Norris until we reached the meadows along the Gibbon River. But these meadows were alive with Robins, for they are underlaid and kept warm by hot springs. In April and early May the birds about West Thumb congregate on the hot springs formation in numbers. At Mammoth Hot Springs, the long gentle slope and flats below Jupiter Terrace, kept warm by the waters spreading over it, is a favorite resort for birds at all seasons. In summer, the birds are attracted there by numerous insects; in fall and winter, they go there for the warmth as well. Wilson Snipe and Solitary Sandpipers halt there on their way south and sometimes remain for weeks after their companions have departed. In winter, Dippers and Mallards are found there. The Dippers are such hardy, winter-enduring birds that it is doubtful if the heat interests them except as it keeps the waters open and insects available; but the Mallards evidently enjoy it, being seen almost every clear afternoon basking, preening, and sleeping in the genial warmth. All through December, January, February and March of each year, the same group of Mallards may be seen there every afternoon, and occasionally they remain all night.

In some bushes growing over this outflow, Song Sparrows build their nests, higher by nearly a thousand feet than any others of their species. The people whose business keeps them in the Park all through the bleak, dreary winter have learned to look first for the returning Robin and Bluebird and then for the Song Sparrow as spring's harbingers; and when they hear the plaintive cry of the Killdeer and the "peet-weet" of the Sandpiper, they know that the summer is surely coming at last. Both these waders come to this formation first, and like the Song Sparrow find places on the slope below Jupiter Terrace for their nests.

Birds often may be seen congregated near the hot springs and geysers, evidently for their heat. I remember well, one bleak day in November, making my way slowly up the valley towards the Pelican Hot Springs. As I approached, a flock of twelve Mallards rose from the ground northeast of the Springs, where the wind was carrying the warm air; and on nearer approach a Raven sprang up from immediately beyond the cone of the main spring, and in doing so flushed a Wilson Snipe from the ground a few feet beyond. No reason could be found for such a mixture of birds except the one of warmth, although I searched the ground diligently for any other

indication. On a frosty morning in June, three Mallards jumped from the edge of Bijah Spring, so close that in rising they shot up through the steam, much to their discomfort; and a few days later a Robin did the same thing at the Giantess Geyser while it was in eruption!

But while the warm springs affect the birds directly through their suffocating gases and their pleasant warmth, their greatest influence is probably indirect, by affording good breeding places for flies and insects, and keeping the brooks and rivers open all winter. The insects of the Jupiter Terrace slopes were doubtless instrumental in bringing additional birds there; but continuous heat and the breeding of insects are so closely connected that it is difficult to separate the two as causes. Flies and other insects breed in large numbers near the hot waters at all seasons, even in winter. When out on snowshoes on a winter's day with the thermometer at zero, I have often been astonished by the sight of flies and long-legged insects skating around on top of the thin film of water running away from a geyser. A thermometer held a quarter of an inch from the water indicated the temperature of a summer day, and it was often warmer still amid the rank vegetable growth that the warm water induces. While the discovery of summer insects on a snowshoe excursion outrages our sense of the fitness of things, the birds accept them cheerfully wherever found, resorting to the formations in numbers when the hunting is poor elsewhere. It is even possible that they prefer this hothouse food, as they come about these places even in midsummer. The overflow from Jupiter Terrace is an ideal place to study this bit of Nature's handiwork. The water is cooled to the proper degree for the insects and is spread out in a thin film through which the birds can easily wade; and here in the early mornings before the insects are moving elsewhere, birds of many species flock to the repast spread out as on a table in a warm room for them. Later when the insects are active in other places, the birds have no need for the warmth they enjoyed in the morning. The Song Sparrows, Killdeers and Spotted Sandpipers, drawn principally by the warmth, find the insects an added attraction; and certainly the Water Ouzels and Mallards do not pass them by. But in addition, there are many other species; Brewer Blackbirds in flocks of a dozen or more come here as early as the middle of June, although it is fully a month later before they appear in flocks elsewhere. Any time before mid-morning, hosts of swallows may swing to and fro over this hunting ground picking



up the flying insects that escape the ground searchers below. The first automobiles always see numbers of birds at this point unless the morning happens to be cold and rainy. It is a particularly good place for the bird lover; he will hear there the cheerful caroling of the Robin, the soft warble of the Bluebird, the music of the Song Sparrow, and the beautiful melody of the Green-tailed Towhee, while no doubt there will be a Red-wing on the neighboring reservoir fence sounding a clear, ringing "o-ka-lee-e-e."

In the evening, after the tourists have left the formation at Mammoth, the birds move up there and are to be found in many strange places. It seems curious to see wild ducks come flying in to ponds whose shores have been visited by hundreds of tourists during the day. Many of the smaller birds will be found seeking the heavy thickets on the edge of the formation for the night.

The most noticeable effect that the warm springs have on the waterfowl is through keeping the streams open and free from ice in winter, an interesting fact first noted by Mr. Chester A. Lindsley and called to the writer's attention in 1898. This is particularly striking in the Gardiner River. Here the warm waters from Mammoth Hot Springs find their way underground through Boiling River into the Gardiner. Above the junction the Gardiner is heavily covered with ice even where the water is quite swift; below, ice does not form at all, and the stream is not only open throughout the winter for the Mallard and Golden-eye but also the comparatively high temperature induces a superabundance of insect and vegetable life.

Dippers resort to open parts of the Gardiner in numbers all through the winter, making it an ideal place to study this remarkable bird. There are numerous favorite spots where one may see him catch his food and hear him sing. Contrary to the usual custom of other birds this bird sings here during the winter and early spring, commencing about Thanksgiving Day. The song, being loud, sweet and clear, is sure to command admiration from all. Heard above the roar of the rapids, often during a heavy snowfall or in the midst of a biting winter wind, it acquires additional charm by the fact that except for this animated little chap the whole world seems frozen. Living along these streams, now plunging into it in pursuit of his insect prey along the bottom, now out on some slippery rock into the keen, freezing air where he sits motionless, except for the blinking of a very conspicuous white eyelid, how can we reconcile our preconceived notions of a songbird with this hardy

midget? Why does he sing in winter? Nesting time does not begin for him until the first of May. Never seen in flocks and rarely even in pairs, it is difficult to determine just when they do mate. They spend a great deal of time building their nest, and if the first one is not satisfactory they will tear it out and begin again; so perhaps they mate in the singing season and spend a month or two getting their nest to suit them. Elsewhere the Dipper is recorded as singing throughout the year, but in the Yellowstone I have never heard it in summer.

Since the hot water keeps it open all winter, the Gardiner River is peculiarly adapted to a study of Mallards and Golden-eyes and their ways. Here they get so tame as to pay absolutely no attention to the constant traffic passing within a hundred feet of them. In the rapid water, they get many opportunities to go coasting on the current and become so expert that they shoot the foamiest kind of white water with ease. Sometimes they drop down little falls as high as three feet and keep on swimming in the pool below; if they are thrown against a submerged rock, they walk right over it, going on their way as if they had been doing this all their lives. Perhaps they have! But still it looks startling, especially to a canoeman who would eye that river suspiciously, and—let it alone!

The Gardiner is not peculiar in thus being kept open in winter; nearly every stream of any size in the Park receives warm water somewhere along its course and is open below; some of the lakes have hot springs in their margins or even on their bottoms. Wherever the ducks and geese find these open waters, they congregate and remain; and among other streams they frequent the Gibbon, Firehole, Madison and Yellowstone Rivers in winter. The Yellowstone River is also a rendezvous for forty or fifty Whistling Swans each winter, about the outlet of Yellowstone Lake. Yellowstone Lake itself is also open where it receives the hot water from Thumb Basin, allowing a few Mallards and Golden-eyes to remain most of the winter.

The open waters, by giving access to the trout, offer inducements to the Kingfishers to remain along both the Gibbon and Gardiner Rivers and probably other streams. At times Wilson Snipe remain all winter where the springs are not too alkaline but still warm enough to permit this worm catcher to get his food.



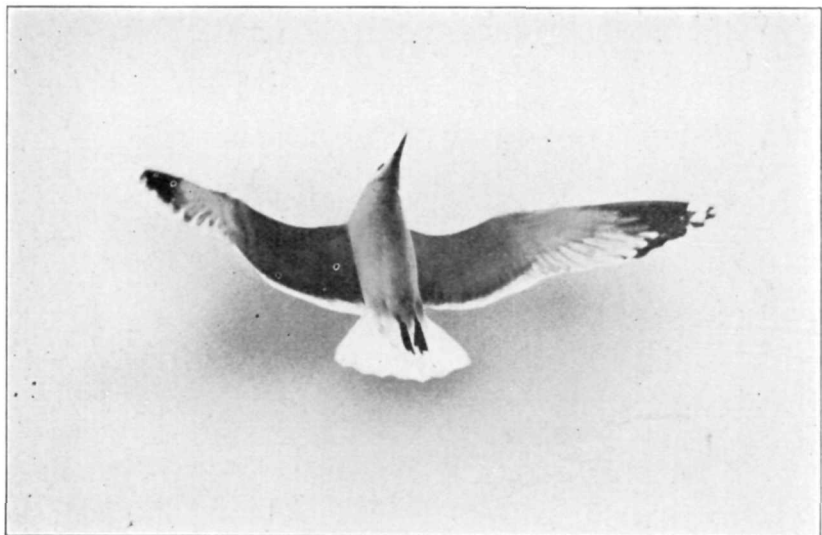
*Photo by M. P. Skinner*

Fig. 27. The Warbling Vireo, while not very common in Yellowstone Park, is a pleasing and conspicuous singer in early summer about Camp Roosevelt and Tower Fall.



*Photo by M. P. Skinner*

Fig. 28. A nest of the California Gull, with young in the down, on Molly Island in Yellowstone Lake. This shows a typical nesting site on the low, stony shores.



*Photo by California Academy of Sciences*

Fig. 29. A California Gull. Gulls with snow-white under parts and black-tipped wings are a frequent sight, always reminiscent of the ocean a thousand miles from Yellowstone Park.



*Photo by California Academy of Sciences*

Fig. 30. The young California Gulls, in mottled, juvenile plumage are able to forage for themselves before August 15.

## THE BIRDS OF YELLOWSTONE LAKE

Yellowstone Lake is a beautiful sheet of clear, cold water at an elevation of over 7700 feet above sea level, and there is no other mountain lake in North America approaching it in size. Its outline is very irregular, giving it a shoreline of more than a hundred miles, the main lake being fourteen miles north and south and seven miles wide, with several arms extending these distances considerably. The eastern shore is backed by the high Absaroka Mountains, but there is only a gentle rise to the west. Practically all of the shores are wooded, yet numerous openings in the forest occur where the various streams enter the lake, and where the outlet leaves it at the north. Two very good-sized streams empty into it through large open valleys, Pelican Creek from the northeast and the upper Yellowstone River from the south, and both of these streams have extensive marshes about their mouths. Hence we have a large body of water remote from man and his disturbing influences, providing a great variety of wilderness conditions for the use of bird and animal. The shores comprise sand beaches, pebble beaches, rocky cliffs and marshy meadows; and back of them lie forest, meadow, prairie and mountain-side. Some of the characteristic birds of Yellowstone Lake are shown in plate 2. The marshes provide choice nesting grounds for Mallard, Blue-winged Teal, Barrow Golden-eye and Canada Geese; two low, isolated islands known collectively as Molly Island provide equally good sites for gulls and White Pelicans. The lake is so full of trout as to attract hundreds of Ospreys which nest in the tall pines and spruce trees along the less frequented shores. But for some reason the Eagle is very scarce; the Bald Eagle nests at only one or two points, while the Golden Eagle is never seen. In the fall migration a great variety of shorebirds resort to the beaches and marshes but they are never very numerous. Besides the two low islands just mentioned, there are four larger, well-forested islands; but beyond affording secure, warm nesting sites for forest birds they do not affect the general situation. The lake is on an important migration route and its marshes and shores offer special attractions to the avian travelers. As the ice lingers very late, only the land birds are seen during spring migration; but in the fall vast numbers of ducks, geese and swans stop on their way south.

Foremost in interest among the water birds of Yellowstone Lake is the White Pelican. A bird of majestic beauty, either when swim-

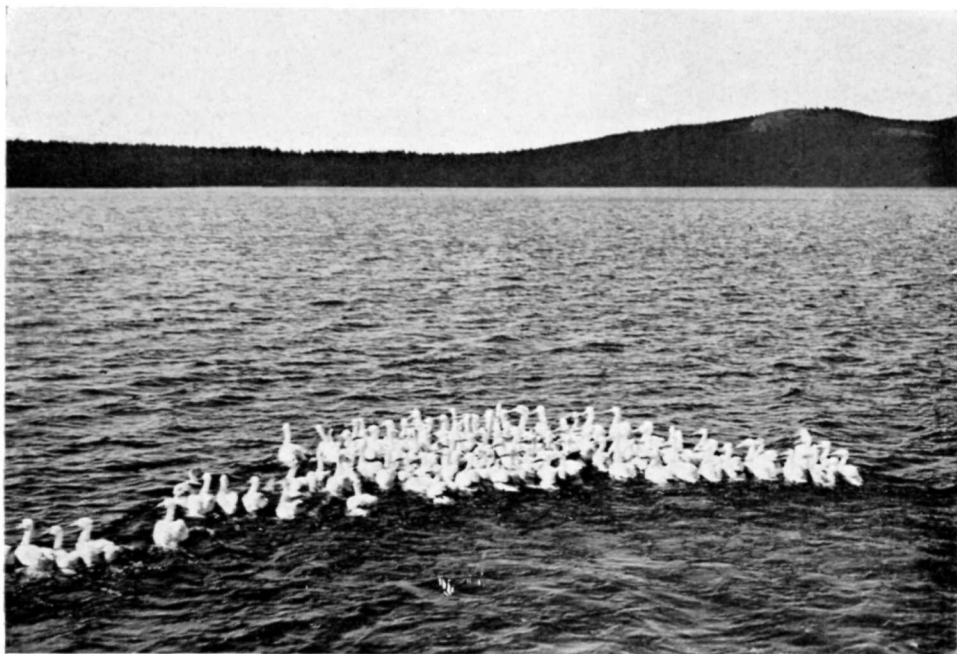
ming on the water or when flying past with long, powerful wing strokes, he never fails to gain the attention of the tourist. And well he may, for he is a striking bird at all times, and his great size and beauty serve to remind us of the wonderful inheritance of native birds with which we Americans were blessed. But our ever westward "progress" is rapidly driving even this harmless bird before it until now Yellowstone Lake is one of the most eastern points at which he breeds.

The first of the returning Pelicans arrive about May 1. As the lake is often covered with ice for a month longer, they wait on the open Yellowstone River, spending their time in fishing. All through May their number increases, until there are probably 700 birds within the Park. Occasionally one or two wander to other sections, but as a rule they confine themselves to Yellowstone Lake and River, frequenting the latter as far as the northern edge of Hayden Valley.

About 250 pairs of Pelicans have nested annually on Molly Island ever since the Park was established. There is little attempt made at building a nest, the two or three soiled white eggs being placed within a slightly raised rim of sand and pebbles. They are laid about June first and before the end of the month the young emerge. These are helpless little creatures, naked, blind, and so weak they can hardly move; but they are fed on regurgitated fish and grow rapidly. Although not able to fly until two months old, they meanwhile take to the water and become expert swimmers at a much earlier date (fig. 31). No calls or cries are to be heard from the adults, and even the fledglings are unusually quiet.

The White Pelican gets his fish by scooping them up as he swims along; but he will often drive a school of small ones before him until they are cornered in some little bay, when a sudden rush secures a pouchful. He does not use his pouch to carry them, however, but gulps them down as fast as caught, using the pouch as a sieve to strain off the water. At times, when lazy or when its own catch comes slowly the Pelican will rob a Merganser, if that duck is so incautious as to fish nearby.

Another water bird using Molly Islands for a breeding place is the California Gull, which nests usually on the islet containing the fewer Pelicans (fig. 28). Their nests are a little more pretentious, being made of grass stems arranged in some semblance of order, and their one to three eggs are dark lavender marked with black in an irregular pattern. The Gulls arrive somewhat earlier than their larger associates and begin nesting about the same time,



*Photo by M. P. Skinner*

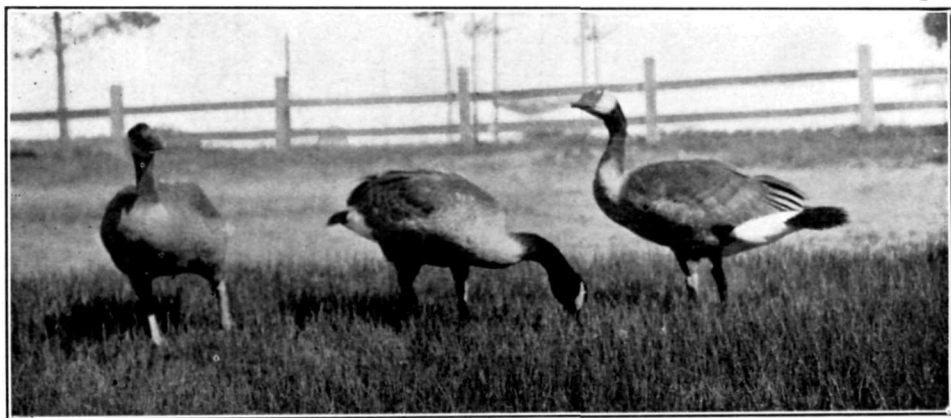
Fig. 31. Young White Pelicans. When the young on Molly Island are disturbed before they can fly, they enter the water and try to escape by swimming.





*Photo by R. B. Rockwell*

Fig. 32. Wilson Phalarope on nest. Although the female lays the eggs, the male of this species, contrary to usual bird custom, does the brooding and takes care of the young.



*Photo by Milton J. Ray*

Fig. 33. Canada Geese, contrary to popular belief, are among the wisest and most interesting of birds. In the Yellowstone they are common and quite fearless.

although the nestlings develop so much faster that they are able to forage for themselves by August (fig. 30). They eat any dead fish they may find and sometimes rob the Mergansers. They watch these ducks diving for fish and as they come up with their prey, secure it for themselves by a quick swoop before the Mergansers can swallow it. More often they resort to the hotel garbage dumps where they dispute with the bears the possession of the food. While the bears are there the Gulls circle about with screaming cries, making frequent dives at them; and the moment the big animals leave, they settle down in numbers to secure the rest of the feast. A marked peculiarity of the Gulls is their extreme buoyancy as they sit on, rather than in, the water. Usually when so seated, they are resting, or perhaps leisurely feeding on something on the surface; at times they even appear to be fishing, for they will suddenly leap up a foot or more and then plunge downward with great force.

A most peculiar black bird with gray wings — the Black Tern — makes his appearance near the lake's outlet at times. Rarely more than one or two at a time, they attract immediate attention by their slender, swallow-like appearance. On the wing they are erratic and very buoyant, rising easily into the air from the water's edge and flying with easy grace as their long wings carry them now here, now there. They feed on insects, and as their wings are very long in proportion to their weight, they can spend hours at a time in tireless pursuit of their prey.

The beaches about the outlet and eastward beyond the mouth of Pelican Creek are especially liked by shorebirds of various kinds. With the exception of the Spotted Sandpiper, abundant on every lake and stream in the Park, shorebirds are never numerous. During the fall months limited numbers of Willets, Baird Sandpipers, Least Sandpipers and Solitary Sandpipers make their appearance. At times a Greater Yellow-legs is seen wading on the flats as far out as its inordinately long legs will allow, nodding its head and occasionally thrusting its bill below the surface. If the observer approaches a bit too closely there is a sudden flash as the bird rises, spreading its white tail and uttering a mellow "tweep, tu-wheep." A surprising bird, the Wilson Phalarope (fig. 32), may be seen here although it is not at all common. This is a small snipe-like bird that spends its time swimming and feeding on the surface of the water — a most astonishing sight to one first making its acquaintance and mistaking it for a shorebird. The Phalarope is a very energetic fellow; swimming erratically here and there, nodding his

head like a walking dove, and always attending strictly to the business of feeding. This bird might be considered a great woman's rights advocate; in contrast with nearly all the rest of the avian kingdom, the female is the larger and more brilliantly colored; she does the courting; she lets her husband build the nest; she lets him brood and hatch the eggs; and she lets him take entire care of the young.

To the transient visitor, perhaps the most astonishing birds in the Park are the Canada Geese (fig. 33). Elsewhere shot at and harried until they are the wildest and wariest of birds, here they are tame and fearless to a remarkable degree. They never fail to surprise the tourist used to barnyard fowls or the domesticated birds of city parks. On studying these wild birds, he soon becomes aware that they are far from being as stupid as common report would indicate. We all know the ancient legend of how the geese saved Rome from the approaching barbarians; and I am quite sure that they are one of the few kinds of birds smart enough to have done it! While the great majority of Yellowstone geese spend only the summer there, quite a few remain all winter upon waters kept open by warm springs. The migrating birds commence to arrive in April and for a month the meadows are alive with them and the air resounds with their silvery "honk-ah-honk." By the end of that period those birds that are on their way north have gone and only the birds that breed here still remain. But even so, they are fairly numerous all through the summer, probably as many as four hundred pairs nesting within the Park limits.

What would pass for courtship with other birds, occupies most of April; but geese are believed to mate for life. Perhaps the courting we notice is that of young birds; or do the older pairs renew their youth at each recurrence of the magic season? During this period they are very uneasy and noisy, but by the time nesting begins, they quiet down into "staid old folks" again. In the case of geese, the word "nest" is rather a misnomer; usually they pick out a low elevation, utilizing whatever grass and sticks may be there already, and adding some down from their breasts. The tops of muskrat houses and especially beaver lodges are preferred for nesting sites (fig. 34); and sometimes the top of a boulder, particularly if surrounded by water, is chosen. More rarely an old Osprey or hawk nest is occupied. The nesting time is irregular, the first of the five or six pale green eggs being laid during the last of April, in May, or even in early June. The goslings leave the

nest soon after birth but stay with their mother all through their callow days when they are covered with fuzzy, yellow down. They are expert swimmers, often following their mother through tempestuous seas, and always trying to keep exactly in her wake. Their feet are not well adapted to progress over land, yet the goslings can walk and run quite rapidly; not fast enough to evade their enemy, the coyote, however, who no doubt catches many before they can fly. I was once much amused by seeing a coyote try to stalk a small flock of full-grown birds. He must have been either very young or else somewhat simple-minded. The Geese were perfectly aware of what was going on, and might well have chuckled to themselves as each long, cautious crawl of the coyote found them just a little farther away and entirely too far from cover to warrant a rush. But the coyote was persistent and the geese seemingly had nothing better to do than to amuse him. Two or three hours passed in laborious efforts, and perhaps much canine swearing, that were all equally unfruitful; but each effort came so near reward! At last the animal's patience gave way in one mad rush across the beach, only to see the exasperatingly calm geese enter the river about two jumps ahead of him and swim away.

The Geese have developed a most interesting protective pose, lying low with head and neck outstretched upon the ground or the surface of the water. If on a stony beach, the deception is perfect; if upon the water, the bird looks like a dead body idly rocking on the waves; but if upon green grass, the goose's acuteness has played him false, for his coloring then makes him very conspicuous. He will crouch in this way for an hour, never moving more than perhaps an eyelid until the intruder is a hundred yards away. Then his head will slowly be lifted, then his neck, and finally he will rise to his feet again. This same device is often used by the brooding bird and it gives her a most un-goose-like appearance.

Mergansers are quite common on Yellowstone Lake and River, as is to be expected on waters so full of fish. While the Common Merganser, or Sheldrake, is numerous, his near cousin, the Red-breasted, is so rare as to be counted an "accidental." When a flock of these fish ducks line up on a sand or gravel bar with their gleaming breasts all turned towards the rising sun they make a handsome sight. They are such expert fishers that their reputation causes them trouble. Both the Gulls and the Pelicans have long ago found out that the Mergansers are much more expert than they are. Gathering in the vicinity of the fishing ducks, they wait until



*Photo by M. P. Skinner*

Fig. 34. Nest of Canada Goose on a beaver lodge, in a pond at Yanceys. Here, where predatory animals are rather numerous, the geese always select some small elevation surrounded by water. Occupied or abandoned beaver houses are favorite nesting sites.

one emerges with a fish preparatory to swallowing it, when they immediately set upon him and rob him of his dinner.

The marshes about the southern ends of the South and Southeast Arms of the Lake are favorite nesting grounds for Mallards and Blue-winged Teal. Other ducks are there also but these two far outnumber the rest. One favorite nesting haunt of the Mallard near the tourist route is at Lava Creek Pond (fig. 41). The Blue-winged Teal are the last of the ducks to arrive, it being the first of June before they reach the Yellowstone. Their nests of grass and leaves are built in the marsh grasses bordering the numerous sloughs and beaver ponds on the flats of the upper Yellowstone. From seven to ten youngsters make their appearance early in July; but they suffer so much from hawks and owls and weasels that barely half reach maturity. The small Teal probably suffer more from the muskrats than do the other ducks. Sometimes the muskrat will even try to catch them after they are grown, but then escape by flight is easy. Late in September the Teal gather in considerable flocks in the various small ponds, preparatory to migration. The Green-winged species (fig. 43) is the smallest duck occurring in the Park.

Eagles are extremely rare in the Yellowstone. It is doubtful if more than three or four pairs of Golden Eagles and four pairs of Bald Eagles make it their home. Two pairs of the latter make their nests along the shore of Yellowstone Lake far from the tourist routes, but in 1919 a third pair built and occupied a nest a mile north of the Fishing Bridge, on the east shore of Yellowstone River. A massive platform of sticks is constructed at the top of a tall pine, and on this are laid two large white eggs. The birds will resent any intrusion with a rapid snapping of the bill that can be heard some distance, and their pale yellow eyes fairly blaze with anger. Whether they would attack or not is rather uncertain; but in view of the heavy, hooked bill and massive claws they are usually let alone by intruders. They have a plentiful food supply in the fish of the Lake, at least such as they find dead or take by force from other fish-eating birds, and it is hard to see why they do not increase as the Osprey has done. In the months of March and April the migrating Bald Eagles pass through and at that time they are quite numerous. In flight they are very graceful, the wing strokes being long, even, and powerful. Should the air currents be just right they can sail for hours apparently without moving the wings, but as a rule they are inferior to the Golden Eagle in power and grace

of flight. They are apt to alight at the very tip of a prominent tree; should it be a stiff, dead stub their weight is easily supported; but the top of a flexible pine will sway to and fro under the gyrations of the heavy bird trying to get his balance.

During October and November the wild Swans gather about Yellowstone Lake and River as far down as the Canyon. Sometimes during the spring flight a few stop for several days, but leave again long before the tourist season opens. While it is quite usual to hear the cry of "Swan! swan!" from one of the boats when a Pelican appears in sight, there is little chance of seeing that far-famed bird. But really, were it not for the superior size of the Swan, the Pelican would be recognized on the water as equally majestic and graceful; and if the truth be told, far more quiet and amiable.

Along a large portion of the southwest shore, especially about Flat Mountain Arm, extensive forest fires have left standing large numbers of bare spectral tree trunks, with much brushy growth now springing up beneath. This environment attracts many Tree Swallows who find the cavities of the dead trees just to their taste. It is a beautiful sight of a calm still morning or evening, to see the hosts of these birds skimming the water in pursuit of their prey.

### THE BIRDS OF THE FORESTS

About three-fourths of the Yellowstone is covered by forests, making a magnificent total of nearly two million acres. Most of it comprises trees unsuited to commercial use; but it performs its own very important function to the ranches lying below on the arid plains. Whether a heavy forest growth attracts precipitation or not, is no problem for our bird-busy minds. It is sufficient for us that the forests are here, that rains and dews fall in ample quantities, and that the brooks and larger streams are plentiful and well distributed. A large share of the precipitation is in the form of snow, and the melting and disappearance is spread over a longer period than would be the case if the country was all open. The soil protected by the forest acts as a sponge and is able to retain the moisture for a still longer period. Both of these factors tend to retard and prevent the sudden run-off of spring water and keep the streams full, well on toward the autumn storms. Not only are the streams and waterfalls kept beautiful but also abundant water is here for plant growth for our birds and for shrubs and trees to contain a varied series of nesting sites.



The forest is composed largely of the lodgepole pine. There are also two species of the white pine; one prominent at Mammoth and the other in twisted, misshapen form near timber line. Douglas fir comprises the largest timber in the Park, sometimes reaching a diameter of five feet. A small balsam fir flourishes near timber line and is the most beautiful of our trees. The Engelmann spruce is another handsome tree that grows well up the mountains and is particularly noticeable in groves covering the south slope of Mt. Washburn. The western red cedar occurs, especially at Mammoth and below. The quaking aspen or poplar is the most common and conspicuous of the deciduous trees. There is a dwarf maple and a dwarf birch, and alders and stunted willows line many streams through mountain meadows, while several species of cottonwoods grow along the lowest streams.

Not only is the scenery beautified by flowing streams, but the forest provides diversified conditions to suit many different species of birds. In the forest itself few birds will be found; so true is this, that the Yellowstone has the undeserved reputation of "no birds" simply because the tourist routes are over half the way in the dense woods which most birds avoid. If the visitors would examine the meadows or walk along the bushy places by the brook-sides, especially on an early morning in June, plenty of birds would be found. Even in the forest there are frequent openings known as "parks," and open or brushy meadows along the streams where birds commonly gather. Some of the more characteristic birds of the Yellowstone forests are shown in plate 1.

Conspicuous among the birds of the forest are the woodpeckers. Among them the Rocky Mountain Hairy Woodpecker, the Batchelder Woodpecker and the Red-naped Sapsucker are the western forms of common eastern birds. The Williamson Sapsucker, which continually haunts the aspen woods, has already been described (pp. 78-80). The Rocky Mountain Hairy, the counterpart of the Hairy Woodpecker of the east, is the most numerous, if we except the Flicker; and he has all the characteristic traits of his tribe. Often a sharp "peek-k, peek-k," will lead to the discovery of one of these birds edging around a tree trunk; still more often a staccato hammering will announce a woodpecker making love to his sweetheart. The Batchelder is the Yellowstone representative of the Downy Woodpecker which it resembles closely in appearance and habits; and though rather scarce it occasionally may be seen, especially about the quaking aspen groves. The Red-naped Sapsucker is

closely allied to the eastern Yellow-bellied Sapsucker, although the latter lacks the red nape. Apparently it does not depend so much on tree sap for food, but is more insectivorous. It, too, is found in aspen groves; and often on a crisp, frosty morning one may be found at the very tip of the tallest aspen with its breast turned towards the east ready to catch the first warming rays of the sun. One would suppose it had learned that trick from the Robin. The Robin always carols of a morning just as though he had no thoughts beyond the music he was making, yet he is very careful to pick out the tip of the tallest tree where the warm sunlight will strike first. Perhaps I am in error to intimate that he is doing anything but "greeting the morning sun."

Even the Chickadees of this region have a habit of lightly hammering on the limbs, woodpecker fashion. Can it be that they are prosaically catching ants? These little birds are the Mountain Chickadees, which have a white stripe above the eye to distinguish them from the eastern Black-caps (see pl. 1). They are the same cheery little fellows, always coming familiarly about camp to investigate everything that may attract their interest. On one occasion a small flock came trooping into my tent where they spent some time gratifying their curiosity. As they were about to leave, two of them discovered my hat and coat hanging on the tree outside, and at once appointed themselves an investigating committee. The coat offered no problem; they had no doubt seen such things before. But the hat was different. One alighted on the brim and the hat tipped and spilled him off. Here was a nice plaything. Again and again those little fellows flew to that hat brim for no reason that could be seen except to be spilled off again! The Mountain Chickadee's call is softer and more mournful than that of the eastern species; but there is another chickadee, the Long-tailed, sometimes associated with them, that is more like our eastern bird. The call is the same and the head has no white stripe; but the tail is almost a quarter-inch longer.

Other birds often accompanying the Chickadees are the Rocky Mountain Creeper, the Rocky Mountain Nuthatch (fig. 37), and the Red-breasted Nuthatch. The last is common enough but the other two are not seen so often. The Creeper is a close counterpart of the eastern bird and could not be distinguished from it unless the birds were in hand; it has precisely the same habits and climbs spirally up a tree trunk, thereby earning the local name of "tree mouse." Why does it always climb *up*; and when it wishes



*Photo by R. B. Rockwell*

Fig. 35. The Western House Wren. These birds are not numerous in Yellowstone Park, and while occasionally seen, are more often heard.



*Photo by R. B. Rockwell*

Fig. 36. Although the nesting cavities of the Mountain Chickadee are to be found usually in dead trunks or limbs at a considerable height, they are sometimes quite low, or even in stumps.



*Photo by F. C. Willard*

Fig. 37. A Rocky Mountain Nuthatch at its nest in a tree cavity. The nuthatch nests appear to be placed lower, as a rule, than those of the Mountain Chickadee.

to descend, *fly* down instead of creeping? The Rocky Mountain Nuthatch is the western form of the White-breast and an even more accomplished creeper, for he easily goes up or down or even bottom side up, without a stiff-pointed tail with which to brace himself like the true Creeper. Another small bird found in the same haunts, although of a very different kind, is the Western Warbling Vireo (fig. 27), the only vireo recorded from the Yellowstone as yet. Perhaps it would be more exact to speak of this bird as a "wandering voice," for a dainty warble, incessantly repeated from the high forest is about all that one is apt to find.

Sometimes birds are encountered in the forest that do not seem to belong there at all. A Kingfisher was seen one day flying through what seemed the densest of pine timber, and only a careful search showed its characteristic haunt, a trout stream flowing among the trees. Robins are normally birds of the open; yet sometimes I have run across them in the deep coniferous forest, and there they seemed unusually wild. Dippers are associated with streams of some width, yet they will occasionally follow up a veritable mountain rill.

I have already spoken of the big Richardson Grouse; but there is another grouse which is found in the forest, especially near the edges or in undergrowth—the Gray Ruffed Grouse. Essentially he is the same as the eastern Ruffed Grouse, but grayish in tone instead of brown (see pl. 4). As with many other birds, the sunny, dry climate gives this lighter tone in marked contrast to the dark brownish bird of the Atlantic slope and the still richer, even reddish shade of the humid Pacific coast bird. As in the case of the Richardson Grouse, we are here on the borders of the range of the Gray Ruffed Grouse, and many Yellowstone individuals incline toward the Canadian Grouse, a more brownish northern form. Due to its absolute protection the Yellowstone grouse exhibit traits not common to the much-hunted birds elsewhere. Neither the Richardson nor the Ruffed Grouse is very abundant here; for nesting and living as they do largely on the ground they are peculiarly subject to attack by coyote, wolf, and rarer fox, and the whole group of small fur-bearing animals that also thrive under the protection given to all wild life. Like their eastern congeners, these grouse are drummers. During early mornings in April this remarkable rolling drum-call resounds from its stand on some fallen log in a thicket of firs or pines. It is produced by the rapid beat of the wings against the air, not striking anything, nor can it be proven that the log has anything to do with the performance beyond affording a convenient

platform. (Cf. Sawyer, *Roosevelt Wild Life Bull.*, Vol. 1, No. 3, pp. 355-384, for an excellent account of the drumming of the eastern Ruffed Grouse.) This drumming, remarkable as it is, is not the only form of courtship; there is also a series of circling, pirouetting, and strutting movements which remind one very forcibly of the barnyard turkey cock. With head thrown back, chest out, ruffs raised to their fullest, and tail erect and spread out fan-shape, the little gallant steps proudly about. The female is usually perched on a limb a few feet above, watching the performance. One would assume that after such ardent courtship the cock would make a model father of the family. But, alas! soon after his mate is won he practically deserts her. It is even said that he is a polygamist and that the hen must hide her nest from him; whether this is true or not, certain it is that the nest is well hidden. There is not much attention to nest building as that term is understood in reference to songbirds. Such a proceeding would perhaps destroy the naturalness of the surroundings. A Ruffed Grouse locates her nest at the foot of a tree amid the dead leaves; and here she makes a bowl-shaped cavity capable of holding the dozen or more eggs that constitute a clutch. The eggs are buff colored, speckled with darker brown. The young are hatched between mid-June and mid-July, and are covered with yellow down and able to run as soon as they leave the shell. It is astonishing at what an early age these fluffy little chicks can fly, when no bigger than a man's fist; and while they fly but a short distance, it is practically impossible to find them again. Their skill in finding secure hiding places is marvellous; they disappear as if by magic on ground that seems absolutely devoid of cover. It is necessary that they be able to run at birth, fly at an early age, and be cunning hidiers, if they are to survive at all. Even as it is the lessened September flocks show all too plainly the dangers that have beset them and taken toll.

Throughout the eastern states the Ruffed Grouse is noted for the skill with which the mother simulates a broken wing and leads an intruder far from her brood with promise of easy capture; here in the Yellowstone she does not make so much use of this ruse. Can this be the result of the protection afforded, or is it to be otherwise accounted for? The absence of hunters here certainly make this fine game bird very tame at times. Camping parties often see pretty little broods of grouse; and although they seem to be perfectly fearless yet it is quite evident that the mother is always on the lookout. Well she knows that a hundred dangers threaten and that, if

she would save her chicks, she must be watchful. After the youngsters are big enough to look after themselves this caution is relaxed, and the birds are comparatively unsuspicious. Then they roam through the forest, stepping along very daintily with head and neck down, hunting for the insects and berries on which they feast. Any unusual sight excites their great curiosity. Let an observer be seen or heard and instantly they become motionless. If the intruder also remains motionless, before long a neck will be craned, and then a head turned for a glance first from one eye then from the other, until little by little the "frozen" birds come to life. Still curious, they circle slowly about the stranger, stopping sometimes to catch a bug or to climb a log for a better view. If not satisfied, they will return time and again for another look as long as the intruder does not move; but when he does move they are off in a hurry, taking to wing if badly scared. Although rapid runners and able to get away quickly through the underbrush, they are much more apt to fly, owing to the fact that most of their enemies are four-footed prowlers.

While the grouse has so many enemies on the ground, there is one that threatens from above even in the heaviest timber—the Western Horned Owl (fig. 39). An owl's activities are not wholly restricted to the night; in fact he is often out hunting when the sun is high in the heavens. This Great Horned Owl is the commonest owl in the Park, found especially in the heavy growth of timber west of the formation at Mammoth Hot Springs, from which he frequently comes down to the terraces in search of rabbits. While he does catch grouse, as a rule where rodents are numerous he confines himself largely to them. He sometimes leaves the heavy forest in the evening to hunt his prey across such large, upland prairies as the Hayden and Blacktail valleys. The Western Horned Owl nests at an early date, the first egg being laid late in March. Old Red-tail Hawks' nests are sometimes utilized, but often a nook under an overhanging ledge is selected instead. So far as known only one brood is raised, so the early nesting is evidently not in preparation for a second brood.

Another owl that inhabits the fir forests is at the other extreme in size; it is the Pygmy Owl, so small that its measurements closely duplicate those of the Bluebird! Not much is known of its habits, although it is quite frequently seen in winter perched at the tip of a tree, getting the benefit of what little warmth the sun affords. The flight of this little owl is not at all owl-like but resembles that of the Sparrow Hawk.

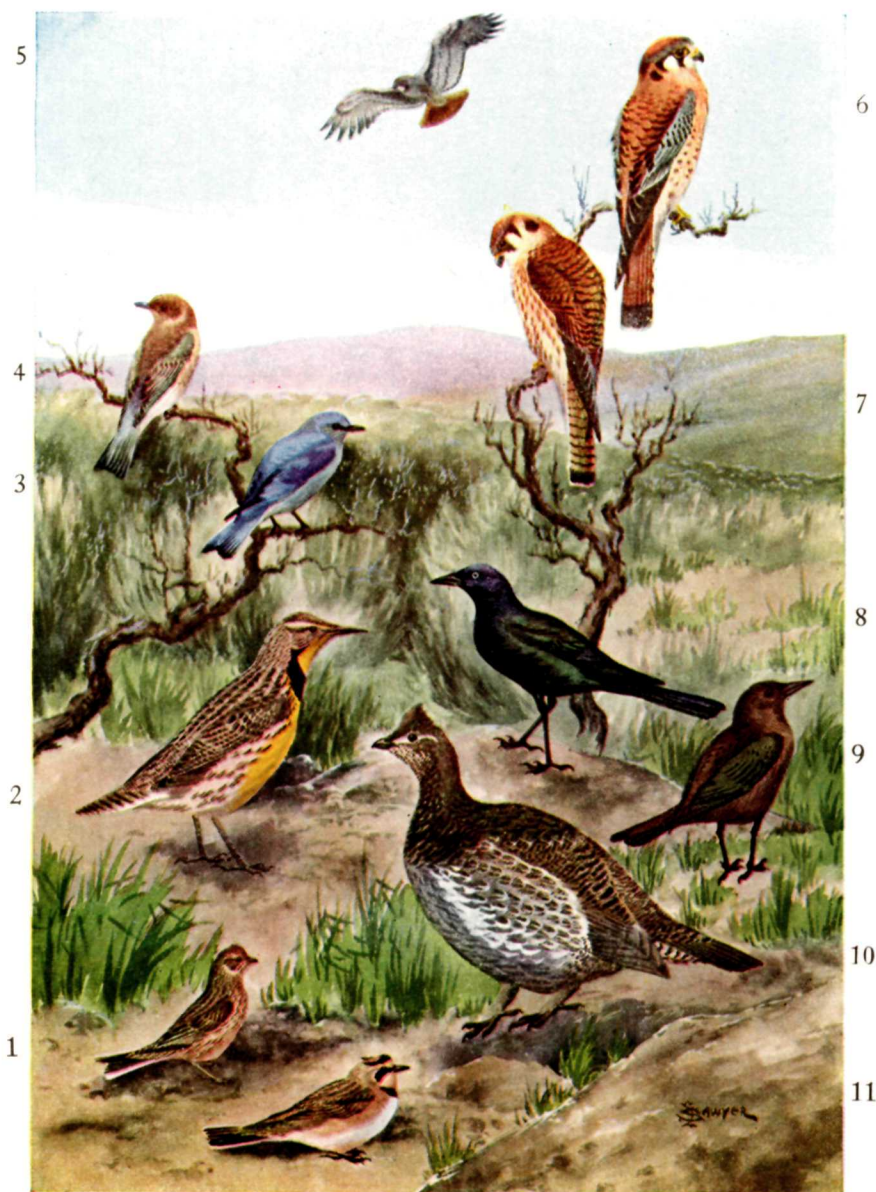


## THE BIRDS OF THE OPEN COUNTRY AND ITS SMALL PONDS

The whole northern section of the Park, including the lower valley of the Gardiner River, the valley of the Yellowstone below Tower Fall, and the valley of the Lamar below Cache Creek, is largely a great stretch of open country lying below 7000 feet; while the northern slopes of Mt. Washburn, the upper valley of the Gardiner, the valley of Nez Percé (including the Lower Geyser Basin), the Hayden Valley, and the valley of Pelican Creek, make up a series of open, prairie-like uplands surrounded by forest, having an average elevation of 7000 to 8000 feet. These two sections of open country differ from each other not only in elevation, but also in the resulting fauna and flora. The lower section is largely covered with sagebrush and is hotter and somewhat drier, while the higher land is covered by a heavy growth of alpine grasses able to resist the frequent frosts.

The open ranges are extremely important to the animals of the Park, who find their grazing there during nine months of the year. The remaining three months coincide exactly with the tourist season when they retire before the heat and annoying flies to the higher mountains. But some birds are *attracted* by the flies, and many species find these open, grassy stretches especially to their liking. Plate 3 shows several of the commoner birds of the open country. Most of the range is well watered by springs and streams; in the spring it is green and fresh, but towards fall, especially on the lower, hotter levels, it becomes dry and brown. Where there is water the surface is dotted with groves of the various trees that go to make up the Park forest.

The most notable bird of the open is the Meadowlark, a minstrel who should not be passed without the full attention he merits. He is equally at home on the flats near the northern entrance at an altitude of 5300 and up in Hayden Valley at 8000 feet. He delivers his song from almost any perch although at times he appears to prefer a fence post or a bush about four feet high. On one occasion I saw a Meadowlark, bubbling over with song, mount to the very top of the tallest tree in sight, an aspen full forty feet high. A cliff a short distance away gave a ringing echo to his song, and there he perched and sang repeatedly, seeming vastly pleased with the very musical disturbance he was creating. Another lark, intending to fly to a fence post to sing, somehow missed his perch, but he was



*Drawn by Edmund J. Sawyer*

### PLATE 3. BIRDS OF THE OPEN COUNTRY

- |   |  |
|---|--|
| 1: Western Vesper Sparrow.              | 6, 7: Sparrow Hawk (male, female).     |
| 2: Western Meadowlark.                  | 8, 9: Brewer Blackbird (male, female). |
| 3, 4: Mountain Bluebird (male, female). | 10: Richardson Grouse.                 |
| 5: Western Red-tailed Hawk.             | 11: Desert Horned Lark.                |

(All figures  $\frac{1}{6}$  life size)

so near bursting with his song that he just dropped to the ground singing melodiously and uncontrollably. The next day a Meadowlark sang while flying, but I must admit that he did much better after he perched in a low cedar. No other bird in the Park gets up so many apparent duets with other species as this one. It is not so surprising to hear a Meadowlark's song giving way to that of a Robin, as they are both persistent singers and occupy the same kind of country; but it is strange to hear the clear fluting of the lark followed by the "wreech-i-ty, wreech-i-ty, wreech-i-ty" of the Western Yellow-throat. Sometimes the other member in the duet is a Song Sparrow, and again the Sparrow mingles his song with that of the Robin.

Many of the Park songsters are so persistent that they sing even during frequent spring showers, but their ardor does seem to be somewhat dampened. The Water Ouzel, the Townsend Solitaire, and the Chickadee sing throughout the winter. The Bluebird and Robin take up their music during late March, and the rest of the songsters join in as they arrive from their southern homes. The chorus reaches its maximum in late May and early June, continuing with little loss of volume until July 10, after which it declines until about July 25, when all are quiet but the Song Sparrow, who continues a week longer. There is also a short song period indulged in by some birds in September.

One of the most interesting features of the open country is its ponds, which attract a surprising variety of waterfowl. The two most commonly seen are the Coot and the Baldpate. The Coots come in April as soon as the ice has disappeared from their favorite ponds, sometimes arriving when only a fringe of water is to be found about the edge of the ice. They breed in a small tule-bordered pond near Junction Butte in the Lamar valley and remain until driven out by freezing October weather (see fig. 40). This small alkaline pond has attractions for many other species also. During the migrations there is no better point in the Park to observe the wild-fowl, except of course the birds of more extensive open waters like the Yellowstone Lake and River. In spite of the pond being small, a great variety of birds stop in passing; Canada Geese are often there; it is one of the earliest haunts of the Killdeer; the Great Blue Heron is frequently seen standing on its shore; and Wilson Snipe stop to feed along its muddy shallows. At its eastern end is a small patch of stunted willows where I always find a few nests of the handsome Yellow-headed Blackbird. But while it has

many transient visitors this pond seems the peculiar property of the Coot, as it is the only place in the Yellowstone where it is found in considerable numbers.

The Baldpate comes to this pond and so does the Red-head Duck; if you could get the latter's opinion, he would no doubt tell you that the Coot and the Baldpate could well be dispensed with. There are some particularly succulent plants growing in the bottom of the pond; the Red-head gets them by diving; the Coot and the Baldpate either cannot dive far enough or are too lazy to. But they like those plants too; so they lie in wait and as the Red-head comes up, they snatch the tidbit from his bill before he can swallow it himself!

Though acting the part of a robber, the Baldpate is a nervous duck of the small ponds and sloughs. In the water, when alarmed, and also in flight it gives utterance to a very shorebird-like whistle. When alighting it exhibits other shorebird-like ways, turning so that the white belly can be seen first from one side, then from the other, and seeming to fall into the water instead of gliding along the surface as the Mallard does.

The most conspicuous birds of the open are the hawks. The Swainson Hawks are the most numerous, and fortunately so, for without their help the Park would soon be overrun with mice, moles and ground squirrels. Sometimes there is a plague of locusts or of grasshoppers, and the larger birds are drawn to the feast from far and near. From all the country surrounding, the Swainsons collect in flocks and it is a strange sight to see these lonely birds of the sky feeding on the ground, dashing here and there, catching grasshoppers like a flock of turkeys. This species is so tame that it often affords good opportunities to the bird student. So scarce are the other large hawks, except the Western Red-tail, that one cannot go far wrong to call every large hawk seen, a Swainson, unless he has plainly the diagnostic chestnut tail of the Red-tail, its near relative. The latter is somewhat the larger of the two and is not quite so plentiful. Both have similar nesting habits. Normally the nests of these big hawks are placed in high trees; but where such trees are scarce, convenient ledges are selected upon the face of some inaccessible cliff. The nest of the Swainson is built of sagebrush and coarse sticks, lined with leaves and bark, and is occupied year after year.

The Red-tail is more truculent than the Swainson, and often fights with his fellows; and, in turn, he affords a shining mark for sportive Nutcrackers. But it is the Crow, strange to say, that has

taken it upon himself to actually resent the presence of the Red-tail. Apparently each large land bird has his own regulator, as it were, to keep him in order. The Red-tail has the Nutcrackers and Crows to look after him; the Eagle has the Ravens; and the Raven has the Brewer Blackbirds. The chief of this crew of tormentors, the Kingbird, is so seldom seen in the Park that I have not learned what his preference might be. The Red-tail has an interesting habit, noted sometimes in the Nutcracker, of descending from a height by a series of plunges, each plunge being made with closed wings and at marvellous speed. Sometimes the hawk varies this by letting his wings open in such a way as to carry him up at an angle to almost the height he started from; then another such plunge and recovery; and this is repeated again and again until the bird has passed out of sight in an undulating flight of great variations. This suggests an interesting question. In pouncing upon their prey, hawks descend from great heights at tremendous speed. What prevents them from being dashed to pieces as they reach the ground? Perhaps they are able to slacken their speed at the last moment. But in the case of the Osprey, plunging into lake or stream, the swoop is made with such unchecked force that a fountain of water leaps up behind him.

The Rough-legged Hawk is another hawk of the open; but he is a winter bird, seldom arriving before the latter part of September and departing as soon as the first melting weather of spring. The Rough-leg, beating across the desolate, wintry meadows and prairies in search of mice or other rodents, compels attention when other birds are scarce.

In summer, it is the sociable reddish brown and blue Sparrow Hawk which attracts most attention. Always conspicuous when perched on a telephone pole or other elevation (fig. 38), he is still more noticeable when he hovers at one point in mid-air for minutes at a time before swooping down on some luckless mouse or grasshopper. More interesting yet is his habit of swooping in a series of steps. Starting at a height of say fifty feet he drops perhaps eight feet; hovers a minute or two, then drops another eight feet; hovers and drops again; and so on till his position is just right for a quick dart to capture his quarry. He seldom misses. Like the larger rapacious birds he finds enough prey of other kinds in the Park so there is no reason to disturb the small birds that are his neighbors. On a sultry summer afternoon, the "killy, killy, killy" cry of this small hawk is often the only sign of life. Fond of com-

panions, the Sparrow Hawk is often one of a group seen about a favorite hunting ground. Exemplary in his domestic habits, he is believed to mate for life and to return to the same nest in an old woodpecker hole year after year. The male does his full share in brooding the eggs and feeding the young.

The Prairie Falcon is another of the small hawks which beat across the open country, but he comes from a nest on a cliff, hunts larger prey, and is not so often seen as the Sparrow Hawk. The Short-eared Owl is also a bird of the open, hunting mostly at night and hiding by day in the brush or the tall grass where he sometimes nests. Another hunter of the open lands, although not strictly a raptorial bird, is the Northern Shrike with his gray plumage marked by black and white. As he appears in October and remains until April, the abundant mice and (during the warmer part of his stay) grasshoppers make up the bulk of his food, which tends to protect the smaller birds from this killer. When present, the Shrike is a striking addition to the landscape, for he spends most of his time perched on some commanding point from which he can sight his prey.

From the sunny hillside just below Mammoth where clumps of low bushes dot the open spaces, all the way to the Gardiner entrance, the Western Yellow-throat finds congenial shelter. Should the visitor be present during the song season, he can hardly overlook these birds, for their insistent song will force itself on his attention. The elevation of the Park is a little too great for this warbler of the lowlands and he must make the best he can of the section below 6000 feet. He is a restless, nervous fellow, clambering among the reeds and bushes in his never-ending search for the tiny insects that are his food. Only when he is singing, or when an intruder attracts his attention, does he pause in his strenuous hunt for food. In addition to his regular song, he has a flight song uttered towards evening; and both he and his mate have a distinct little alarm note. The nest is made of grass and leaves placed on the ground, or at least very close to it, and is lined with finer materials such as hair and rootlets. Three or four white eggs with brown spots about the larger end are laid early in June. The female is quietly dressed and so retiring that she is hard to find; she attends strictly to the care of her home. While she discreetly keeps under cover, her mate plays his part of the game. Go too near the nest and he will move off just slowly enough to encourage you to follow after and be led a merry chase.





*Photo by R. B. Rockwell*

Fig. 38. The Sparrow Hawks are small and handsomely mottled. They commonly select conspicuous perches along the roads, and as they are not molested in the Park, soon become very bold.



*Photo by R. B. Rockwell*

Fig. 39. A juvenile Western Horned Owl. This owl nests so early in the year that the eggs are sometimes frozen during a temporary absence of the brooding parent.



In striking contrast to the Yellow-throat is the Desert Horned Lark, its black head and chest marks alone serving to distinguish it from the soil it stands on (see pl. 3); shy of intruders, with a song that is seldom heard, this attractive bird is as much at home upon the high, grassy plateaus or bare slopes as its brother and sister larks on the burning sagebrush flats below. About the first of March, as soon as patches of bare ground begin to show through the melting snow, flocks of larks are to be seen running nimbly about; or else sitting fluffed up in the shelter of a rock taking a nap in the warm sunlight. If you approach too close, they are up and away, each one uttering a series of silvery "cheeps" that sound good to a winter-weary ear. After flying in zigzag flight for a hundred feet or so, they wheel and return almost to their starting place; then settle down and immediately go to gleaning grass and weed seeds again. In summer they are wilder and fly farther, often forgetting to come back at all. Always true ground birds, whether on the cool heights of Specimen Ridge, or the much warmer valleys below, they decline to mount a bush even when they wish to sing; though one may climb a pile of dirt to utter a soft little ditty, or even hop upon a stone a few inches high and sing from there. On the wing, however, they sing a sweet, stirring love song; often mounting up until the song comes drifting softly back from an unseen musician. But as you gaze upward, the little minstrel comes shooting down with wings half folded and tail held up to serve as rudder. Nearing the ground he catches himself and comes to rest beside his mate as lightly as a bit of down. Although the larks are fairly abundant, breeding on the high grassy plateaus, a nest is seldom found for the good reason that it may be placed anywhere upon the ground within an area of thousands of acres with absolutely nothing to guide one to the site. Trusting to her protective coloring the invisible little mother stays quietly on her nest although an intruder may be only a few feet away. As if to contribute their mite towards concealment, the nestlings leave the nest while very young.

The Western Vesper Sparrow, who has a brown striped back and white outer tail feathers (see pl. 3), is the sparrow of the open flats and uplands, outnumbering all other birds of this habitat. Throughout most of the northern section of the Park he is everywhere present, and it is difficult indeed to cross any of the sagebrush covered flats without finding him running along the ground ahead of you. This sparrow arrives early in April and remains

until October unless driven out earlier by very cold weather. Like the Horned Lark, the Vesper Sparrow is found not only on the hot sagebrush flats but also in the larger of the mountain valleys. As the 8000-foot level is approached the Vespers give way to the Savannah Sparrows in the grassy parks and to the Lincoln Sparrows in the brushy tracts.

In the lower parts of the open country, Crows are sometimes seen, only one or two at a time, or occasionally in small flocks; for they are not plentiful and never gather in the large flocks to which easterners are accustomed. The largest flock ever reported numbered sixty-seven and these were migrating, flying south over Mammoth. Another bird common on eastern farms but very rare here is the Cowbird. In the old days the constant companionship between this bird and the buffalo gave rise to the legend that the birds built their nests in the shaggy hair between the horns of a buffalo. When brought to book on this statement, the westerner would always reply, "Well, you never found a nest anywhere else." For I am sorry to say that the Cowbird lays her eggs in other birds' nests in this region as well as throughout the rest of the country. Here, the Cowbird associates with the horses, and on the Buffalo Ranch it has once more become the "buffalo bird." An amusing story is told of one "dude" on his first camping trip. He had found it too cold to get up and had stayed in his blankets until after sunrise. He came out to the fire rubbing his eyes. "Say, what did you leave that can on the horse's back for?" he demanded. The guide was rather startled for a moment as he hadn't rested easy the night before, fearing that the horses might roll on some of the old rusty cans lying about; but a glance at the horse set him laughing. There was a Cowbird perched on its withers keeping his feet warm. Another joke that the Cowbird gave rise to: A horseback party traveling along the Tower Fall road was followed for several miles by a small flock of Cowbirds that time and again flew up and alighted in the road among the horses. Every time they came flying up from behind, one of the ladies asked what they were. On being told that they were buffalo birds who lived on the buffalo's head with their nests between the horns, she exclaimed, "Why, there are lots of them! And I don't see any buffalo either!"

## THE BIRDS OF THE BROOKS AND RIVERS

The attractiveness of the Yellowstone scenery is due mainly to its high lakes and swift streams fed from mountain snows. Where would be the beauty of the rapids and waterfalls without an abundance of water? Would the wild flowers be as fresh and sweet without abundant water, or the birds and animals as numerous? What would Yellowstone Lake be like without frequent rains, or the perennial flow from deep snows back in the high ranges? Would there have been a Yellowstone Canyon without a powerful stream to cut it? Would it be half as attractive without the lofty waterfalls at its head and the magnificent river at its bottom? Would the forests be as attractive without copious rains? What, oh dusty tourist, would be your condition if there was too little water to sprinkle the roads once a day?

Yellowstone Park is on the continental divide; its important streams flow down in all directions toward the thirsty plains. The Yellowstone River itself rises in a high mountain basin outside the present boundary of the Park but flows through it by way of Yellowstone Lake, and is joined within the Park by many good-sized streams. At the northern boundary it receives the water of the Gardiner River gathered from many square miles of the northern section. The Gallatin River flows through and drains the north-western corner of the Park. The Madison collects through its branches the waters of the whole central part, and with the Gallatin makes two of the three streams forming the Missouri. The Snake River drains the southern parts of the Park and is an important part of the Columbia River system. So there are three great rivers receiving a large part of their waters within the Park; and in addition there are many important tributary streams and legions of brooks and springs.

So many streams born in such a limited space cannot fail to have considerable influence upon the Park bird life. They bring many striking and beautiful species to Yellowstone Lake and Yellowstone River, as we have already seen, either because of the presence of the water itself, or because of the abundant insect, fish and vegetable food provided. Indeed, it is believed to be the food supply, mainly, that decides birds in their choice of homes. Of course they require suitable nesting sites; but without an unfailing food supply for the young, they will not nest, no matter how good the sites. The streams promote the growth of bushes and other vegetation along

their courses, providing good nesting sites and food for avian vegetarians, and breeding grounds and food for many of the insect eaters. They also furnish conditions for forming meadows, to the delight of the meadow-haunting birds. A characteristic group of the birds of the upper woodland streams is shown in plate 4.

The birds which make direct use of the brooks and rivers are those ducks and geese that prefer the smaller waters to the broad expanse of Yellowstone Lake, together with the Spotted Sandpiper, the Kingfisher, and the Water Ouzel. Ospreys, California Gulls, and even Bald Eagles frequently forsake the Lake to hunt along the larger streams, but it is the blue and white crested Kingfisher who really is most at home there. Not only does the abundant supply of trout attract large numbers of these interesting birds in summer, but it holds some of them all winter along the streams kept open by warm springs. So often do we see this bird flying from tree to tree along a brook and uttering his harsh, rattling call, that we invariably think of him as noisy; yet there is a period during July and early August when the parents are noticeably quiet. Throughout well-settled regions, the Kingfishers retire before the advance of civilization. This is apparently not because the birds shun human beings, for about well-known summer resorts they are apt to be plentiful if fish are numerous and the streams unpolluted. Here in the Yellowstone it happens that there are more Kingfishers on the streams along which the tourist routes run than elsewhere. For several years there has been a nest near the Riverside Geyser, one of the most frequented spots of that popular section, the Upper Geyser Basin. The people waiting to see the geyser play can meanwhile watch the birds fly back and forth, do their fishing and feed their young. Sometimes the Kingfisher goes so far up a trout stream that he finds the timber interfering with his diving; still, he does the best he can and seems able to get his fish by simply dropping on it even from a height of not more than three feet.

To an eastern bird student, the Dipper is a great discovery, so new and strange a bird that every meeting with him excites surprise and admiration at his unique ways. A singing, perching bird that lives in the water even more than a duck does, and that performs submarine feats which the majority of shorebirds cannot approach, amuses and fascinates us. Though spending his life in the water, his waterproof suit keeps him so dry he seems to consider a bath necessary every morning or oftener. He takes it differently from other birds. Making a flying start, he sticks his head down and

scoots along the surface with the water flying all over him; then he flies up and repeats the performance. When he has had enough of the plunge bath he goes ashore, stands in the shallow water up to his belly and flutters and shakes himself, getting a regular bird bath in addition. Then he wades out on a rock, shakes himself still more, and preens his feathers. Nor does this little fellow follow the prescribed style when he alights at the end of a flight. Instead of alighting on land he is more apt to alight in the water and then climb up on the desired rock. At times the Ouzel is seen on the surface of a small pond. After sitting quietly for a few minutes, he plunges forward and down, often to a depth of fifteen feet. When he returns to the surface he comes up with a rush that throws the spray all about and even carries him above the surface. He is a solitary little chap except during the nesting season, and even the youngsters when they leave the nest about the first of July separate, each one thereafter fending for himself. Apparently each pair of birds "stake their claim" to a certain section of the stream; interlopers are chased far beyond its limits.

But however interesting the Kingfisher and the Dipper are, it is the Spotted Sandpiper that makes the streams really lively. It is the same Spotted Sandpiper known to every farmer boy as the "tip-up." Many a different bird is given the credit for arousing a latent interest and starting a budding ornithologist, but where is the country boy who hasn't commenced his hunting by sneaking up on a Sandpiper with nerves a-tingle and the old family musket held ready? As a teacher of bird lore the "teeter snipe" (another of its local names) vies with the Grebe, or Water-witch. We imagine we hear the old question: "How does the teeter fly without moving his wings?" It is useless to say that the wings beat the same as those of other birds, only moving so fast they cannot be seen. The youthful inquirer was never satisfied with this, he was sure *he* could see them move if he only watched carefully enough. Behold the ornithologist in embryo! What are any of us doing, but trying to see the birds do something nobody else has seen yet!

Truly the Sandpiper takes advantage of every opportunity for a suitable abode; one finds the hot lower levels just the home he wants, while according to his brother's notion the streams and ponds high up in the mountain meadows at 9000 feet are the "choicest lots." He never pretends to be a singer, but his ringing "peet-weet" is a cheery sound and a very familiar one. Even his name brings up in our mind a fresh, clean mountain meadow with a pair of trim

little gray birds bowing and courtesying to each other and — “peet-weet, peet-weet, peet-weet,” which it is easy to imagine is the sandpiper expression for “all’s well.”

As a harbinger of spring the Sandpiper has the confidence of the mountain people. He does not come in March and then sit around a month or so disconsolately, wishing he was back south; when he arrives in mid-May, his human friends know it’s time to put away snow shovels and get out the fly screens. No disconsolate sitting about for him; he is all business just as soon as he arrives. He finds him a mate and begins housekeeping with a nest under a clump of grass; perhaps merely a slight hollow lined with a little grass and a few leaves on which are laid four large, olive-drab eggs, spotted with brown and purplish. The youngsters are hatched early in July, are covered with down, and can run (and swim if accident takes them into the water) about as soon as they are dry. I said “run” advisedly, for if you get curious and want to run one down, you have a surprise coming to you. They can make those little legs of theirs go so fast that you will give up the chase long before they are even distressed; and if you corner them, they enter the water without hesitation and swim buoyantly off, leaving you gazing after in open-mouthed astonishment.

The Sandpiper picks up his insect food from the mud and sand bars, or gleans it from the water surface; and no doubt collects toll from the meadow grass whenever he threads his way through it. To my surprise I once saw one catch a fly on the wing. From the sandy beach he jumped up into the air about five feet, caught the passing gnat, and returned to the beach just as if he had been doing such stunts all his life!

Many other birds dwell or forage along the streams, especially those that favor more or less brushy places. Among them is the Catbird. The mountains are too high, and perhaps too cold for him, but along the Gardiner River below 5600 feet he finds the conditions he likes, and his mate builds her nest in the willow bushes and raises a brood of young ones. The Tree Sparrows come here as true migrants, tarrying in the Park only for a short time in February and March, and again in September and October; but when they are present, they will be found in the birches and alders about some spring-fed rivulet or brook.

But while all these birds, except the Dipper, live along the banks of the streams, there are others that live on the surface. Notable among them is the Eared Grebe, he of the high black crest and

tawny cheeks, who, like the Dipper, is an expert diver. But the Grebe is a genuine water bird, unable to walk on land, and builds a floating nest in quiet, marshy shallows (fig. 42). Though frequently seen he is not so abundant as to make him appear commonplace. He is a summer resident only, arriving in May as soon as the ice is out of the small ponds which he loves, and remaining on them until October. As they often inhabit streams close beside the Park roads, these attractive divers become so tame as to permit much closer study than can be had elsewhere.

With the Grebe, or at least on the same waters, is sure to be found the Green-winged Teal; which also undoubtedly breeds here, and which often remains all winter in the open streams. He is almost the smallest of our ducks, but far from being the least noticeable. It is true that he does not have the resplendent plumage of the Wood Duck; but his natty suit of brown, black, green, white and buff always looks clean and refreshing (pl. 2). He is a dainty though voracious feeder on the juiciest of water plants and it is small wonder that he has the reputation of being always fat and of most delicious flavor. Since he likes the same food and the same resting and sleeping places, he is often found with the Mallard. The Green-wing Teal has various call notes; the ordinary alarm is a "quack, quack," quite similar to that of the Mallard, while the call note of the male is a whistle-like "greep, greep!" When flying or when resting quietly, these little ducks keep up an almost incessant chatter amongst themselves. Like the Mallard, Pintail, Shoveler, and most other river ducks, the Teal spends considerable time on shore, basking in the sun, preening and sleeping.

On the other hand the Golden-eye is seldom seen standing on anything; yet the nest is usually made inside a hollow tree. The common American Golden-eye, with the round white spot at the base of the male's bill, is here from October to April; while the few Barrow Golden-eyes (with crescent-shaped white face patch), staying all winter, are greatly reinforced in April so that a goodly number remain to breed.

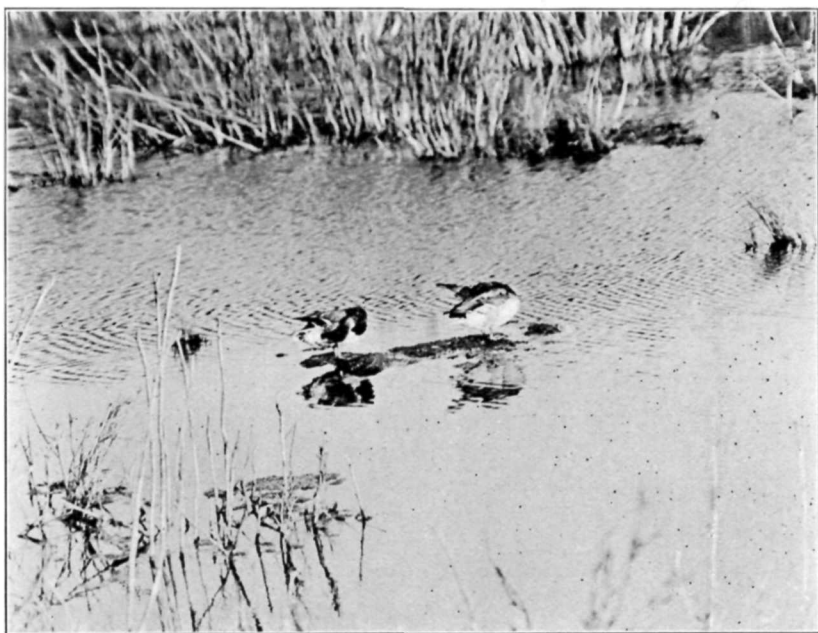
The Harlequin is a rare duck here, but that is true of him everywhere except in the far North. He is a lover of the swift water and has been seen only on the rapids of a few of our largest streams. Little is known about the Harlequin; but he is believed to pair for life; certain it is that the drake has never been reported in the Yellowstone without his mate being near. They are not gregarious here, one or two couples being the most seen at one time. Appar-





*Photo by R. B. Rockwell*

Fig. 40. Nest, eggs and young of an American Coot. The fuzzy, black youngsters do not usually number more than three to the brood, although there may be as many as six eggs.



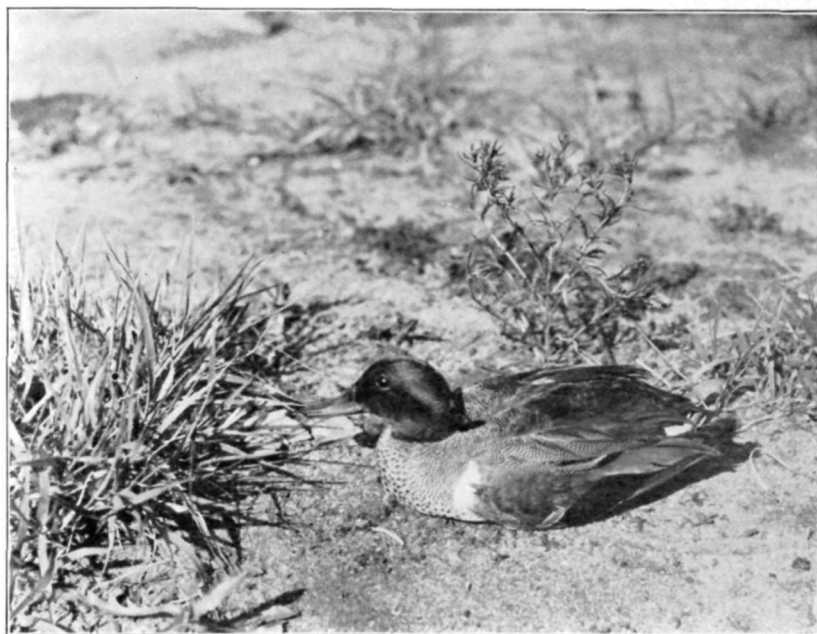
*Photo by M. P. Skinner*

Fig. 41. Mallard drakes preening on a small mud island in a beaver pond near Lava Creek. For years the Mallards have nested in this beaver pond beside the Park highway.



*Photo by R. B. Rockwell*

Fig. 42. The floating nest and eggs of the American Eared Grebe. This is the only grebe at all common in Yellowstone Park, and the only one found nesting there as yet.



*Photo by R. B. Rockwell*

Fig. 43. The Green-winged Teal. This beautifully mottled bird is the smallest of the ducks found in the Park.

ently the swift mountain streams afford them endless enjoyment; they are seldom quiet, and are most often seen on rapid water, letting the swift current carry them down. When they have gone far enough, they fly back upstream to enjoy another coast downward; and this play is kept up for hours at a time. The excessive rarity of this handsome duck, together with the fact that little is known of his habits, makes the sight of him a red-letter occurrence.

Other ducks besides the Harlequins are found along the largest streams; the Madison especially being favored by Mallards and Mergansers. The Mallards resort to a stretch of the Madison where the beaver have formed a series of channels across an aspen meadow. To this attractive place come the teal and the Wood Duck, now one of our greatest rarities.

But it is not only ducks that come to the Madison valley. The banks of this river are noted for the number and variety of its feathered visitors. While a few species do not reach so high an altitude, there is no other place in the Park that approaches this in avian resources; and it is an important gateway for the migratory birds to the central and western parts of the Park.

The migration routes through the Yellowstone are very complicated. In common with all mountain sections, there is a two-fold migration; the regular north and south movement, and a movement up and down the mountains. The great majority of the larger, bolder birds move in true north and south direction. Some of the hardier species, such as the Nutcracker and the Dipper, simply move up and down the mountains as the seasons change. The Nutcracker changes his habitat from all elevations in summer to the sections below 7000 feet in winter, mainly on account of the food supply. The Dipper changes from the higher elevations of summer to the lower levels as the higher streams freeze and he is forced to seek an open stream where his favorite food can be had. But these movements are further complicated by the migration of the smaller, shyer species who pass up and down the river courses. As I have already noted, the rivers flow out of the Park in three widely different directions. The continental divide crosses the Park from the southeast corner to the west side, so that all birds going out by way of the Snake River are forced to cross it. And even those birds that go out the upper Yellowstone valley must cross the high passes of the Wind River and the Big Game ranges. Those birds that go out by way of the Madison also have to cross the continental divide, but they can do so by much lower passes than any within

the Park. It is quite probable that many of the earliest arrivals take the roundabout course of coming up either on the east or on the west until they strike the Yellowstone Valley to the north of us, and then follow it southward up into the Park.

So many of the migrants are night-flying species that it is difficult to ascertain their exact route. In the case of the early Robins, Bluebirds and Meadowlarks they are first noted at Livingston, Montana; they arrive a day or two later at the north boundary, and three or four days after that they are at Mammoth and the lower elevations throughout the northern part of the Park.

The Tree Swallows, which travel by day, arrive in the Jackson Lake region the latter part of April, move slowly up the Snake River to the southern boundary, and faster up the Lewis River to the head of Lewis Lake, where they cross over the continental divide to Yellowstone Lake. Then they pass along the west shore of the lake to the outlet, where they usually arrive between April 25 and May 10, according to the progress of the season. From this point the flight is slow, only a few miles a day, as they proceed down the Yellowstone River to their summer homes. Some of the Park Tree Swallows also come north to the west of the Teton Mountains and up the headwaters of the Snake River to Henry's Lake, where they cross the divide to the Madison at the west boundary. They arrive here about the same time that they do at Yellowstone Lake; and that portion of the birds going into the Yellowstone Park branch off and make their way slowly up the Madison River. The route via Henry's Lake is used by a great many birds summering along the Madison, and indeed all through the western part of Montana; but the Snake River-Yellowstone Lake route seems to be used only by Park birds.

Another route is via the Snake and Lewis Rivers to the headwaters of the Firehole River and then down. This route is used especially by the Brewer Blackbirds in the autumn migration. In July these blackbirds gather in flocks, but not until two months later does the migration start. Then they make their way up the Firehole River in small, compact flocks of from two to thirty birds, chattering together sociably and flying about twenty feet above the ground, although they will rise a hundred feet if necessary to clear an obstacle. With a speed a little swifter than usual, the flocks follow each other closely so that they may keep in line by sight. But should a flock get off the route, on discovering the fact it will wheel and return at once *to the line of flight* rather than toward the

flock ahead. When migrating, the Brewer Blackbirds fly during the afternoon, stopping during the morning to feed. At the height of the migration about a thousand birds pass a given point during each hour. The flight lasts several days; and as there are not many blackbirds resident in the Park, it is evident that they come largely from beyond the northern boundary. The line of flight lies up the Firehole to the Upper Geyser Basin; over Old Faithful Inn direct to the Lone Star Geyser; then up the Firehole a little farther; across a low ridge and down Shoshone Creek to Shoshone Lake; around the west end of Shoshone Lake and across to Lewis River, down which they fly to the Snake River and so on south to Jackson Lake. The main flight takes place in the middle of September, but many of the Park-bred birds remain in the Yellowstone three weeks longer.

There is also a small flight of Cliff Swallows along the blackbirds' route almost at the same time as the main blackbird flight, although the resident swallows leave two weeks earlier. Evidently these later birds, like the majority of the blackbirds, come from north of the Park.

### THE BIRDS OF BEAVER MEADOWS

If the Yellowstone plateau was covered by a uniform growth of forests, we would get but meager enjoyment from it. For no matter how much we like the forest, we do not want to be shut in by it. The numerous brooks and larger streams give beauty and variety and charm to the forest, while the beaver meadows afford a delightful setting for the streams and allow us space to form a proper perspective of the whole.

To the bird student the meadows are of special interest, both for their characteristic species and for the forest-loving birds that come here to nest and feed along the margins. Apparently the birds resemble us in liking forests, but do not care for too much of them. Many of the birds found along the brooks and rivers are of course to be found frequenting the meadows also, but the characteristic meadow birds differ somewhat from those of the open. In a general way the open country, except on steep slopes, is but a series of larger and more diversified meadows; still, the low meadows are damper, and I believe this accounts for the differing fauna. Generally speaking, the seed-eating birds are in the broad, open lands, while the insect catchers take to the meadows and the neighboring forest margins.

The meadows are everywhere along the streams and even about springs high up on the mountains. Many of them are the result of former beaver ponds. When a stream first starts, it cuts its way down until it has formed a gully with more or less sloping sides. The beaver find this gully and throw their dams across it at favorable points, forming ponds and small lakes. The silt and débris brought down from above collect in the beaver pond and settle to the bottom. Should the beavers' staple food — quaking aspen and willow — grow scanty after a few years, they will desert this site for another. The dam thus left neglected will stand for awhile but eventually will go to pieces, allowing the water to drain out and leaving behind several years' accumulation of silt. Where the food supply was soon exhausted, this deposit will be shallow; but in cases where the food was more ample, the beaver will have stayed through many generations and the deposit will be heavy. This silted deposit is rich, and in a short time after being drained will become covered with a luxuriant growth of grasses, and the meadow stage has begun. It is still too wet for trees, and for many years it will remain open, but finally willows will get a foothold. Some of the ponds were formed in times remote, even as far back as the glacial epoch. Swan Lake Basin represents the remains of such a lake, of which the present pond is but a remnant.

Ducks, geese and shorebirds are found about the meadows; with few exceptions all of those that prefer the streams to other habitats will pick out the sections where the streams are meadow bordered. The broad, open meadows therefore afford an excellent opportunity to note such of the wild-fowl as are apt to seek these haunts to preen and sun themselves. Especially so for Mallards and Geese. Strange to relate, often the Geese are comparatively tame while the Mallards are wild. Of course these are birds of passage not used to taking advantage of the Park protection. But why such a difference? The Geese are much more wary elsewhere. Must we give them credit for sensing conditions sooner than the Mallards? True, birds and mammals both exhibit a wonderfully quick perception of protection given them.

One of the most beautiful ducks of the meadow, the Sprig or Pintail, is never found in the Park except in the small ponds of wide open meadows and prairies. The Wood Duck and the Green-winged Teal are conceded to be the two handsomest of American ducks, in so far as rich coloring goes; but the Pintail's is a beauty equally dependent on grace of form and carriage. Not that it lacks

beautiful plumage, but the softly blended browns and grays are simply appropriate to such a graceful bird. His head is well formed and beautifully set upon a long, slender neck; his slim, graceful body is very different from the stumpy, squat affair that most ducks are blessed with; while his wings are narrow and his tail has several long plumes. As if to give point to all these beauties, the Pintail is possessed of dignity and stateliness. This handsome bird arrives early in the spring; the very first of the strictly migratory ducks to appear in March. When feeding along the edge of the small, sedgy ponds that he prefers, with his long neck thrust under the surface, he can usually reach what he needs; but if the water gets a little deep he stands on his head to reach farther. Should the roots be deep down and resistant, his feet and legs vibrate frantically like paddle wheels.

The Great Blue Heron, who may sometimes be seen standing quietly beside some stream or pond hunting frogs, is the only member of the heron family to visit the Park, and he is here in numbers. Although he stays all through the summer from May to the middle of September, I have not yet succeeded in finding a nest. This heron usually chooses a lower elevation than the Park, at 5000 feet or less along the larger streams on the plains.

One of the great attractions of the beaver meadows, especially in May and June, is the morning concert given by Green-tailed Towhees, White-crowned Sparrows, Bluebirds and Robins, while Western Tanagers and various warblers fly about, lending color to the scene by flashing their yellow plumes in the air. In spite of their family name, few of the wood warblers are noted for their songs. True, they each have a song, but with most of them it is only a weak affair. Perhaps they have no leisure time to spare from their strenuous hunt for insects to develop a song. The great majority of warblers in the Park are Audubons; but as there are seven others listed, the chance of seeing a rarer one is good. Truly America is fortunate in having these dainty wood warblers for her own; and as if to show how richly blessed she is, there is one set comprising many species in the east, and another set in the mountains, while the Pacific coast has still others. We have only one warbler in the Park that is common to the east, the Yellow Warbler; so truly American that it breeds throughout the continent. But our Audubon Warbler (pl. 4) bears a close resemblance to the eastern Myrtle Warbler; our Western Yellow-throat is a sub-species of the Maryland Yellow-throat; and our Pileolated Warbler closely resembles



the Wilson Black-cap. The Townsend and Orange-crowned Warblers are western birds that have no eastern counterparts. The status of the Calaveras Warbler in the Yellowstone is hard to determine, as only the one specimen found dead in a gas cave has been recorded. The Orange-crowned Warbler is a low-level species, seen as yet only in the thickets along the lower Gardiner River. The Townsend Warbler frequents the firs near Mammoth and at lower altitudes; and he is very difficult to find in the dark conifer tops and equally hard to watch on account of his sprightly, nervous movements. The Audubon Warbler arrives early in May but the other warblers are strictly summer birds of June, July and August.

The Macgillivray Warbler is not numerous but may be met with anywhere in the meadows below 8000 feet. Doubtless it breeds here, although I have never found its nest. Mr. Edmund J. Sawyer informs me that he discovered a nest of the Macgillivray with two or three well-grown young, in a low bush at the edge of a brushy glade just back of Camp Roosevelt, in 1922. It is a very striking warbler with head, neck and breast covered as by an ashy hood. This little chap is either so curious that he must stick his head out of his leafy tangle to see who is there, or else he is so shy as to retreat until only his bill and one bright eye remain in sight. At any rate, about all that is seen of him is his face peering out as one passes by. Such an alluring glimpse cannot fail to set me hunting him up, but I seldom see any more of him.

The Audubon Warbler is an inhabitant of the edges of the forest, but he so often overlaps into the meadows that he is even more apt to be seen there than when hunting through the tree-tops.

The Yellow Warbler is rather scarce but it is the only warbler besides the Audubon and Macgillivray whose nest has been reported from the Park. The Yellow Warbler's nest is to be found along the Gardiner, placed in the willows and alders, usually built of grass and very prettily lined with cottonwood down, and contains about four dark, spotted, greenish eggs.

The Pileolated Warbler, the western form of the Wilson Warbler, is a beautiful little bird with his vivid yellow and green dress and his glossy black crown. Indeed it is that black cap which calls attention to him. The willows bordering mountain streams at any elevation up to 8000 feet are his favorite haunts; and although his nest has not yet been found by me the sight of a family of young ones near Obsidian Creek aroused suspicions that the nest had been somewhere near. The Pileolated does not care for the higher trees



*Drawn by Edmund J. Sawyer*

#### PLATE 4. BIRDS OF THE WOODED STREAMS

- |  |                           |
|--|---------------------------|
| 1: Gray Ruffed Grouse.                 | 6: Townsend Solitaire.    |
| 2, 3: Pink-sided Junco (male, female). | 7: Audubon Hermit Thrush. |
| 4, 5: Audubon Warbler (female, male).  | 8: Water Ouzel or Dipper. |

(All figures  $\frac{1}{6}$  life size)

as so many of his cousins do, but contents himself with flitting through the low brush. His motions are quick and he is continually on the go, though his confiding manners often lead him to stop and look up at you with a winsome side glance from under the black cap. As he makes his way through the brush, he runs up one twig and down another, searching always and everywhere for his prey. At times he bends over and gives a critical glance to the under side of a leaf, or even hovers before it, hummingbird fashion.

But hummingbirds themselves frequent these flowery mountain meadows. The West must give the palm to the East in the matter of warblers, but she is compensated by her sixteen species of hummingbirds against the single one of the East. To be sure most of these are natives of California and the Southwest; but in the Yellowstone there are three, the Rufous, the Calliope, and the Broad-tailed Hummingbird (fig. 10), but the last-named is very rare or accidental. None of them are common and you will be fortunate to see even one. The Rufous Hummingbird is foxy red with a fiery red, orange, or green throat, according as the light strikes it. He has been found occasionally in the Upper Geyser Basin. The tiny Calliope hummer is one of the smallest in America. He is a dainty little mite just three inches long, but when half of this is deducted for the bill and tail there really isn't much left. As yet he has been noticed only in the vicinity of Mammoth. The ways and habits of these hummers are very similar to those of the Ruby-throat of the East. They feed from flowers, are pugnacious to a degree, and are so bold and daring in their attacks on larger birds that they make us gasp with astonishment.

Another of the peculiarly interesting birds of the meadows, although very different in character from the warblers and hummers, is the Wilson Snipe. He is not abundant but is sometimes seen by a warm spring, particularly during migration; and may be found often on his choice feeding grounds among the beaver ponds. If when watching a woodpecker drilling for a grub, we have wondered if the food paid for the labor, what should we think of a Snipe? We read that he "probes for his food in the soft mud," which sounds like a very comfortable, easy way of getting one's living. But watch him at work and you will be quite ready to take off your hat to him. Selecting the edge of a pond he begins operations with strokes as rapid as a woodpecker's, delivered with the whole force of his body driving his two and a half-inch bill clear in up to his eye. If we compare a woodpecker with a carpenter driv-

ing a spike, then we must compare the snipe's stroke to that of a good axman who makes every ounce of his weight count. To watch a Snipe drilling is to see an expert putting all his power where it will tell. Nor is all of the work in the downward stroke, for the little fellow often drives so hard it requires all his strength to pull out his bill again. Working thus with great rapidity he covers a strip a foot wide and five feet long in an hour! When he is at work he gets something eatable every half dozen strokes or so, and he will sometimes work steadily for two hours or even three, and at the end, it seems safe to say, will have every worm and edible insect in the ground he has covered. No doubt it is this intensive gleaning that enables him to winter so far north. Here in the Yellowstone where twenty degrees below zero is common, he stays and gains a good living from a few square feet of soft ground near a warm spring.

There is one, at least, of the inhabitants of the meadow willow thickets which never fails to arouse interest when first seen. It is a blackbird; a fine large one, with a white patch on his wing, and with his head, neck and chest covered by a bright yellow hood that gives him the name of Yellow-headed Blackbird. Being a true blackbird, this fellow makes no pretension to being a Caruso among birds, but he does his best, and that is at least novel and compelling. There are not so many of the Yellow-heads as there are Brewers, but enough to lend variety to the life of the marshes.

A singular woodpecker that is sometimes seen in the meadows is the Lewis Woodpecker, named for Captain Lewis of the Lewis and Clark expedition. And why is he singular? Because he looks black at a distance and even has some blackbird ways to confuse the observer. He usually perches on boughs crosswise like other birds and frequently flies down to the ground after grasshoppers as if he were a Meadowlark. Many a budding naturalist has trouble with this bird; he sees what he thinks is a blackbird in the road and so notes it; but a moment later the "blackbird" springs up and clings to the side of a telephone pole as no other self-respecting blackbird would, or could.

Such small and inconspicuous tree-loving birds are the flycatchers that it is only about the more open meadows that they can be readily recognized. There are eight of the family listed here, but with the exception of the Kingbird and the Phoebe all are small. The Say Phoebe is the form here, the brown breast distinguishing it from the eastern bird, of which it is the counterpart in every other respect.

Among sparrows, the Savannah is a true denizen of the meadows, and yet his presence may not be suspected until you take a ramble across country. Then you will find him everywhere in the higher meadows — the Vesper taking his place on the lower, hotter levels. A mysterious little fellow; as you walk along he springs up from the grass at your feet, zigzags off for a hundred feet or so and — is swallowed up by the grass again. How is one ever to see enough of him to know him! Take a walk early in the morning and you will find him singing merrily from the top of a stub or a bush, and he may even select a telephone pole or wire. If on the pole, you have a good chance to see him as he throws back his head, puffs out his chest, and pours out his low-keyed melody; if he selects the wire, he is apt to sing so vigorously and forgetfully as to twitch himself off the wire. Then he picks himself up in mid-air with a dazed expression of "What happened, anyway?" His song is not loud, but it is to be presumed that the little wife on the nest in the grass thinks it is of the very finest. So intent is the singer that if you flush him, he will start singing again as soon as he alights. Flush him again and he flies off with a highly injured air. The summer days are not long enough for this musician, but he must begin at an unearthly hour in the morning. At my camp in early June in the Nez Percé valley he commenced singing at 3:30 A. M., and was at concert pitch by four o'clock. If you really want to see the dainty little songster, take a walk through the Gibbon Meadows; the place is alive with Savannah Sparrows and their kin.

### THE WHITE PELICANS OF YELLOWSTONE LAKE

Taking second place only to the Osprey, the White Pelican (*Pelecanus erythrorhynchos*) is of extreme interest to the Yellowstone Park tourists, especially when they reach the Lake and its vicinity. It is a noticeable bird by virtue of its great beauty when swimming on the surface of its beautiful mountain lake, and also when flying past, often at close range. On the water it is grace personified, and moves serenely along like a ship under full sail. At such times it carries its head well back and close to the shoulders, and the deep pouch seems to be drawn up close under the long bill. The pure white plumage, except for the black wing tips, makes it conspicuous and recognizable a long distance away. So great is its beauty and size that the first view is almost sure to rouse an enthusiastic cry of "Swan! Swan!" The Pelican is even more majestic in flight. The main auto-road runs for some distance along



the Yellowstone River on its way from the Yellowstone Lake to Hayden Valley, and these great birds have become so indifferent to the passing machines that there is a peculiarly fine opportunity for the tourists to see at very close range the great spread of wings, often as much as ten feet, and to hear the soft "fluf fluf" of the moving pinions.

Pelicans have been reported from Yellowstone Lake ever since 1870, but were not stated to be breeding there until 1890 (Linton, '91, p. 344), although it is probable that they nested there long before the earlier date. They seem to be holding their own in point of numbers, for my visits since 1898 have shown about the same number each year save in those extraordinary seasons when unusually high water caused the waves and cold spray to dash across their breeding grounds on Molly Island. Outside the Park, the number of colonies has steadily decreased before the westward advance of civilization; but this has been balanced to some extent by an increase in the number of birds in some of the colonies. Here in the Park almost all the Pelicans are to be found on Yellowstone Lake and scattered along the outlet for a few miles to the north. Occasionally I have found them on Heart, Lewis and Shoshone Lakes, and on Snake River, but only as single transients. Pelican Creek and Valley are not regularly resorted to by more than a half-dozen birds. Pelicans are very fond of visiting sand and gravel bars and beaches, and even the mud bars of Yellowstone Lake, to sun themselves and to preen and sleep; and they do the same thing at similar places along the outlet. Upon a few occasions I have found them perched upon partly submerged rocks in the Lake and outlet, when there were no waves to make things unpleasant. I have never seen one of these birds in a tree, and only once or twice have I found one on a stump cast up on the beach.

Most of a Pelican's movements are slow and dignified. Yet he is a strong swimmer, even to the point of riding the waves during Yellowstone's worst storms. His wing power is fully proven by habitual flights of many miles in search of food. When driving schools of small fish before him he moves quickly and expertly, and there is no trace of heaviness or clumsiness.

The big white bird's behavior varies a good deal with conditions, and allowances have to be made accordingly. When fishing or when flying to and from the fishing grounds he is more or less solitary, and at the same time unsuspicious. On his breeding grounds, he must behave as only one of a large colony, owing to limited area

of suitable island nesting grounds (fig. 46), and is quite wary there. Near the breeding grounds, individuals of both sexes often go through a series of wonderful flights and maneuvers that involve large flocks of the huge birds. As a rule a Pelican is peaceable, although undignified squabbles frequently take place near the nests.

Nor does the Pelican seek society with other species. Yet it is often seen associating with small flocks of Buffle-heads, Barrow Golden-eyes, Canada Geese, American Mergansers, and even Mallards. Its breeding ground is shared only with the California Gulls and Spotted Sandpipers, so far as I could definitely determine. But there is a fourth bird that I have noted on Molly Island, the Caspian Tern. I have seen small flocks there on four occasions in late May and early June, and once on July 5 when the birds had the black cap and the coral-red bill of the breeding season (see pl. 2), and yet I could not actually find the terns' nests. But since the above was written, young Caspian Terns, too small to fly, have been found on Molly Island by Alvin G. Whitney and Edmund J. Sawyer, August 24, 1922.

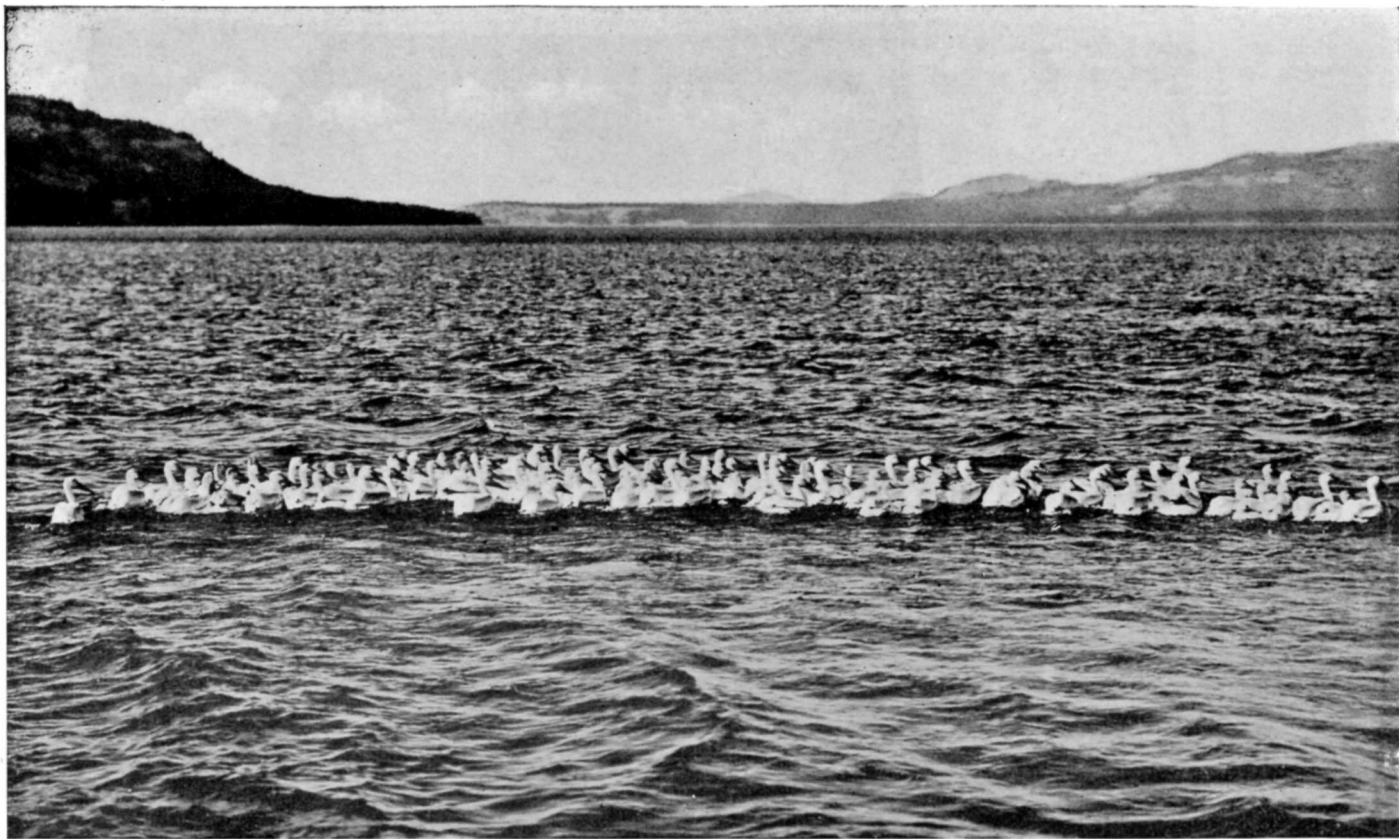
Young Pelicans in the nest have the adjacent nesting Gulls to be fearful of during the first few hours of their life (fig. 45), and I have no doubt that a good many are killed and eaten. But the only enemy that the adult Pelican has is the coyote that occasionally succeeds in catching one. When away from the protection of their island, the Pelicans sometimes get into trouble, as I discovered one summer day. A small flock of perhaps a dozen birds had come close inshore near the mouth of a small brook where a huge boulder afforded cover for the cautious approach of enemies, and there I watched two coyotes stalking them. Pelican meat is a fishy and greasy food, but evidently the coyotes are fond of it, or perhaps this particular pair had a hungry litter of pups at home awaiting them. By slow, careful creeping through the meadow grass the coyotes reached the rock; but their birds were still too far away to be caught by a sudden rush. The eager pair waited long and patiently, but in vain, for the birds to come nearer, until the approaching darkness finally caused a change of tactics. The larger of the two coyotes allowed the tip of a waving tail to show beside the rock. The birds noticed it and curiosity getting the better of them, they swam almost to shore. But when the smaller coyote made the rush the distance was still too far and the Pelicans escaped by a short flight out into the lake. When I saw the coyotes lose this chance, I thought they would give up. But no, they had another



trick to try and it was a good one, too! The coyote on the beach played about until the inquisitive pelicans were drawn in closer. Without a glance at the hoped-for prey the wily animal then trotted up the meadow, adjoining the beach, in plain sight of the birds. Apparently she had given up the hunt. Just then an elk strode out on the beach, and as he came opposite the boulder he drove out the second and larger coyote which would soon have had one of those birds. Did that teach the Pelicans to beware of that rock? Not at all? Now they were sure that there was nothing behind it. But a quick, swift rush of a third coyote (that I had not seen) from another direction caught one of their number. A fluttering struggle was followed by the coyote tossing the great bird over his shoulder and trotting off after his companions.

Some of the Pelicans are infested with a tapeworm (*Dibothrium cordiceps*) in the intestinal tract. From this position the tapeworm discharges its eggs out into the lake with the excreta from the Pelican. The eggs are eaten by the native trout which then become the unwitting hosts of the worms in their larval, or intermediate stage. The eating of the trout by the Pelican permits the worm to develop to the adult, and thus completes the life cycle. I have not noticed that these parasites actually destroy any Pelicans, or even affect their health to an appreciable extent.

Near noon each day there is a change of birds on the nests on Molly Island and this affords a wonderful sight in the aerial evolutions of large flocks of Pelicans that mount high into the air and whirl and maneuver with a skill and dexterity and majestic beauty very surprising to one accustomed only to the apparently clumsy birds in our zoological gardens. Acquaintance with the birds here in their chosen, native haunt shows them to be as strong and graceful as their great spread of wing would indicate. It is my impression that the flocks follow the leadership of a wise old female if any is present; otherwise, the most sagacious of the males. How long a Pelican lives, on the average, has not yet been determined, but probably it is fairly long-lived; and this bears directly therefore on the skill developed by the leaders and the consequent safety of the species. The leader of a flock shows even better command than in the case of flying geese. When returning from their fishing excursions, the flocks are small and the Pelicans fly in line; and as a rule they vary their wing-beats with short stretches of coasting upon deeply bowed wings. At the end of the glide, the leader loses headway first — presumably because the first bird is subjected to



*Photo by M. P. Skinner*

Fig. 44. Young White Pelicans near Molly Island, Yellowstone Lake. A pelican colony requires for its nesting site a remote island near a good supply of fish.



*Photo by George Shiras, 3rd*

Fig. 45. California Gulls attempting to rob the nests of the White Pelicans on Molly Island, Yellowstone Lake.

greater wind pressure than the ones behind — and recommences his strokes first, followed shortly after by the second bird; then the third, fourth, and succeeding birds take up the change at accurately timed intervals until the whole line is in strong, even flight with all the wings beating together in perfect time. Where the big birds come flying in to alight near shore or at the fishing grounds, they descend to the water in circles and then slide into it very gracefully and without much splash.

Pelicans have no song, nor have the adults any call-notes. Even the young have only a food call, a low grunt at times rising to a shrill scream.

In the Yellowstone Park, the first of the returning Pelicans arrive early in May; but the lake being usually still closed by ice, the early comers spend most of their time on the open outlet. For a month the number steadily increases until there are about seven hundred birds. In August, the Pelicans begin to depart, especially the non-breeders and those relieved early of home cares, so that by September 5 practically all are gone. Dates of their arrival and departure for a number of years are summarized as follows:

In 1914,	first seen	May 10,	last seen	Sept. 17
1915,	" "	April 28,	" "	Sept. 5
1916,	" "	May 12,	" "	Sept. 10
1917,	" "	May 15,	" "	Sept. 8
1919,	" "	May 4,	" "	Sept. 10
1920,	" "	May 20,	" "	Sept. 5
1921,	" "	May 10,	" "	Sept. 15
1922,	" "	May 23,	" "	Sept. 11

The total number of about 700 are present on an average of 96 days per season. Average breeding pairs number approximately 250, and non-breeders number about 200 individuals. The young reared per average season number about 150, although between 400 and 500 eggs are laid.

Very little is known about the winter home of our Yellowstone Pelicans, but they are for the most part believed to retire to the head of the Gulf of California, near the mouth of the Colorado River.

The White Pelican gets his food by scooping up fish as he swims along. Often a school of small fish are driven into a sheltered cove where a sudden rush and a violent plunge secures a pouchful. One afternoon I was encamped near the mouth of Grouse Creek at the southern end of the South Arm on Yellowstone Lake, where the water is very shallow for a long distance from shore. Twenty

Pelicans were in sight when I arrived, then came a flock of fifteen, then a flock of seven, and then more by ones and twos until there were over sixty. These then formed a long irregular semi-circle with the birds approximately twelve feet apart, and advanced towards shore with the ends of the line gradually closing in in front and the birds drawing closer together. Occasionally a bird, as if getting impatient, would lunge forward in a wild grab, but otherwise the line was well preserved until within a hundred feet of shore and in water that I afterwards found to be about nine inches deep. Then the whole line of Pelicans began to break and each bird rushed forward with feet just touching the surface of the water and the wings beating violently. After rushing twenty or thirty feet, each bird plunged forward through the spray and thrust bill and pouch under. From my knowledge of the conditions there, I was inclined to think they were after small fish such as chub and suckers rather than trout. It is said that White Pelicans do not dive, yet on at least one occasion while riding along the shore of Yellowstone River I saw one do that very thing. It was swimming on the surface where the water was clear and about four feet deep, and suddenly sprang forward and down after the manner of a Grebe. It went clear under the surface and immediately came up again, but I could not say whether it caught any fish. I have never seen a White Pelican plunge from a height as Ospreys and Brown Pelicans love to do. The pouch is used to separate the fish from the water, the latter escaping from the side of the pouch; but is not used to *carry* the fish in. They are swallowed immediately; although they may afterwards be regurgitated to feed the young. Sometimes I have seen a Pelican rob a Merganser after a chase and considerable scuffling.

It has always been a matter of curiosity with me where our Pelicans catch their food, and I suspect that they eat frogs, tadpoles, salamanders and crawfish as well as fish. In the course of years of observations, including many counts, I have tabulated sufficient data to indicate that no great number of Pelicans fish on Yellowstone River below the lake, twenty-six being the greatest number seen there at any one time. Day-long watches have shown Pelicans going up and down the river but I never could convince myself that there were more than sixty or seventy birds so engaged. Pelicans do not fish on the open lake, and they do not fish near the breeding ground at Molly Island. On trips around the lake in a canoe, along the entire shoreline I have never seen more than a dozen single

Pelicans fishing, and these usually at the mouth of streams, except once or twice a year when I have witnessed a drive as detailed above. Nor have I observed over six a day visit the Pelican Valley, where they get small fish; and the visits of Pelicans to Heart, Lewis and Shoshone Lakes are so rare as to be negligible; I am therefore able to account for the fishing grounds of only one-seventh of our birds. I believe they may raid the fish traps at Cub and Columbine Creeks where the trout are penned in; but still it seems likely that some of our Pelicans at least regularly visit fishing grounds outside the Park. On May 29, some years ago, I was on Flat Mountain Arm shortly after noon, and hence just after the brooding birds had been relieved at the Molly Island nests. On glancing upward I counted a flock of 63 Pelicans high up and flying south towards Snake River and Jackson Lake, and soon after another flock of 22 followed the first. This seems very significant, and further investigation should disclose exact and interesting data on their fishing grounds.

While I have made no special observations on the bathing habits of the White Pelican, I have seen them preen and dress their feathers at more or less regular intervals. Once I observed a bird standing on the shore with wings wide open, as if drying and airing its feathers.

No courtship peculiarities have been noted by me, unless the flight maneuvers near Molly Island in May and June have such significance. The horny knobs on the bills of both sexes reach their greatest development in late May (see pl. 2); by the middle of June they begin to be shed, and before the end of the month all have fallen. At the same time the color of bill and pouch and the bare skin around the eyes loses the red tinge of the breeding season and remains yellow until another season comes around. The white nuchal crest is also at its prime in May, but is replaced some ten days later than the falling of the bill knobs, by plain gray feathers on the crown and nape.

The White Pelican is said not to breed along the seacoast, but in springtime it resorts to the inland lakes of the Great Basin and the Plains, from Salton Sea on the south to as far north as Fort Smith in northern Canada. It breeds farther east in Canada than it does in this country, reaching the lakes in Manitoba. In the United States the range formerly extended east to Chase Lake, North Dakota, and even into Minnesota; but now Yellowstone Lake is the most eastern of the large colonies although we are pleased

to hear lately that a few scattered birds still nest in Minnesota and Dakota. It speaks well for this bird's adaptability that it can accommodate itself equally well to the moist, showery atmosphere of Manitoba, the cold heights of the Yellowstone, the northern wilds of Great Slave Lake, the plains of Saskatchewan, the deserts surrounding Great Salt Lake and Pyramid Lake, and the extreme heat of Salton Sea. Otherwise, the peculiar conditions essential to a Pelican's nesting site could not be so easily met. First, there must be an inexhaustible supply of fish. The kind of fish is not so important, for this bird eats the pickerel and small fry of muddy Canadian lakes as readily as he does the toothsome trout of crystal-clear Pyramid Lake and Yellowstone waters. Second, as the bird cannot walk well the nest must be near the water. Third, with these ground-nesting birds the site must be low to permit access to the water where the young swim long before they can fly. Fourth, as both parents and downy young are white, the nesting must be on an island to give protection against predatory animals. Fifth and most important, the island must be remote, to afford privacy. Hence Pelicans are restricted to large bodies of water remote — or at least protected from man — and containing low islands.

As soon as the ice of Yellowstone Lake disappears, and a little before that, if the season is late, the Pelicans resort to two small islets, together known as Molly Island, and located in the southern end of the Southeast Arm of Yellowstone Lake. They are an eighth of a mile apart, each islet about 400 feet long by 200 feet wide, with their summits eight or ten feet above low water. But little soil being present, the expanse of sand and gravel is relieved only by a trifling amount of vegetation on one islet and a few bedraggled bushes. They are protected to some extent in a bay with the shore to the west and south, less than a mile away; but in times of high water, a fierce wind sweeps waves and spray across them in quantities sufficient to destroy the eggs by undue chilling, a disaster that occurs perhaps once in twenty years.

My first visit to Molly Island was in 1898, and during each season I find a never-failing pleasure in revisiting this bird colony. It is accessible from the Lake Hotel or Lake Camp by either motor launch or small boat. As one approaches Molly Island he is met a mile out by a California Gull or two, circling overhead and screaming vociferously; and as he draws nearer the Gulls and their hubbub increase, but the more dignified Pelicans remain until the intruder is two or three hundred yards away, when they beat a slow retreat



(fig. 46). If the eggs are hatching or the young are still small, the adults fly out only a few hundred yards and alight; but later in the season, the parents may fly far out of sight. The first egg is usually laid about May 25 and incubation begins a week later after another egg or two have been laid. There is little attempt at nest building, the large white eggs being placed within a slightly raised rim of sand and pebbles without other nest materials. Both sexes share in incubation, nest relief taking place about noon each day, and, I have reason to believe, again at midnight. It is impossible to tell the sexes apart, so that I have no way of knowing whether the females are on the nest in the morning, rather than the afternoon, or if there is any regularity at all. The incubation period is unknown but believed to be less than a month. The nestlings remain in these ground nests about two weeks although they cannot fly for a month longer.

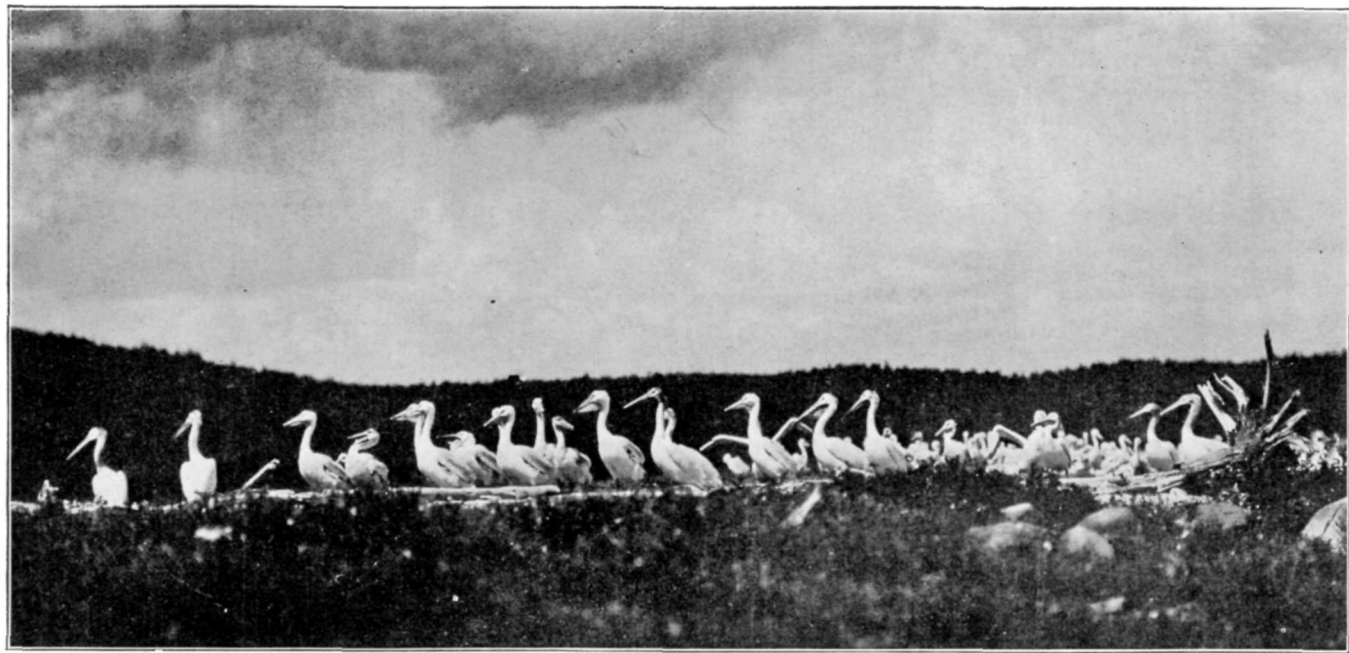
When first hatched, the Pelicans are helpless little creatures, naked, blind, and so weak that they are barely able to move about in the shallow hole that holds them. After two weeks their ruddy little bodies are covered with whitish down, affording them at least some protection from the hot sun, and they now begin to move about. The parents are devoted to their offspring, shielding them from the sun, feeding them liberally on regurgitated fish, and leaving them very reluctantly. If a person approaches their nest, and the young are large enough to walk, they follow their parents to the far edge of the islet and then attempt to swim out to where their parents have flown. After the intruder leaves, they return to their nests. I never could see just how the adults ever distinguished their own young, but they must have some unerring method, for I have seen a parent return with fish and refuse to open his, or her, bill until the youngster that appeared to be the right one was found. With the bill and pouch open, and a little regurgitated fish in the pouch, the old bird patiently allows the youngster to prod about and even to search throat and gullet until he appears liable to disappear down it altogether. Only one young at a time is fed. As a rule not more than one bird in a brood reaches maturity. There is therefore a great disparity between the number of eggs laid and the nestlings that grow up. One year I counted more than five hundred eggs, but there were only a hundred and seventy young birds left in mid-August. This emphasizes the precarious existence of even the Yellowstone colony, unless carefully protected. What becomes of the other young ones is more than

I know. A few young birds are killed by exposure to the sun; and perhaps the gulls that nest adjacent to them develop an inordinate appetite for Pelican eggs and nestlings. The little Pelicans grow rapidly and keep in a compact flock whether on shore or while swimming (figs. 44, 47).

This Yellowstone colony bids fair to maintain itself, with the protection being given it by the government. While the juvenile mortality is high, enough young survive to keep up the number. Pelicans are hardy birds and their great danger is the encroachment of civilization. On Molly Island they seem secure, as they are too far from the tourist centers to be visited often; and the government decreed (1920, 1921 and 1922) that landing on Molly Island should not be permitted until after July 25 each year in order to prevent disturbing the newborn young.

### THE MALLARD IN YELLOWSTONE PARK WATERS

Sometimes Mallards may be found on large lakes like the Yellowstone, particularly at its south end, and Shoshone Lake, but they much prefer bays, smaller lakes, ponds, sloughs, or even a pool of muddy water from melting snow, and they appear partial to beaver ponds. In the same way they may be seen along the large Yellowstone River but are much more numerous on smaller streams and even tiny rills of water from some spring or in ditches. Sometimes they even follow up small brooks into the dense forest. In the winter they live along the rivers kept open by hot water, seek sheltered nooks out of the cold wind, and even search out the spots that receive the first morning sun. In winter it is warmer down near the water than in the upper air but evidently the warm sunlight is also welcome. Should a thaw set in, the Mallards at once search out the open areas of water, especially pools of snow water, sometimes leaving the open river where they have been all winter. In the spring, they are numerous in the snow water along the edges of ice of the still frozen main part of lakes or ponds. In the early mornings, before the sun has melted the previous night's freeze, they collect about the springs or seek the edge of the ice on the water kept open by waves or current; but later in the day they make their way out into the new grass or flooded margins, or frequent the snow water collecting in pools on the flats. Even in summer after a heavy rain, they like to forsake regular bodies of water and wander through the flooded meadow grass, and they also prefer to be in the reeds along shore rather than out on the open water.



*Photo by George Shiras, 3rd*

Fig. 46. White Pelicans, mostly adults, on Molly Island. The nests are constructed on the ground among the stumps and boulders at the right.



*Photo by George Shiras, 3rd*

Fig. 47. Close-up view of White Pelicans on Molly Island. The young birds are not able to fly for several months, but they are excellent swimmers.

In the fall, they begin congregating on ponds and small lakes. In 1922, at "muskrat pond," near Mammoth, there were 53 Mallards on September 24th, 88 on the 26th, 88 on the 29th, 91 on October 3rd, 127 on the 8th, 131 on the 13th, and 140 on the 16th. And as the small ponds freeze, on the approach of colder weather, they seek larger lakes of two or three square miles in area in huge numbers, and are then much more numerous along the Yellowstone River between Yellowstone Lake and the Canyon, sometimes flying down as far as the Lower Fall, but almost always returning immediately. When they come out to rest and preen on shore their gray backs blend perfectly with the dried stones. Mallards quite frequently seek the reservoir at Mammoth Hot Springs in winter and spring when the traffic is less.

A peculiar feature of Park wild life is its seeking of the warm waters as winter approaches. Then the Mallards search out such rivers as the Gardiner, Yellowstone, Firehole and Gibbon, and Yellowstone Lake at the Thumb, which receive enough hot water to keep them open; and a portion stay in such places all winter. In some years Mallard, Green-winged Teal and Wilson Snipe have wintered on the overflow below Jupiter Terrace, and after they first left in March an extra cold morning brought them back again temporarily. They have actually been seen on Jupiter Terrace itself in the somewhat cooler water where it overflowed the basins. Even in summer such warm waters as Turbid Lake are favorite haunts. One evening at Bath Lake near Mammoth, after the tourists had left, I found Mallards dropping in through the steam, to swim about a little before preening themselves. Sometimes they visit the immediate vicinity of geysers, but they may do this because of insects that are also attracted by the heat; still, I have seen Mallards flying over the Grand Geyser while it was in eruption. In some places the warm waters overflow and keep bare of vegetation a certain tract that is favored by Mallards which even make their way up, and astonishingly close, to the hot spring. They are also given to making their way through the tules kept growing by warm lime water near the Mammoth power house.

Mallards are such expert swimmers that even the ducklings tumble into the water as soon as they leave the egg; certainly they swim as soon as they can walk, and with far greater ease. In rapids the adults swim from eddy to eddy; rapidly in the narrow strips of current, and easing up as they enter the eddy. They are not at all disconcerted by "white water" and the dashing spray; indeed, **they take great delight in such rapids. There is nothing in the**

Gardiner River too rough for them — they drop down over falls three feet high and at the bottom may go out of sight in the foam and spray. In one instance I saw a drake thrown by the current against a submerged rock, but he did not mind at all, for, instead of swimming around and away, he *walked* right over and swam off the other side. When on the water, Mallards usually scatter out more than other shoal-water ducks. While the government's protection here causes them to lose their fear of man, they are nevertheless wide awake and alert, as many a hawk and mink have discovered.

Still, it is strange how completely the birds breeding in the Park have lost their fear of man, and they contrast very strongly with the wild migratory Mallards which pass through in April and again in October. They sun themselves on the boulders of the streams or sleep on the bars and flats while one goes by within a few yards, or if he does approach a little too close they merely enter the water and swim out a short way. If the stream be narrow, they swim across and then walk up the far side away from the disturbers. Along the Gardiner River, they sun themselves or "tip" for food absolutely unconcerned by the highway traffic passing within a few feet. After wintering on the overflow from Jupiter, as mentioned above, they became so tame as to merely walk to one side of my path when I passed between them and the reservoir they were supposed to be on. Once I found a flock of seven at the Alum Creek bridge so fearless that they would not leave the causeway when I drove my car over, and only swam out twenty feet when I walked up to them. At "muskrat pond" they would all swim to the far end of the pond, and as I walked past they all swam back to the starting point; but when I drove my car along the road they gave me no attention whatever unless I stopped opposite them. While driving along the shore of Turbid Lake the Mallards preened on the logs beside the road absolutely indifferent to me while the car kept *moving*, but were up and away instantly if the car *stopped*. Evidently they thought it looked rather suspicious when I stopped just at that place. At the same time that the Mallards were so tame along the main road, they were much wilder when farther from the travel.

While Mallards are found with Mergansers, Golden-eyes, Pintails, Blue-winged Teal, Green-winged Teal and Baldpates in summer, I cannot say that they are together for company's sake. I have noted too much data to the opposite effect, such as "Mallards flock by themselves"; "Mallards near Golden-eyes but not associating

with them"; "Mallard at southern end of Swan Lake, Baldpate at northern end"; "Mallard and Teal on muskrat pond but distinctly not together and even drew further apart when they saw me." In the autumn Mallards, Baldpates, Redheads, Canvas-backs, Blue-bills, Buffle-heads, Barrow Golden-eyes, Golden-eyes, Shovelers, Geese and Swans are often seen in dense masses on small ponds, especially if a heavy wind is driving them from the larger waters. In the spring, I have seen them with Buffle-heads and Ruddy Ducks in an opening in the rotting ice on Yellowstone Lake. I have seen them at play with a flock of Green-winged Teal in a slough having mud banks and bottom, quacking together sociably, chasing each other, and swimming rapidly and dabbling joyously in the shallow water. Sometimes I have seen some strange gatherings; once a beautiful Mallard drake on a submerged bar of Gibbon River, while on the meadow near him was a big beaver stripping a willow twig — and then a pair of Teal came buzzing into the picture; once three big bull moose crashed through a quiet pool just as a flock of Mallards left in dismay; and once I found a Mallard, a Red-winged Blackbird, and a Killdeer together at the warmest part of the overflow from Jupiter Terrace while the cold north wind drove the snow past in wispy gusts. Again, I flushed a Mallard, a Wilson Snipe and a Water Ouzel together.

Mallards and their ducklings show no fear when the big Ospreys plunge within a few feet. Once I saw a Golden Eagle swoop at a flock of Mallards on a pond, but he did not get any. Fortunately, Duck Hawks and Goshawks are rare. I often find coyotes hunting near Mallard waters and see their tracks where they have sneaked along waters known to be frequented by Mallards; and one May day I found the remains of a Mallard that had probably been caught and eaten by a coyote. I have even seen Mallards flushed by swimming muskrats and beaver.

Mallards are such swift and powerful flyers that on approaching a little pond closely surrounded by aspens, they set their wings when directly above and perhaps sixty feet up, and come down with a rush. Sometimes when I disturb them, they swim across a small river and then flush when they reach the far side. When they do flush, Mallards are quite apt to jump straight up, especially if there is anything in the way like a bank or a grove of trees, holding their bodies almost perpendicular as they go. If on the water, Mallards are likely to swim a little and scatter slightly before flushing.



As a rule the Mallard ducks quack louder and more frequently than the drakes; I have seen the bill of a drake at fifty feet moving as if quacking, but if he made a noise it was so soft that I could not hear it.

Mallards along the Gardiner River seem much more numerous on a cold winter morning than on a warmer morning at the same season. On February 9, the day after zero weather, there were 81 seen along the river; but five days later, after a four-day thaw, there were only 15 along the same stretch. During the winter and even in January, a sudden cold increases the number, and they are apt to move up towards the mouth of Boiling River where that stream enters the Gardiner and warms it up. At such times they are usually to be found in the morning at the very first point the rising and warming sun touches. With the coming of warmer mornings in late February, the Mallards along the Gardiner become uneasy and apparently send scouts up the river above the open water (for this river freezes above the mouth of Boiling River, a stream from Mammoth Hot Springs, and is always open below), even while there is a good deal of ice up there. A day or two later, if the warm spell continues, there is a marked movement, and I find them wherever there is a little open water. In fact as soon as there is any open water, whether permanent or temporary, there are Mallards on it. I have even seen them on a little puddle of water near the still frozen Swan Lake, but contentedly doing their best until the bigger water opened. Mallards come in from the south as early as March 5 and steadily augment in numbers, but those that do not stay for the summer leave during April. In late September the returning migratory birds, noticeable because of their marked wildness, begin to appear, especially along the Yellowstone River and on the medium-sized lakes where they become abundant in October. As the waters freeze they congregate still more thickly in the open pools before the majority leave. The numbers in the Park are at their lowest ebb in January but gradually increase until July—the northerly migration causing little, if any, increase because our waters are still frozen when the birds come up from the South; then the young birds maturing and the southerly migration cause a more rapid increase until November, when there is a sharp falling off as the southbound birds depart. I do not believe the temperature affects their movements so much as the freezing over of their feeding grounds. While Mallards like to sleep in a warm, sunny nook under the lee of a bank, I have seen them tipping

along the Gardiner River in the coldest of winter weather. Still, a sudden cold spell early in the season causes surprising movements. A heavy snowstorm in September drove a Mallard Duck to a washing trough near a Ranger Station for three days. The October storm of 1919 massed the Mallards along the Gardiner in unheard-of numbers. But in spite of temporary movements like these, they usually stay each year until the actual freezing of their waters drives them out.

Mallards secure most of their vegetable food by "tipping" in shallow water, or in unfrozen parts of a pond, or by merely skimming it from the surface. During the tipping Mallards stay under water for from three to five seconds. On the first of October most of the Mallards on Lava Pond were tipping, but at least one dove under, "ker-plop"; two weeks later there were a number of them diving, though rather awkwardly. By the 20th all the Mallards on that pond were diving and staying entirely under water for five to seven seconds and becoming quite expert. Most of the tipping is done on shallow ponds, but I have seen it in running water, especially along shore. In places they pick up oats where dropped from the trucks along the roadways. For some reason I found Mallards very fond of dabbling and feeding on a small muddy pond of cooled geyser water at the Upper Geyser Basin from October 15 to 20 as soon as the water thawed out each morning.

Often I see both ducks and drakes bathing by thrusting their heads under the surface and with a jerk causing water to run up over their backs, fluttering their wings at the same time. After about five of these showers, they stand up erect on a stone and flap their wings rapidly. Then they preen themselves, dress and oil their feathers, hoist one leg and go to sleep, especially if there is a warm sun. They may be observed bathing and preening even in cold February. I have often seen them preening and sleeping on a muskrat house. It seems quite the thing for a Mallard to preen after eating. Often they dress their feathers and sun themselves on the gravel bars along the Lamar and Yellowstone Rivers. On one occasion I found some Mallards preening on a half-submerged log beside the road, indifferent to passing traffic.

The flocks usually break up into pairs early in May, though a large number of the winter residents stay mated all winter; and when in pairs, the female almost always quacks the alarm and flushes first. Once I started a pair where the duck was twenty feet farther away, but still she jumped first. This habit of the duck

preceding the drake I have noticed especially in April, May and June, or during practically the whole time that the birds are mated; and in winter the same rule is followed where there is any difference at all, for generally at that time they get away together.

While some Mallards are in pairs all winter along the Gardiner River, there is an average of two drakes to each duck, and under such conditions I often find three drakes with a single duck. In January I find about 40 per cent paired, but gradually the unattached find partners and the proportion increases to 100 per cent paired by March 1, when the first migratory birds begin to arrive. Then the real mating begins, in which a kind of bowing by male to female is the active sign of courtship.

The drakes retain their breeding plumage (see pl. 2) as late as June 18, and after the molt they begin to show green on the heads and chestnut on the breast by September 11, and two weeks later are in full plumage.

Mallards and Blue-winged Teal use the sloughs and beaver ponds of the Upper Yellowstone as one vast breeding ground. The young are hatched in broods of five to eight from June 1 to August 10, and are ready to run, swim and dive as soon as dry. Although I have found some of them almost grown and able to fly by July 25, I have never found any evidence of second broods and believe the late nests to have been delayed for some other reason. My observations correlate the nesting dates with altitude, as Mallards were found hatched, as follows:

Soda Butte Creek,	at 6600 ft.,	June 3
Yellowstone Park,	at 6500 "	June 17
Lava Creek beaver pond,	at 6500 "	June 22
"muskrat pond," near Mammoth,	at 6400 "	June 22
Beaver Lake,	at 7400 "	June 24
Alum Creek,	at 7700 "	July 1
Trout Creek,	at 7700 "	July 1

It would therefore seem that the time is roughly dependent on elevation of the nesting place above sea level; not a strange conclusion when we realize that vegetation is three weeks later in the Park at 7700 feet than at 6500 feet.

Once, on the weedy edge of a pond I came upon a family of these ducks with five ducklings. At the alarm note of the mother, the youngsters dove and clung to weeds at the bottom of the shallow water while the mother fluttered at my horse's feet with a pretended broken wing.

## THE TRUMPETER SWAN IN THE YELLOWSTONE PARK

Although this bird was formerly very abundant throughout the United States, it has been so incessantly hunted and shot at that it is now very rare anywhere. As a breeding bird within the limits of our country it had even, within the last few years, been considered extinct. It is peculiarly fortunate, therefore, that one or more pairs have found refuge in Yellowstone National Park and are now breeding there regularly.

While this is a wild swan possessed of great grace and beauty in flight, it does not differ greatly from the tame swan of our eastern parks. About the only noticeable difference to be observed is that, when swimming, the neck of the wild bird is held stiff and straight whereas the domestic bird usually curves its neck.

The Trumpeter Swan is from 5 to 5½ feet long with a wing extent of from 8 to 10 feet, and is one of our very largest birds. Yet it does not, as one would naturally suppose, require a broad stretch of water. True, it is more often seen swimming on Yellowstone Lake; but that is because there are many more tourists there to see the big, pure-white birds. As a rule they prefer the smaller lakes and ponds, especially when they pick out a nesting site. So far as my experience goes, they are quite apt to select a different locality, within a radius of ten miles, each year.

One day as I was riding leisurely towards a pond about a quarter of a mile wide, near Junction Butte, I discovered a single bird close to the farthest shore. This proved to be a young bird (one or two years old) and remarkably tame; for, as I rode my horse into sight and stopped near the shore, the swan came swimming towards me until it was within fifty yards of where I sat in plain sight. Then, after a few minutes of admiration, I rode on around the northern shore of the pond toward a beautiful setting sun. The swan swam along on my right and a little to the rear, but only a hundred yards away; so that I had a fine view of this glorious bird, not only sitting quietly on the water, but also as it glided gently forward. In some ways the whole scene was one of the finest for sheer majestic wilderness beauty that I have ever seen. Not only was there no other person in sight but there were no roads, no fences, no axemarked trees, indeed no civilization marks of any kind. I was alone with the swan and adjacent flocks of ducks and geese, except for a mother elk and her tiny calf on the far shore. Over all was a

glorious sky shot with flaming golden colors from the sinking sun; while underfoot, the prairie was dotted and splashed with an equally glorious mosaic of the early spring flowers.

Since that wonderful evening I have seen Trumpeter Swans several times, as listed below, and have derived keen pleasure from observing them. Once I flushed two from Yellowstone Lake while I was trout fishing. These birds began their flight from the surface by first drawing in their heads, then accompanying the first twenty wing strokes with vigorous kicks of both feet at the water. This enabled them to rise high enough so that they could then trust to their wings alone and draw up their feet and legs into a horizontal position with the legs close to their body and their feet under their tails. The wings were so large and the strokes so powerful that the wing strokes were plainly heard until the birds were quite a distance away. Their flight was strong and direct until they passed out of sight. Later, the same day, a swan alighted on the water near me, putting down the rear of the foot first and skating into the water on the stiffened feet.

When unalarmed, the call is a clear, ringing, far-reaching note that gives these birds their distinctive title of "trumpeter."

My records of Trumpeter Swans seen in Yellowstone Park are as follows:

May 29, 1915.....	4	Aug. 14, 1919.....	2
May 31, 1915.....	4	Sept. 6, 1919.....	5
Aug. 16, 1917.....	1	July 4, 1920.....	2
June, 1919.....	1	May 29, 1921.....	1

Early in the summer of 1919 I noted a swan in the vicinity of Heart Lake. A little later, on July 4, the nest was found on a low island in a lagoon northeast of Lewis Lake and contained five whitish eggs, the nest being made of leaves and grass. On August 14 I returned and then found the tail and flight feathers molted by the adults, but the birds were too far away and too wary to determine which of the two species of swan it might be. On September 6, I again visited this section and found five Trumpeter Swans, the two parents and three young so nearly grown as to be able to fly well. During that same summer, Dr. H. M. Smith, U. S. Fish Commissioner, reported that on July 16, 1919, he visited a small unnamed lake lying south of Delusion Lake and found there a pair of swans with six cygnets about the size of teal swimming actively about. On August 23, 1922, while quietly exploring in the Southeast Arm of Yellowstone Lake, three swans were observed at fairly close range

by E. J. Sawyer and A. G. Whitney, over the shallows near the mouth of Trail Creek. These birds were resting and feeding in company with the large numbers of Canada Geese and Mallards usually found there. As the boat drifted rapidly toward the shore the great snow-white birds rose, one after another, and flew swiftly past toward the east side of the Arm.

## NOTES FOR FIELD IDENTIFICATION OF THE BIRDS

To save space, these field identification notes omit many of the rarer birds. In using them it will be noted that ordinarily the first line contains the common and scientific names of the bird; the second indicates the comparative size of the bird and the season when found in Yellowstone Park; the third gives the prominent field marks of the male, and characteristic call notes, and the fourth states the localities where most likely to be found within the Park.

For a full description of all our western birds, consult Mrs. Florence M. Bailey's "Handbook of Birds of the Western United States." To keep abreast of the advances in bird study in that region one should refer to "The Condor," the leading bird magazine of the West (W. Lee Chambers, Eagle Rock, California).

### WATER BIRDS

Grebes are small duck-like birds with sharp-pointed bills; likely to be met with on ponds and lakes, but practically never on shore.

Loons are large black-and-white diving birds, rarely seen in the Yellowstone except during migrations in May and November.

Gulls are large white birds, usually seen flying but sometimes resting along shore or on the surface of the water. Abundant about the Yellowstone Lake and River; occasionally seen about the other large lakes and rivers, and around some of the garbage piles at camps and hotels.

CALIFORNIA GULL. *Larus californicus* Lawr.

April to November.

White with pearl-blue mantle; a vermilion spot on bill.

Lakes and rivers between 7000 and 8000 feet altitude.

RING-BILLED GULL. *Larus delawarensis* Ord

April to November.

White with pearl-blue mantle; black band around bill near the tip.

Yellowstone Lake.

WHITE PELICAN. *Pelecanus erythrorhynchos* Gmel.

This is a large white bird with black wing tips, usually seen on Yellowstone Lake and River and often mistaken at first sight for a swan.

The ducks are given in the order in which they are seen most frequently during June to September, as follows:

MALLARD. *Anas platyrhynchos* Linn.

Occurs at all seasons; abundant on small ponds and streams.

Male: head, green; breast, chestnut. In summer, both sexes are a dull mottled brown, the tail feathers showing a white V as the birds are flushed.

Found throughout the Park.

BARROW GOLDEN-EYE. *Clangula islandica* (Gmel.)

Smaller than the Mallard. Occurs at all seasons.

Head, glossed with purple; rest of plumage, black and white.

In flight, the white patches on the wings and the whistling noise are distinctive.

On all large lakes and rivers.

MERGANSER. *Mergus americanus* Cass.

A trifle larger than the Mallard. Occurs at all seasons.

Head and back, black; white predominating.

On all large lakes and rivers.

BLUE-WINGED TEAL. *Querquedula discors* (Linn.)

A very small duck. June through October.

General color, brownish; wings with blue patch showing plainly in flight.

Common on small ponds, and especially along the upper Yellowstone meadows.

GREEN-WINGED TEAL. *Nettion carolinense* (Gmel.)

Even smaller than the blue-winged species. Present at all seasons.

General color, chestnut-brown, but richly varied. The best field marks are its small size and green wing patch.

Found on all waters, but prefers small ponds and streams.

PINTAIL. *Dafila acuta tzitzihua* (Vieill.)

Large and slender, even longer than Mallard. June to November.

General color, gray; lighter underneath. Long neck and long pointed tail. Wings comparatively narrow.

On the smaller ponds and lakes.



The Canada Goose is a large grayish brown bird with black head and neck and a white cheek band. It is the only one of the three species of geese that stays in the Park during the summer.

Swans are very rare during the summer months.

The Great Blue Heron is a large slate-blue bird seen standing beside a watercourse or pond, or flying along the shore with neck folded back upon itself.

The Sandhill Crane is more brownish than the heron, is not necessarily to be found near water, and flies with neck outstretched.

The Coot is a very dark slate-gray, duck-like bird with a sharp, white bill, and haunts the small reedy ponds.

The Wilson Phalarope is a snipe-like bird seen swimming on the surface of lakes and rivers in summer and but seldom on shore.

The snipes, sandpipers and plovers follow in the order of frequency, as with the ducks:

SPOTTED SANDPIPER. *Actitis macularia* (Linn.)

Larger than a sparrow. May through August.

Above, brownish gray; below, white with large black spots.

Notes: a clear whistled *peet-weet*.

Common at all altitudes along every pond and stream.

KILLDEER PLOVER. *Oxyechus vociferus* (Linn.)

Size of a robin, but bill and legs longer. March 15 to October.

Above, grayish brown; rump, rusty brown; two black bands across breast. Very noisy; call, *killdeer, killdeer*.

Common near water from 6000 to 8000 feet altitude.

WILSON SNIPE. *Gallinago delicata* (Ord)

Smaller than robin, bill very long. March to June, and August to December.

Plumage a striped pattern of white, black, brown and buff; easily identified by the long bill and chestnut bar across tail.

Utters a sudden *sceep, sceep*, when flushed.

Found about springy places at all altitudes. Not common.

WESTERN WILLET. *Catoptrophorus semipalmatus inornatus* (Brewst.)

As large as a crow, but more slender. August to October.

Brownish gray, white bar on wing, bill long.

Along ponds and streams at all points. Not common.

WESTERN SOLITARY SANDPIPER. *Tringa solitaria cinnamomea* (Brewst.)

Larger than sparrow. August and early September.

Dark gray with greenish tinge; back dotted with brown or whitish.

Near any water, but not common.

**GREATER YELLOW-LEGS.** *Totanus melanoleucus* (Gmel.)

Larger than robin, with long yellow legs. August and September.

Gray with white markings. When flushed the white rump and tail, and the ringing *tweep, tu-weep* identifies this bird.

Seen about Yellowstone Lake and River and in marshy places.

**GROUSE AND DOVES**

The Richardson Grouse is a large bluish black grouse partial to the fir and spruce forests, but might also be found in the lodgepole pine.

The Gray Ruffed Grouse is a smaller, grayish grouse with black shoulder ruffs. This grouse and the last are the only ones likely to be met with. The Ruffed Grouse is partial to aspen groves as well as to the pine and fir.

The Western Mourning Dove is the only representative of the pigeons here. In flight, a white edging of the spread tail shows plainly, and when walking the peculiar nodding of the head is characteristic.

**HAWKS AND OWLS**

The hawks will be found very difficult to identify, as individuals of the same species vary greatly in size and color. They are arranged here in the order of their frequency of occurrence.

**OSPREY.** *Pandion haliaëtus carolinensis* (Gmel.)

A large hawk. April 15 to October.

Black above and white below; head and neck white.

Numerous on all bodies of water. Nests on pinnacles of rock and on tree-tops.

**SWAINSON HAWK.** *Buteo swainsoni* Bonap.

Smaller than the Osprey. April to September 15.

Usually dark brown, a rusty brown band across breast.

Found at all elevations; prefers open country.

**DESERT SPARROW HAWK.** *Cerchneis sparveria phalæna* (Less.)

Size of a robin. April to October.

Rufous and blue in color, marked with black and white, tail bright chestnut.

Found all through the lower elevations of open country.

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

Size of Osprey and larger than Swainson Hawk. April through September.

Sooty brown; tail, rich chestnut.

At all elevations; circles high over the open country.

MARSH HAWK. *Circus hudsonius* (Linn.)

Smaller than Swainson. April through September.

Usually brownish black. The white rump is a good field mark. Hunts the open country by skimming close to the grass and tops of brush.

PIGEON HAWK. *Falco columbarius columbarius* Linn.

Slightly larger than robin. April to October.

Only field marks are its size and the tail barred black and white. Does not hover nor circle overhead. Color varies from bluish ash to dark brown.

The owls are all brown or gray. There are only two species likely to be seen; both hunt some in daylight.

The Western Horned Owl is large and prefers dense timber. Marked by long erect ear tufts.

The Short-eared Owl is smaller, about the size of a crow, and is a bird of the open, frequently seen hunting the meadows and uplands.

## THE SMALLER LAND BIRDS

### I. Black and Dark-colored Birds

RAVEN. *Corvus corax sinuatus* (Wag.)

Larger than crow. Occurs at all seasons.

Uniform black with gloss in places. Flight characterized by short sailing periods. Note, a hoarse croak.

Found below 9000 feet.

WESTERN CROW. *Corvus brachyrhynchos hesperis* Ridg.

Smaller than a raven. March to November.

Glossy black. Flight distinguished by continual flappings.

Note, *caw, caw, caw*.

Found below 7500 feet over open country.

BLACK-HEADED JAY. *Cyanocitta stelleri annectens* (Baird)

Larger than robin. Occurs at all seasons.

Head and crest black. Back, dark slate and blue, lighter below.

Found below 8500 feet in more or less open evergreen forests.

LEWIS WOODPECKER. *Asyndesmus lewisi* Riley

Larger than robin. June to September.

Above, greenish black; below, gray changing to rose on belly.

Found below 7800 feet in evergreen belts.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus* (Bonap.)

Size of robin. June, July and August.

Black, with head and breast orange-yellow.

Found below 7800 feet in open marshes.

ARCTIC THREE-TOED WOODPECKER. *Picoides arcticus* (Swains.)

Size of robin. Very scarce but might be seen at any time.

Above, glossy blue-black; below, white, barred with black on sides. Square yellow patch on crown.

Found between 6000 and 8000 feet in heavy fir and spruce.

WILLIAMSON SAPSUCKER. *Sphyrapicus thyroideus* (Cass.)

Slightly smaller than robin. May to September.

Above black, rump white, white patch on wing; below, throat and breast black, belly yellow. Note, a shrill *huit-huit*, uttered while flying.

Found below 6500 feet in fir and aspen groves.

BREWER BLACKBIRD. *Euphagus cyanocephalus* (Wag.)

Slightly smaller than robin. June through October.

Black, with pale yellow eyes.

Found below 8000 feet in open country. In latter part of season it frequents roads and stable yards in dense flocks.

THICK-BILLED RED-WINGED BLACKBIRD. *Agelaius phœniceus fortis* Ridgw.

Smaller than robin. April to October 20.

Black, with red spot on shoulder.

Found below 8000 feet about open marshes, and often with the Brewer Blackbird.

CATBIRD. *Dumetella carolinensis* (Linn.)

Smaller than robin. June, July and August.

Dark slate-gray. A noted songster. Its call is a cat-like *mew*.

Rare and only found as yet below 6000 feet.

KINGBIRD. *Tyrannus tyrannus* (Linn.)

Smaller than robin. June through September.

Above, black and dark slate-gray; below, white, white terminal tail band.

Found below 7500 feet in open and meadows. Rare.

WATER OUZEL, or DIPPER. *Cinclus mexicanus unicolor* Bonap.

Smaller than robin. Common at all seasons.

Dark slate-gray.

Found along every rapid stream.

COWBIRD. *Molothrus ater ater* (Bodd.)

Smaller than robin. June through September.

Black; head and chest, brown. Notes, a metallic twitter and *kluck-see-e-e-e*.

Found below 7500 feet about horses and stables. Rare.

2. Birds with Black Markings

CLARK NUTCRACKER. *Nucifraga columbiana* (Wils.)

Larger than robin. Common at all seasons.

Gray; wings and tail marked with white and black. Its notes are harsh and strident.

Found in all parts of the Park.

WESTERN ROBIN. *Planesticus migratorius propinquus* (Ridgw.)

Found in the Park from March to November.

Black and slate-gray above; below, chestnut.

At all elevations, mostly on open meadows or nearby.

WESTERN EVENING GROSBEAK. *Hesperiphona vespertina montana* Ridgw.

Smaller than robin. Erratic, but might be seen any time.

Dull olive to yellow; crown, wings and tail, black.

Above 6500 feet in the coniferous forests.

CLIFF SWALLOW. *Petrochelidon lunifrons lunifrons* (Say)

Size of a sparrow. June through August.

Above, black; forehead, white; below, rufous and white.

Found below 8000 feet elevation.

BARN SWALLOW. *Hirundo erythrogastra* Bodd.

Size of sparrow, but with long forked tail. July and August.

Above, deep steel-blue; below, rufous.

Found below 8000 feet, but scarce and erratic.

MOUNTAIN CHICKADEE. *Penthestes gambeli gambeli* (Ridgw.)

Smaller than sparrow. Occurs at all seasons.

Cap and throat, black; upper parts, gray; white stripe above eye. Note, a mournful *phoe-dee-dee*.

At all elevations in the forests.

TREE SWALLOW. *Iridoprocne bicolor* (Vieill.)

Smaller than sparrow. April through August.

Above, dark steel-blue or greenish black; below, white.

Common below 8000 feet elevation.

ROCKY MOUNTAIN NUTHATCH. *Sitta carolinensis nelsoni* Mearns

Smaller than sparrow. Occurs at all seasons.

Crown, black; sides of head and below, white; above, gray; wings and tail marked with black and white.

At all elevations; partial to fir forests.

LONG-TAILED CHICKADEE. *Penthestes atricapillus septentrionalis* (Harris)

Smaller than sparrow. Occurs at all seasons.

Cap and throat, black; above, ashy; below, white. Has the familiar *chick-a-dee* call.

At all elevations in the forests; frequently with the Mountain Chickadee.

## 3. Birds with White Markings

RED-SHAFTED FLICKER. *Colaptes cafer collaris* Vigors

Larger than robin. February through November.

White rump and red wing and tail linings, conspicuous in flight.

Found between the 5500 and 9000 foot levels.

CLARK NUTCRACKER. *Nucifraga columbiana* (Wils.)

Larger than robin. Occurs at all seasons.

Gray; wings and tail marked with white and black. Its notes are harsh and strident.

Found in all parts of the Park.

ROCKY MOUNTAIN HAIRY WOODPECKER. *Dryobates villosus monticola* Anth.

A trifle larger than a robin. Occurs at all seasons.

Above, black with white stripes and spots; nape, scarlet.

Found in the forests, and prefers a mixture of aspens and coniferous trees.

WILLIAMSON SAPSUCKER. *Sphyrapicus thyroideus* (Cass.)

Slightly smaller than robin. May to September.

Above, black, rump white, white patch on wing; below, throat and breast black, belly yellow. Note, a shrill *huit-huit*, uttered while flying.

Found below 6500 feet in fir and aspen groves.

RED-NAPED SAPSUCKER. *Sphyrapicus varius nuchalis* Baird

Smaller than robin. May to October.

Crown, throat and nape, red; back, black and white; breast, black; belly, yellow.

Occasional in the groves of quaking aspen.

BATCHELDER WOODPECKER. *Dryobates pubescens homorus* Cab. & Heine

Larger than sparrow. Occurs at all seasons.

Above, black with white markings; red on back of head.

Found occasionally in the forests.

PACIFIC NIGHTHAWK. *Chordeiles virginianus hesperis* Grinn.

Larger than sparrow. June to September 15.

Gray-black with white bars on the wings. An erratic night flyer. Common at Upper Geyser Basin.

Also found over meadows and forests elsewhere.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys leucophrys* (J. R. Forster)

Same size as English Sparrow. Very abundant, May to October.

Head, striped black and white; white stripe not extending in front of eye; body color, gray and brown.

Found in brushy meadows at 6500 to 9000 feet.

WESTERN VESPER SPARROW. *Poæcetes gramineus confinis* Baird.

Smaller than English Sparrow. May to October.

Above, brownish gray, streaked; bend of wing, reddish brown.

Outer tail feathers, white, making a distinguishing mark in flight.

In sagebrush and large open spaces below 7000 feet.

PINK-SIDED JUNCO. *Junco hyemalis mearnsi* Ridgw.

Smaller than sparrow. March to November.

Head, neck, and chest, slate; back, brown; belly, white. White outer tail feathers a conspicuous field mark.

Common all through the *coniferous forests*.

4. Birds with Yellow or Orange Markings

WESTERN MEADOWLARK. *Sturnella neglecta* Aud.

Larger than robin. March to November.

Above, grayish brown with darker streaks; outer tail feathers, white; below, yellow with black crescent on breast.

Abundant in larger meadows and open country below 8000 feet.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus* (Bonap.)

Size of robin. June, July and August.

Black, with head and breast orange-yellow.

Found below 7800 feet in open marshes.

DESERT HORNED LARK. *Otocoris alpestris leucolama* (Coues)

Smaller than robin. April to October.

Above, brown; head with black tufts of elongated feathers ("horns"); throat, yellow.

At all elevations on grassy open lands.

WESTERN EVENING GROSBEAK. *Hesperiphona vespertina montana* Ridgw.

Smaller than robin. Erratic, but might be seen any time.

Dull olive to yellow; crown, wings and tail, black.

Above 6500 feet in the *coniferous forests*.

BOHEMIAN WAXWING. *Bombycilla garrula* (Linn.)

Larger than sparrow. Erratic; may occur at any season.

General color, fawn; belly and tip of tail, yellow.

An irregular wanderer, seen in flocks in cedars. Uncommon.

WESTERN TANAGER. *Piranga ludoviciana* (Wils.)

Larger than sparrow. June, July and August.

Head and neck, scarlet; back, black; rump and under parts, yellow.

Below 8000 feet, in the forested sections.



WESTERN FLYCATCHER. *Empidonax difficilis difficilis* Baird

Size of sparrow. May to September.

Above, olive-green; below, dull yellow; belly, eye-ring, wing marks, and under tail, brighter yellow.

Found between 6500 and 8000 feet.

AUDUBON WARBLER. *Dendroica auduboni auduboni* (J. K. Towns.)

Slightly smaller than sparrow. May to October.

Crown, throat, sides and rump, yellow; rest of plumage, bluish gray marked with black.

Abundant at all elevations, especially about edges of the forest.

PALE GOLDFINCH. *Astragalinus tristis pallidus* (Mearns)

Smaller than sparrow. June and July.

Crown, wings and tail, black; body, yellow.

Occurs below 6500 feet.

ORANGE-CROWNED WARBLER. *Vermivora celata celata* (Say)

Smaller than sparrow. June, July and August.

Above, olive changing to yellow on rump; crown, orange-brown.

A rare bird, sometimes seen along the Gardiner River.

YELLOW WARBLER. *Dendroica aestiva aestiva* (Gmel.)

Smaller than sparrow. June to September 20.

Above, yellowish green; below, yellow streaked with brown.

Found below 7500 feet.

MACGILLIVRAY WARBLER. *Oporornis tolmiei* (J. K. Towns.)

Smaller than sparrow. June, July and August.

Head and throat, ashy; back, olive-green; below, yellow.

A rare bird, sometimes seen below 6500 feet.

WESTERN YELLOW-THROAT. *Geothlypis trichas occidentalis* Brewst.

Smaller than sparrow. June, July and August.

Front and sides of head, black; above, olive-green; below, yellow.

Found below 6500 feet; common along the Gardiner River.

PILEOLATED WARBLER. *Wilsonia pusilla pileolata* (Pallas)

Smaller than sparrow. June, July and August.

Crown, black; rest of plumage, yellow.

Found below 7500 feet, and partial to willow-covered meadows.

PINE SISKIN. *Spinus pinus* (Wils.)

Smaller than sparrow. April to October.

Entire body streaked; wings and tail with yellow patches showing in flight especially.

Common in all forested sections; peculiarly fond of dandelion seed.

5. Birds with Red Markings

RED-SHAFTED FLICKER. *Colaptes cafer collaris* Vigors

Larger than robin. February through November.

White rump and red wing and tail linings, conspicuous in flight.

Found between 5500 and 9000 feet.

ROCKY MOUNTAIN HAIRY WOODPECKER. *Dryobates villosus monticola* Anth.

A trifle larger than a robin. Occurs at all seasons.

Above, black with white stripes and spots; nape, scarlet.

Found in the forests; prefers a mixture of aspens and coniferous trees.

RED-NAPED SAPSUCKER. *Sphyrapicus varius nuchalis* Baird

Smaller than robin. May to October.

Crown, throat and nape, red; back, black and white; breast, black; belly, yellow.

Occasional in the groves of quaking aspen.

THICK-BILLED RED-WINGED BLACKBIRD. *Agelaius phoeniceus fortis* Ridgw.

Smaller than robin. April to October 20.

Black, with red spot on shoulder.

Found below 8000 feet about open marshes, and often with the Brewer Blackbird.

ROCKY MOUNTAIN PINE GROSBEAK. *Pinicola enucleator montana* Ridgw.

Smaller than robin. March to December.

Carmine red, changing to gray on shoulders, belly and flanks.

Found in the coniferous forests.

BATCHELDER WOODPECKER. *Dryobates pubescens homorus* Cab. & Heine

Larger than sparrow. Occurs at all seasons.

Above, black with white markings; red on back of head.

Found occasionally in the forests.

CROSSBILL. *Loxia curvirostra minor* (Brehm)

Larger than sparrow. Very erratic, may be seen any time.

Red; wings and tail, blackish.

Can be told from grosbeak by smaller size and crossed bill.

SLATE-COLORED FOX SPARROW. *Passerella iliaca schistacea* Baird

Larger than English Sparrow. April to September.

Above, slaty with olive tinge; reddish on rump, wings and tail.

Very shy, found in brush at lowest elevations,

GREEN-TAILED TOWHEE. *Oberholseria chlorura* (Aud.)

A trifle larger than sparrow. May through September.  
Crown, chestnut; throat, white; above, grayish green.  
In brushy places below the 6500-foot level.

WESTERN TANAGER. *Piranga ludoviciana* (Wils.)

Larger than sparrow. June, July and August.  
Head and neck, scarlet; back, black; rump and under parts,  
yellow.  
Below 8000 feet, in the forested sections.

CASSIN PURPLE FINCH. *Carpodacus cassinii* Baird

Size of sparrow. April to September 20.  
Bright crimson patch on top of head; upper parts, brown  
streaked with lighter.  
Quite common about stables and other buildings.

RED-BREASTED NUTHATCH. *Sitta canadensis* Linn.

Smaller than sparrow. Occurs at all seasons.  
Crown, black; above, bluish gray; below, red-brown.  
Usually seen on the trunks of coniferous trees.

RUBY-CROWNED KINGLET. *Regulus calendula calendula* (Linn.)

Smaller than sparrow. April to September.  
Crown patch, scarlet; above, greenish olive.  
Found in the coniferous forests, usually where open.

RUFous HUMMINGBIRD. *Selasphorus rufus* (Gmel.)

Much smaller than sparrow. July and August.  
General color, reddish brown, with a flaming red throat.  
Very rare, seen once in Upper Geyser Basin.

CALLIOPE HUMMINGBIRD. *Stellula calliope* (Gould)

Much smaller than sparrow. July and August.  
General color green, with a rose purplish throat.  
Rare; has been seen about Mammoth.

## 6. Birds Partly or Largely Blue

BLACK HEADED JAY. *Cyanocitta stelleri annectens* (Baird)

Larger than robin. Occurs at all seasons.  
Head and crest, black; back, dark slate and blue; below, lighter.  
Found below 8500 feet in coniferous forests.

BELTED KINGFISHER. *Ceryle alcyon alcyon* (Linn.)

Larger than robin. Occurs at all seasons.  
A large crest. Upper parts, grayish blue marked with white  
and black. A characteristic rattling call.  
Found along practically every stream.

MOUNTAIN BLUEBIRD. *Sialia currucoides* (Bech.)

Larger than sparrow. March through October.  
Above, azure-blue; below, pale greenish blue.  
Very abundant; found at all elevations.

LAZULI BUNTING. *Passerina amœna* (Say)

Smaller than sparrow. June and July.  
Head and upper surface, bright blue; breast, chestnut-brown.  
In brushy open spaces below 6000 feet.

7. Birds with Green Markings

NORTHERN VIOLET-GREEN SWALLOW. *Tachycineta thalassina lepida*  
Mearns

Larger than sparrow. June, July and August.  
Crown, green; back, purplish green; rump, violet.  
Common locally throughout the Park.

GREEN-TAILED TOWHEE. *Oberholseria chlorura* (Aud.)

A trifle larger than sparrow. May through September.  
Crown, chestnut; throat, white; above, grayish green.  
In brushy places below the 6500-foot level.

WESTERN WARBLING VIREO. *Vireosylva gilva swainsoni* (Baird)

Smaller than sparrow. June to September 15.  
Above, gray olive-green; below, white tinged with yellow.  
Scarce, but might be seen almost anywhere below 8000 feet.

ORANGE-CROWNED WARBLER. *Vermivora celata celata* (Say)

Smaller than sparrow. June, July and August.  
Above, olive changing to yellow on rump; crown, orange-brown.  
A rare bird, sometimes seen along the Gardiner River.

WESTERN YELLOW-THROAT. *Geothlypis trichas occidentalis* Brewst.

Smaller than sparrow. June, July and August.  
Front and sides of head, black; above, olive-green; below,  
yellow.  
Found below 6500 feet; common along the Gardiner River.

RUBY-CROWNED KINGLET. *Regulus calendula calendula* (Linn.)

Smaller than sparrow. April to September.  
Crown patch, scarlet; above, greenish olive.  
Found in the coniferous forests, usually where open.

CALLIOPE HUMMINGBIRD. *Stellula calliope* (Gould)

Much smaller than sparrow. July and August.  
General color, green with a rose purplish throat.  
Rare, but has been seen about Mammoth.

## 8. Brown, Gray, and Obscurely Colored Birds

ROCKY MOUNTAIN JAY or CAMP ROBBER. *Perisoreus canadensis capitalis* Ridgw.

Larger than robin. Occurs at all seasons.

Crown, white; nape, dark gray; rest of plumage, lighter gray.

Common above the 6500-foot level.

OLIVE-SIDED FLYCATCHER. *Nuttallornis borealis* (Swains.)

Smaller than robin. June, July and August.

Above, dark olive-brown; below, white; sides, olive-brown.

Not common anywhere.

BOHEMIAN WAXWING. *Bombycilla garrula* (Linn.)

Larger than sparrow. Erratic, may occur at any season.

General color, fawn; belly and tip of tail, yellow.

An irregular wanderer; seen in flocks in cedars. Uncommon.

TOWNSEND SOLITAIRE. *Myadestes townsendi* (Aud.)

Larger than sparrow. Occurs at all seasons.

Above, brownish gray; below, paler; wing with two white bars and a buff band showing in flight.

Below 8000 feet; never more than a pair at a time.

AUDUBON HERMIT THRUSH. *Hylocichla guttata auduboni* (Baird)

Larger than sparrow. May to September 20.

Above, grayish brown; tail, rufous; below, white; breast with dark spots.

Frequents dark places in the forest. Uncommon.

SLATE-COLORED FOX SPARROW. *Passerella iliaca schistacea* Baird

Larger than English Sparrow. April to September.

Above, slaty with olive tinge; reddish on rump, wings and tail.

Very shy; found in brush at lowest elevations.

PIPIT. *Anthus rubescens* (Tuns.)

Larger than sparrow. May to November.

Above, grayish brown; outer tail feathers largely white; below, pale buff. When flushed, it springs up uttering a series of *cheeps*.

Above timber line in summer; later, in the lower valleys.

ROCKY MOUNTAIN NUTHATCH. *Sitta carolinensis nelsoni* Mearns

Same size as sparrow. Occurs at all seasons.

Crown, black; sides of head and below, white; above, gray; wings and tail marked with black and white.

At all elevations, but mostly in the fir forests.

WRIGHT FLYCATCHER. *Empidonax wrighti* Baird

Size of sparrow. June to September 20.

Above, grayish olive; two white wing bars; below, white.

Common about the lower levels, but a few go up to 7500 feet.

WESTERN SAVANNAH SPARROW. *Passerculus sandwichensis alaudinus* Bonap.

Size of English Sparrow. May to September.

Crown stripe and line above eye, white; above, gray-brown; below, white; streaked everywhere.

Very shy but common in the grassy meadows, 7000 to 8000 feet.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys leucophrys* (J. R. Forster)

Size of English Sparrow. Very abundant, May to October 20.

Head, striped black and white; white stripe not extending in front of eye; body color, gray and brown.

Found in brushy meadows from 6500 to 9000 feet.

ROCK WREN. *Salpinctes obsoletus obsoletus* (Say)

Size of sparrow. May to October.

White line above eye; above, gray-brown dotted with black and white; rump, cinnamon-brown.

Common throughout the open northern section.

MOUNTAIN SONG SPARROW. *Melospiza melodia montana* Hensh.

Size of English Sparrow. March to October.

Crown, dull bay; above, gray streaked with black and brown; below, white streaked with brown; a patch on breast. A fine songster.

Common in brush, especially willows, below 6500 feet.

BANK SWALLOW. *Riparia riparia* (Linn.)

Size of sparrow. May to September.

Above, mouse-brown; below, white with brown breast band.

Common locally where suitable sandbanks occur.

WESTERN VESPER SPARROW. *Poæcetes gramineus confinis* Baird

Smaller than English Sparrow. May to October.

Above, brownish gray, streaked; bend of wing, reddish brown.

Outer tail feathers white, making a distinguishing mark in flight.

In sagebrush and large open spaces, below 7000 feet.

PINK-SIDED JUNCO. *Junco hyemalis mearnsi* Ridgw.

Smaller than sparrow. March to November.

Head, neck and chest, slate; back, brown; belly, white. White outer tail feathers a conspicuous field mark.

Common throughout the coniferous forests.

LINCOLN SPARROW. *Melospiza lincolni lincolni* (Aud.)

Smaller than English Sparrow. June, July and August.

Above, grayish brown streaked with black; below, white; breast, sides and neck, streaked sharply and thickly.

Very shy; frequents the willow meadows above 7000 feet.

WESTERN HOUSE WREN. *Troglodytes aëdon parkmani* Aud.

Smaller than sparrow. June, July and August.

Dull brown, barred with dusky. A persistent singer of tinkling little songs.

Not common; but occasional about Mammoth.

RED-BREASTED NUTHATCH. *Sitta canadensis* Linn.

Smaller than sparrow. Occurs at all seasons.

Crown, black; above, bluish gray; below, red-brown.

Usually seen on the trunks of coniferous trees.

WESTERN CHIPPING SPARROW. *Spizella passerina arizonæ* Coues

Smaller than English Sparrow. May to September.

Crown, chestnut; above, brown streaked with black; below, white or grayish. Note: *chippy*, many times repeated.

Common below 8000 feet.

ROCKY MOUNTAIN CREEPER. *Certhia familiaris montana* Ridgw.

Smaller than sparrow. Occurs at all seasons.

Above, streaked black, white and rusty; below, white.

Seen climbing or "creeping" up coniferous tree trunks.

PINE SISKIN. *Spinus pinus* (Wils.)

Smaller than sparrow. April to October.

Entire body streaked; wings and tail with yellow patches showing conspicuously in flight.

Common in all forested sections. Especially fond of dandelion seed.

## LIST OF BIRDS OF THE YELLOWSTONE NATIONAL PARK

1. Western Grebe ..... *Æchmophorus occidentalis* (Lawr.)
2. Horned Grebe ..... *Colymbus auritus* Linn.
3. Eared Grebe ..... *Colymbus nigricollis californicus*  
(Heer.)
4. Pied-billed Grebe ... *Podilymbus podiceps* (Linn.)
5. Loon ..... *Gavia immer* (Brünn.)
6. California Gull ..... *Larus californicus* Lawr.
7. Ring-billed Gull .... *Larus delawarensis* Ord
8. Bonaparte Gull ..... *Larus philadelphia* (Ord)
9. Caspian Tern ..... *Sterna caspia imperator* (Coues)
10. Black Tern ..... *Chlidonias nigra surinamensis* (Gmel.)
11. White Pelican ..... *Pelecanus erythrorhynchos* Gmel.
12. Merganser ..... *Mergus americanus* Cass.
13. Hooded Merganser.. *Lophodytes cucullatus* (Linn.)
14. Mallard ..... *Anas platyrhynchos* Linn.
15. Gadwall ..... *Chaulelasmus streperus* (Linn.)
16. Baldpate ..... *Mareca americana* (Gmel.)



17. Green-winged Teal... *Nettion carolinense* (Gmel.)
18. Blue-winged Teal ... *Querquedula discors* (Linn.)
19. Cinnamon Teal ..... *Querquedula cyanoptera* (Vieill.)
20. Shoveller ..... *Spatula clypeata* (Linn.)
21. Pintail ..... *Dafla acuta tztzihoa* (Vieill.)
22. Wood Duck ..... *Aix sponsa* (Linn.)
23. Redhead ..... *Marila americana* (Eyton)
24. Canvas-back ..... *Marila valisineria* (Wils.)
25. Scaup Duck ..... *Marila marila* (Linn.)
26. Lesser Scaup Duck.. *Marila affinis* (Eyton)
27. Golden-eye ..... *Glaucionetta clangula americana*  
(Bonap.)
28. Barrow Golden-eye.. *Glaucionetta islandica* (Gmel.)
29. Buffle-head ..... *Charitonetta albeola* (Linn.)
30. Pacific Harlequin  
Duck ..... *Histrionicus histrionicus pacificus*  
Brooks.
31. Scoter ..... *Oidemia americana* Swains.
32. White-winged Scoter. *Oidemia deglandi* Bonap.
33. Ruddy Duck ..... *Erismatura jamaicensis* (Gmel.)
34. Snow Goose ..... *Chen hyperboreus hyperboreus* (Pallas)
35. Canada Goose ..... *Branta canadensis canadensis* (Linn.)
36. Hutchins Goose .... *Branta canadensis hutchinsi* (Rich.)
37. Whistling Swan .... *Cygnus columbianus* (Ord)
38. Trumpeter Swan .... *Cygnus buccinator* Rich.
39. White-faced Glossy  
Ibis ..... *Plegadis guarauna* (Linn.)
40. Great Blue Heron... *Ardea herodias treganzai* Court.
41. Whooping Crane .... *Grus americana* (Linn.)
42. Little Brown Crane.. *Grus canadensis* (Linn.)
43. Sandhill Crane ..... *Grus mexicana* (Müll.)
44. Sora ..... *Porzana carolina* (Linn.)
45. Coot ..... *Fulica americana* Gmel.
46. Northern Phalarope.. *Lobipes lobatus* (Linn.)
47. Wilson Phalarope ... *Steganopus tricolor* Vieill.
48. Avocet ..... *Recurvirostra americana* Gmel.
49. Wilson Snipe ..... *Gallinago delicata* (Ord)
50. Pectoral Sandpiper.. *Pisobia maculata* (Vieill.)
51. Baird Sandpiper .... *Pisobia bairdi* (Coues)
52. Least Sandpiper .... *Pisobia minutilla* (Vieill.)
53. Greater Yellow-legs.. *Totanus melanoleucus* (Gmel.)
54. Yellow-legs ..... *Totanus flavipes* (Gmel.)
55. Western Solitary  
Sandpiper ..... *Tringa solitaria cinnamomea* (Brewst.)
56. Western Willet ..... *Catoptrophorus semipalmatus inornatus*  
(Brewst.)
57. Spotted Sandpiper .. *Actitis macularia* (Linn.)
58. Long-billed Curlew.. *Numenius americanus* Bech.
59. Killdeer ..... *Oxyechus vociferus* (Linn.)

60. Ruddy Turnstone ... *Arenaria interpres morinella* (Linn.)
61. Richardson Grouse .. *Dendragapus obscurus richardsoni*  
(Doug.)
62. Franklin Grouse .... *Canachites franklini* (Doug.)
63. Gray Ruffed Grouse. *Bonasa umbellus umbelloides* (Doug.)
64. Columbian Sharp-  
tailed Grouse ..... *Pediæcetes phasianellus columbianus*  
(Ord)
65. Sage Grouse ..... *Centrocercus urophasianus* (Bonap.)
66. Western Mourning  
Dove ..... *Zenaidura macroura marginella* (Wood-  
house)
67. Marsh Hawk ..... *Circus hudsonius* (Linn.)
68. Sharp-shinned Hawk. *Accipiter velox* (Wils.)
69. Cooper Hawk ..... *Accipiter cooperi* (Bonap.)
70. Goshawk ..... *Astur atricapillus* (Wils.) subsp?
71. Western Red-tailed  
Hawk ..... *Buteo borealis calurus* Cass.
72. Swainson Hawk .... *Buteo swainsoni* Bonap.
73. Rough-legged Hawk. *Archibuteo lagopus sancti-johannis*  
(Gmel.)
74. Ferruginous Rough-  
leg ..... *Archibuteo ferrugineus* (Lich.)
75. Golden Eagle ..... *Aquila chrysaetos* (Linn.)
76. Bald Eagle ..... *Haliaëtus leucocephalus leucocephalus*  
(Linn.)
77. Prairie Falcon ..... *Falco mexicanus* Schlegel
78. Duck Hawk ..... *Falco peregrinus anatum* Bonap.
79. Pigeon Hawk ..... *Falco columbarius columbarius* Linn.
80. Desert Sparrow Hawk *Cerchneis sparveria phalæna* (Less.)
81. Osprey ..... *Pandion haliaëtus carolinensis* (Gmel.)
82. Long-eared Owl .... *Asio wilsonianus* (Less.)
83. Short-eared Owl .... *Asio flammeus* (Pont.)
84. Rocky Mountain  
Screech Owl ..... *Otus asio maxwelliæ* (Ridgw.)
85. Western Horned Owl *Bubo virginianus pallescens* Stone
86. Hawk Owl ..... *Surnia ulula caparoch* (Müll.)
87. Rocky Mountain  
Pygmy Owl ..... *Glaucidium gnoma pinicola* Nelson
88. Belted Kingfisher ... *Ceryle alcyon alcyon* (Linn.)
89. Rocky Mountain  
Hairy Woodpecker. *Dryobates villosus monticola* Anth.
90. Batchelder Wood-  
pecker ..... *Dryobates pubescens homorus* Cab. &  
Heine
91. Arctic Three-toed  
Woodpecker ..... *Picoides arcticus* (Swains.)
92. Alpine Three-toed  
Woodpecker ..... *Picoides americanus dorsalis* Baird

93. Red-naped Sapsucker *Sphyrapicus varius nuchalis* Baird
94. Williamson Sapsucker *Sphyrapicus thyroideus* (Cass.)
95. Red-headed Wood-  
pecker . . . . . *Melanerpes erythrocephalus* (Linn.)
96. Lewis Woodpecker . . *Asyndesmus lewisi* Riley
97. Red-shafted Flicker.. *Colaptes cafer collaris* Vigors
98. Pacific Nighthawk . . *Chordeiles virginianus hesperis* Grinn.
99. White-throated Swift. *Aëronautus melanoleucos* (Baird)
100. Broad-tailed Hum-  
mingbird . . . . . *Selasphorus platycercus* (Swains.)
101. Rufous Humming-  
bird . . . . . *Selasphorus rufus* (Gmel.)
102. Calliope Humming-  
bird . . . . . *Stellula calliope* (Gould)
103. Kingbird . . . . . *Tyrannus tyrannus* (Linn.)
104. Say Phoebe . . . . . *Sayornis sayus* (Bonap.)
105. Olive-sided Flycatcher *Nuttallornis borealis* (Swains.)
106. Western Wood Pewee *Myiochanes richardsoni richardsoni*  
(Swains.)
107. Western Flycatcher.. *Empidonax difficilis difficilis* Baird
108. Traill Flycatcher . . . *Empidonax trailli trailli* (Aud.)
109. Hammond Flycatcher *Empidonax hammondi* (Xantus)
110. Wright Flycatcher . . *Empidonax wrighti* Baird
111. Pallid Horned Lark.. *Otocoris alpestris arcticola* (Linn.)
112. Hoyt Horned Lark.. *Otocoris alpestris hoyti* Bishop
113. Desert Horned Lark. *Otocoris alpestris leucolæma* (Coues)
114. Black-billed Magpie.. *Pica pica hudsonia* (Sabine)
115. Black-headed Jay . . . *Cyanocitta stelleri annectens* (Baird)
116. Rocky Mountain Jay. *Perisoreus canadensis capitalis* Ridgw.
117. Raven . . . . . *Corvus corax sinuatus* Wag.
118. Western Crow . . . . . *Corvus brachyrhynchos hesperis* Ridgw.
119. Clark Nutcracker . . *Nucifraga columbiana* (Wils.)
120. Piñon Jay . . . . . *Cyanocephalus cyanocephalus* (Wied)
121. Bobolink . . . . . *Dolichonyx oryzivorus* (Linn.)
122. Cowbird . . . . . *Molothrus ater ater* (Bodd.)
123. Yellow-headed Black-  
bird . . . . . *Xanthocephalus xanthocephalus*  
(Bonap.)
124. Thick-billed Red-wing *Agelaius phæniceus fortis* Ridgw.
125. Western Meadowlark *Sturnella neglecta* Aud.
126. Brewer Blackbird . . . *Euphagus cyanocephalus* (Wag.)
127. Western Evening  
Grosbeak . . . . . *Hesperiphona vespertina montana*  
Ridgw.
128. Rocky Mountain Pine  
Grosbeak . . . . . *Pinicola enucleator montana* Ridgw.
129. Cassin Purple Finch. *Carpodacus cassini* Baird
130. Crossbill . . . . . *Loxia curvirostra minor* (Brehm)

131. White-winged Cross-bill . . . . . *Loxia leucoptera* Gmel.
132. Gray-crowned Rosy Finch . . . . . *Leucosticte tephrocotis tephrocotis* Swains.
133. Hepburn Rosy Finch. *Leucosticte tephrocotis littoralis* Baird
134. Black Rosy Finch. . . *Leucosticte atrata* Ridgw.
135. Redpoll . . . . . *Acanthis linaria linaria* (Linn.)
136. Pale Goldfinch . . . . *Astragalinus tristis pallidus* (Mearns)
137. Pine Siskin . . . . . *Spinus pinus* (Wils.)
138. English Sparrow . . . *Passer domesticus* (Linn.)
139. Snow Bunting . . . . *Plectrophenax nivalis nivalis* (Linn.)
140. Alaska Longspur . . . *Calcarius lapponicus alascensis* Ridgw.
141. Western Vesper Sparrow . . . . . *Poæcetes gramineus confinis* Baird
142. Western Savannah Sparrow . . . . . *Passerculus sandwichensis alaudinus* Bonap.
143. Western Lark Sparrow . . . . . *Chondestes grammacus strigatus* Swains.
144. White-crowned Sparrow . . . . . *Zonotrichia leucophrys leucophrys* (J. R. Forster)
145. Gambel Sparrow . . . *Zonotrichia leucophrys gambeli* (Nutt.)
146. White-throated Sparrow . . . . . *Zonotrichia albicollis* (Gmel.)
147. Western Tree Sparrow . . . . . *Spizella monticola ochracea* Brewst.
148. Western Chipping Sparrow . . . . . *Spizella passerina arizonæ* Coues
149. Brewer Sparrow . . . *Spizella breweri* Cass.
150. Intermediate Junco. . *Junco hyemalis connectens* Coues
151. Montana Junco . . . . *Junco hyemalis montanus* Ridgw.
152. Pink-sided Junco . . . *Junco hyemalis mearnsi* Ridgw.
153. Mountain Song Sparrow . . . . . *Melospiza melodia montana* Hensh.
154. Lincoln Sparrow . . . *Melospiza lincolni lincolni* (Aud.)
155. Slate-colored Fox Sparrow . . . . . *Passerella iliaca schistacea* Baird
156. Spurred Towhee . . . *Pipilo maculatus montanus* Swarth
157. Green-tailed Towhee. *Oberholseria chlorura* (Aud.)
158. Black-headed Grosbeak . . . . . *Zamelodia melanocephala* (Swains.)
159. Lazuli Bunting . . . . *Passerina amana* (Say)
160. Lark Bunting . . . . . *Calamospiza melanocorys* Stej.
161. Western Tanager . . . *Piranga ludoviciana* (Wils.)
162. Cliff Swallow . . . . *Petrochelidon lunifrons lunifrons* (Say)
163. Barn Swallow . . . . *Hirundo erythrogastra* Bodd.

164. Tree Swallow ..... *Iridoprocne bicolor* (Vieill.)  
 165. Northern Violet-green Swallow ..... *Tachycineta thalassina lepida* Mearns  
 166. Bank Swallow ..... *Riparia riparia* (Linn.)  
 167. Rough-winged Swallow ..... *Stelgidopteryx serripennis* (Aud.)  
 168. Bohemian Waxwing. *Bombycilla garrula* (Linn.)  
 169. Northern Shrike .... *Lanius borealis* Vieill.  
 170. White-rumped Shrike *Lanius ludovicianus excubitorides* Swains.  
 171. Western Warbling Vireo ..... *Vireosylva gilva swainsoni* (Baird)  
 172. Calaveras Warbler .. *Vermivora ruficapilla gutturalis* (Ridgw.)  
 173. Orange-crowned Warbler ..... *Vermivora celata celata* (Say)  
 174. Yellow Warbler .... *Dendroica aestiva aestiva* (Gmel.)  
 175. Myrtle Warbler .... *Dendroica coronata hooveri* McGregor  
 176. Audubon Warbler .. *Dendroica auduboni auduboni* (J. K. Towns.)  
 177. Townsend Warbler.. *Dendroica townsendi* (J. K. Towns.)  
 178. Macgillivray Warbler *Oporornis tolmiei* (J. K. Towns.)  
 179. Western Yellow-throat ..... *Geothlypis trichas occidentalis* Brewst.  
 180. Pileolated Warbler... *Wilsonia pusilla pileolata* (Pallas)  
 181. Pipit ..... *Anthus rubescens* (Tuns.)  
 182. Dipper; Water Ouzel. *Cinclus mexicanus unicolor* Bonap.  
 183. Sage Thrasher ..... *Oreoscoptes montanus* (J. K. Towns.)  
 184. Catbird ..... *Dumetella carolinensis* (Linn.)  
 185. Rock Wren ..... *Salpinctes obsoletus obsoletus* (Say)  
 186. Western House Wren *Troglodytes aëdon parkmani* Aud.  
 187. Western Marsh Wren *Telmatodytes palustris plesius* (Ober.)  
 188. Rocky Mountain Creeper ..... *Certhia familiaris montana* Ridgw.  
 189. Rocky Mountain Nuthatch ..... *Sitta carolinensis nelsoni* Mearns  
 190. Red-breasted Nuthatch ..... *Sitta canadensis* Linn.  
 191. Pygmy Nuthatch .... *Sitta pygmæa pygmæa* Vigors  
 192. Long-tailed Chickadee *Penthestes atricapillus septentrionalis* (Harris)  
 193. Mountain Chickadee. *Penthestes gambeli gambeli* (Ridgw.)  
 194. Western Golden-crowned Kinglet... *Regulus satrapa olivaceus* Baird  
 195. Ruby-crowned Kinglet ..... *Regulus calendula calendula* (Linn.)  
 196. Townsend Solitaire.. *Myadestes townsendi* (Aud.)  
 197. Willow Thrush ...., *Hylocichla fuscescens salicicola* Ridgw

198. Olive-backed Thrush. *Hylocichla ustulata swainsoni*  
(Tschudi)
199. Audubon Hermit  
Thrush . . . . . *Hylocichla guttata auduboni* (Baird)
200. Western Robin . . . . *Planesticus migratorius propinquus*  
(Ridgw.)
201. Western Bluebird . . . *Sialia mexicana occidentalis* J. K.  
Towns.
202. Mountain Bluebird . . *Sialia currucoides* (Bech.)

### ACKNOWLEDGMENTS

In the preparation of this paper, I have used mainly my own notes and data gathered during a series of years spent in the Yellowstone country; but in many ways I am indebted to others for valued help. To Mrs. Florence Merriam Bailey and Prof. Alvin G. Whitney I am especially grateful for critical help and advice on the preparation of the manuscript. To Dr. Frederic A. Lucas, and the American Museum of Natural History, my grateful thanks are given for the use of the Museum's extensive collection of bird skins, nests and eggs. From Dr. T. S. Palmer, and the late Prof. Wells W. Cooke of the Biological Survey of the U. S. Department of Agriculture, I have received much encouragement and advice. I am also indebted to Mr. Aretas A. Saunders of Fairfield, Conn., and to Col. Wirt Robinson of West Point, for many notes on birds seen in this and in neighboring territory; also to Mr. Edmund J. Sawyer, the present Park Naturalist, for records of the nesting of the Caspian Tern and Macgillivray Warbler. In addition, I have drawn rather freely on the writings of Mr. Leander S. Keyser, Mrs. Florence M. Bailey, Dr. Elliott Coues, Dr. Frank M. Chapman, and Neltje Blanchan; and I have received much confirmatory data from articles in *The Condor*, and from bird lists included in the reports of the various Superintendents of Yellowstone National Park. The plates accompanying this paper are reproduced from drawings executed by Mr. Edmund J. Sawyer, who gathered his materials directly in the field (during the seasons of 1922 and 1923) in order to show the characteristic birds of different habitats as accurately as possible in their natural Park surroundings. Mr. R. B. Rockwell, Mr. Edward R. Warren and Mr. George Shiras, 3rd, have been especially generous in furnishing photographs for illustrations, and the Editors of *The Condor* and *Natural History* have kindly loaned plates for a similar purpose. To all of these, as well as to various writers and photographers credited in the list of illustrations, I wish to express my thanks and appreciation.

## LIST OF REFERENCES

The following bibliography has been made as complete as possible by the inclusion of all titles known to mention Yellowstone Park birds.

BAILEY, FLORENCE M.

1916. *Handbook of Birds of the Western United States*. Pp. 1-590. Fifth edition. Boston.

An invaluable manual, although it makes no special reference to Yellowstone birds.

BAILEY, VERNON, and BAILEY, FLORENCE M.

1918. "The Birds." In *Wild Animals of Glacier National Park*, pp. 103-210. National Park Service, U. S. Dept. Interior.

A valuable reference book, as most Glacier Park species occur also in the Yellowstone.

BEARD, DAN

1901. In *a Wild Animal Republic*. Recreation, Vol. 15, Dec., 1901, p. 423.

Mentions a few birds in Yellowstone Park.

BENT, ARTHUR CLEVELAND

1921. *Life Histories of North American Gulls and Terns*. U. S. National Museum Bull. 113, pp. 1-345.

In the chapter on the California Gull mention is made of this species breeding in Yellowstone Park, page 131.

1922. *Life Histories of North American Petrels and Pelicans and Their Allies*. U. S. National Museum Bull. 121, pp. 1-343.

In the excellent chapter on the American White Pelican mention is made of the Yellowstone Lake breeding colony, page 292.

BURROUGHS, JOHN

1907. *Camping and Tramping with Roosevelt*. Pp. 1-111. Boston.

On pages 28-72 there are notes on the birds observed. See also Theodore Roosevelt's "Wilderness Reserves."

CARY, MERRITT

1917. *Life Zone Investigations in Wyoming*. U. S. Dept. Agriculture, Bur. Biological Survey, North American Fauna No. 42, pp. 1-95.



## CHAPMAN, FRANK M.

1908. *Camps and Cruises of an Ornithologist*. Pp. 1-432. New York.

Includes a most appreciative account of the life history of the White Pelican, and mentions the Yellowstone colony on page 371.

## COMSTOCK, THEO. B.

1874. *The Yellowstone National Park*. *The American Naturalist*, Vol. 8, No. 2, Feb., 1874, pp. 75-76.

Gives a list only, of 29 species.

## COUES, ELLIOTT

1874. *Birds of the Northwest*. U. S. Geological Survey of the Territories, Miscel. Publications No. 3, pp. 1-791.

Contains references to Merriam's work in the Yellowstone.

## GIGNOUX, CLAUDE

1920. *Note on the Nesting Habits of the Osprey in Yellowstone Park*. *The Condor*, Vol. 22, No. 6, Nov., 1920, p. 205.

## GRAVE, B. H. and WALKER, ERNEST P.

1916. *Wyoming Birds*. *University of Wyoming Bulletin*, Vol. 12, No. 6, pp. 1-137 (June 1, 1913; published Feb., 1916).

This account is supplementary to Knight's "The Birds of Wyoming."

## GRINNELL, GEORGE BIRD

1876. "Birds." In *Ludlow's Report of a Reconnaissance from Carroll, Montana, to Yellowstone National Park and Return, 1875*, pp. 72-92. U. S. War Dept.

## HAGUE, ARNOLD

1893. *The Yellowstone Park as a Game Reservation*. In *American Big-Game Hunting (The Book of the Boone and Crockett Club)*, pp. 268-269. New York.

## KNIGHT, WILBUR C.

1902. *The Birds of Wyoming*. *Wyoming Experiment Station (Laramie, Wyo.) Bull.* No. 55, pp. 1-174.

Repeats records by Merriam, Grinnell and Coues, but contains no new matter pertaining to Yellowstone National Park.

LINTON, EDWIN

1891. A Contribution to the Life History of *Dibothrium Cordiceps* Leidy, a Parasite Infesting the Trout of Yellowstone Lake. Bull. U. S. Fish Commission, Vol. 9, 1889 (1891), pp. 344-351.

Discusses the relation of the White Pelican to the parasitic worm in trout.

MEARNS, EDGAR A.

1903. Feathers Beside the Styx. *The Condor*, Vol. 5, No. 2, Mar., 1903, pp. 36-38.

MERRIAM, C. HART

1873. "Birds." In U. S. Geological Survey of the Territories (Montana, Idaho, Wyoming and Utah) 1872 (1873), pp. 670-715.

PALMER, T. S.

1907. Notes on Summer Birds of the Yellowstone National Park. Annual Rept., Superintendent Yellowstone National Park for 1907, pp. 15-23. U. S. Dept. Interior.

1912. The Calaveras Warbler in the Yellowstone National Park. *The Condor*, Vol. 14, No. 6, Nov., 1912, pp. 224-225.

ROBINSON, WIRT

- [An unpublished manuscript on birds noted in Yellowstone National Park during 1907.]

A copy of this paper was deposited, 1924, in the library of the Roosevelt Wild Life Forest Experiment Station, Syracuse, New York.

RIDGWAY, ROBERT

- 1901-1919. The Birds of North and Middle America. U. S. National Museum Bull. No. 50, Parts 1-8.

Contains references to work by Merriam, Grinnell and Coues.

ROOSEVELT, THEODORE

1904. Wilderness Reserves. In *American Big Game in its Haunts* (The Book of the Boone and Crockett Club), pp. 23-51. New York.

Roosevelt's account of his camping with John Burroughs in Yellowstone Park, April, 1903. Mentions a few birds on pages 42-43.

## SAUNDERS, ARETAS A.

1921. A Distributional List of the Birds of Montana. Cooper Ornithological Club, Pacific Coast Avifauna No. 14, pp. 1-194. Berkeley, Calif.

A valuable reference book although it does not refer to Yellowstone Park directly.

## SHIRAS, GEORGE, 3RD.

1913. Wild Animals That Took Their Own Pictures by Day and by Night. National Geographic Mag., Vol. 24. No. 7, July, 1913, pp. 809-820.

Contains a few references to aquatic birds and a picture of White Pelicans on Yellowstone Lake.

## SKINNER, MILTON P.

- \*1915. "Birds." In The Yellowstone National Park, 1915: General Information, pp. 49-55. U. S. Dept. Interior.
1916. The Nutcrackers of Yellowstone Park. The Condor, Vol. 18, No. 2, pp. 62-64.
- \*1916a. "Birds." In The Yellowstone National Park, 1916: General Information, pp. 56-64. U. S. Dept. Interior.
1917. Some Birds of the Yellowstone. American Museum Journal, Vol. 17, No. 2, pp. 129-134.
- \*1917a. "Birds." In General Information Regarding Yellowstone National Park, 1917, pp. 54-59. U. S. Dept. Interior.
- 1917b. The Ospreys of the Yellowstone. The Condor, Vol. 19, No. 4, pp. 117-121.
- 1917c. The Birds of Molly Island, Yellowstone National Park. The Condor, Vol. 19, No. 6, Nov., 1917, pp. 177-182.
1918. "Birds." In General Information Regarding Yellowstone National Park, 1918, pp. 61-66. National Park Service, U. S. Dept. Interior.
1919. "Birds." In General Information Regarding Yellowstone National Park, 1919, pp. 76-83. National Park Service, U. S. Dept. Interior.
- \*1919a. "Birds." In Report of the Director of the U. S. National Park Service for 1919, p. 173.
1920. Trumpeter Swan Breeding in Yellowstone Park. The Condor, Vol. 22, No. 2, Mar., 1920, p. 72.
- \*1920a. "Birds." In Rules and Regulations, Yellowstone National Park, 1920, pp. 80-90. National Park Service, U. S. Dept. Interior.

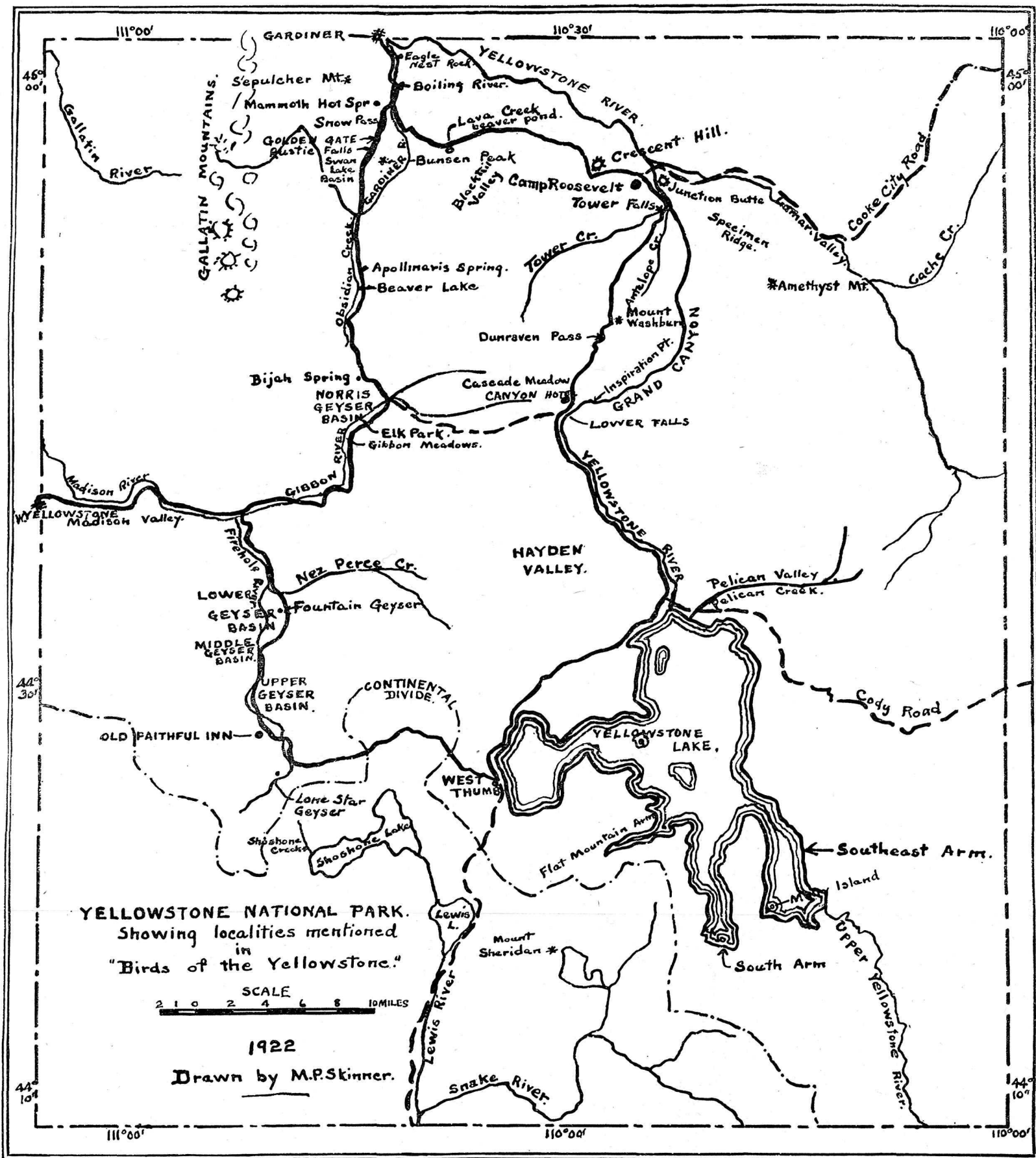
---

\* The notes on birds appearing in these official publications are by M. P. Skinner, Park Naturalist, although not there credited to him. See also, in this connection, Palmer, T. S., The Auk, Vol. 35, pp. 492-493; 1918.

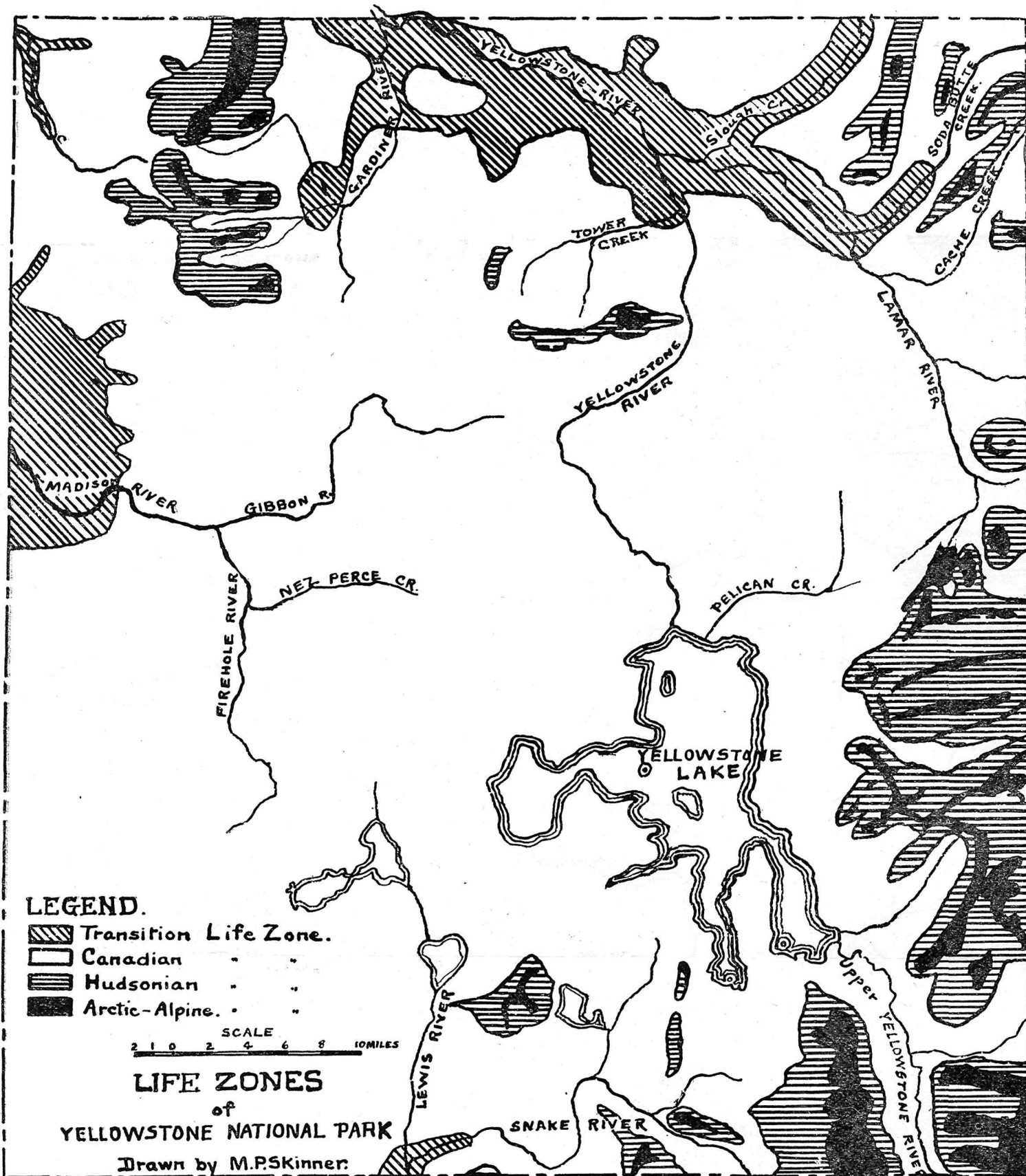
- \*1920b. "Birds." In Report of the Director of the U. S. National Park Service for 1920, pp. 208, 224-225.
  - 1920c. The Pink-sided Junco. *The Condor*, Vol. 22, No. 5, Sept., 1920, pp. 165-168.
  - 1921. Yellowstone Park, Wyo. [Christmas Bird Census.] In Bird-Lore's Twenty-first Christmas Census. *Bird-Lore*, Vol. 23, No. 1, Jan., 1921, p. 29.
  - \*1921a. "Birds." In Rules and Regulations, Yellowstone National Park, 1921, pp. 80-90. National Park Service, U. S. Dept. Interior.
  - 1921b. The Rocky Mountain Jay. *The Condor*, Vol. 23, No. 5, Sept., 1921, pp. 147-151.
  - \*1921c. "Birds." In Report of the Director of the U. S. National Park Service for 1921, pp. 179-180.
  - 1922. The Dipper. *The Condor*, Vol. 24, No. 1, Jan., 1922, pp. 18-21.
  - 1922a. "Birds." In Rules and Regulations, Yellowstone National Park, 1922, pp. 73-83. National Park Service, U. S. Dept. Interior.
  - \*1922b. "Birds." In Report of the Director of the U. S. National Park Service for 1922, p. 107.
  - 1923. Additions to the List of Birds from Yellowstone Park. *The Condor*, Vol. 25, No. 1, Jan., 1923, p. 28.
  - 1923a. Feeding Habits of the Rocky Mountain Hairy Woodpecker. *The Condor*, Vol. 25, No. 1, Jan., 1923, p. 32.
  - 1923b. "Birds." In Rules and Regulations, Yellowstone National Park, 1923, pp. 75-85, 100. National Park Service, U. S. Dept. Interior.
  - 1924. *The Yellowstone Nature Book*. Pp. 1-229. McClurg, Chicago.
- WARD, HENRY B.
- 1924. Banding White Pelicans. *The Condor*, Vol. 26, No. 4, July, 1924, pp. 136-140.
- WHEELER, OLIN D.
- 1893. *Wonderland*, 1893. Northern Pacific Railroad, St. Paul. Contains, on page 71, the earliest report of dead birds found at Stygian Cave.
- YOUNG, S. B. M.
- 1908. "Birds." In Annual Report of the Superintendent of the Yellowstone National Park, 1908, p. 11. U. S. Dept. Interior.

---

\* The notes on birds appearing in these official publications are by M. P. Skinner, *Park Naturalist*, although not there credited to him. See also, in this connection, Palmer, T. S., *The Auk*, Vol. 35, pp. 492-493; 1918.



Map 1. Yellowstone National Park, showing the highways and the localities mentioned in "The Birds of the Yellowstone National Park."



Map 2. The major faunal areas or "life zones" of Yellowstone National Park.

## INDEX

### A

Absaroka Mountains, 61, 93.  
 Alum Creek, 148, 152.  
 Amethyst Mountain, 73.  
 Antelope Creek, 73, 74.  
 Ants, as bird food, 82, 104.  
 Apollinaris Spring, 42.  
 Avocet, 171.

### B

Bailey, Mrs. Florence M., 68, 182.  
     reference to "Handbook of  
     Birds," 155.  
 Baldpate, 60, 111, 112, 148, 149, 170.  
 Bath Lake, 147.  
 Beaver Lake, 43, 152.  
 Big Game Range, 125.  
 Bijah Spring, 88.  
 Birds, accuracy in observing, 62.  
     duets of, 111.  
     influenced by hot springs, 85-92.  
     list of Yellowstone Park, 170-  
     176.  
     notes for field identification, 155-  
     170.  
     of the forests, 102-109.  
     of the high slopes, 56, 73, 80-81,  
     83-84.  
     of the meadows, 127-133.  
     of the open, 110-117.  
     of the small ponds, 111-112.  
     of the streams, 118-125.  
     of Yellowstone Lake, 93-102,  
     133-146, 153-155.  
     relative supremacy of, 112.  
     singing in beaver meadows, 129.  
     song periods, 111.  
     tameness under protection, 47,  
     49, 148, 153.  
 Blackbird, Brewer, 14, 26, 34, 46, 63,  
     74, 81, 88, 113, 160, 173.  
     albinos, 45.  
     flocking, 33, 55, 74.  
     migrating, 126-127.  
     nest, 14, 61.  
     tormenting Ravens, 60-61.  
 Red-winged, 15, 89, 149, 160, 165,  
     173.  
 Yellow-headed, 111, 132, 159, 163,  
     173.  
 Black Growler, 87.

Blacktail Creek valley, 74.  
 Bluebill, 149, 171. *See also* Scaup  
     Duck.  
 Bluebird, Mountain, 14, 16, 51, 74, 80,  
     87, 89, 111, 126, 129, 167, 176.  
     description, 26.  
     food, 26, 55, 80-81.  
     killed by storms, 27.  
     nesting habits, 26-27, 45, 80.  
     Western, 176.  
 Bobolink, 173.  
 Boiling River, 89, 150.  
 "Buffalo Bird," 117. *See also* Cow-  
     bird.  
 Buffalo Ranch, 117.  
 Buffle-head, 36, 60, 135, 149, 171.  
 Bunting, Lazuli, 20, 167, 174.  
     Snow, 174.  
     Lark, 174.

### C

Cache Creek, 110.  
 Camp Robber, 68. *See also* Jay,  
     Rocky Mountain.  
 Camp Roosevelt, 91.  
 Canvas-back, 149, 171.  
 Canyon Camp, 63.  
     birds seen near, 63-67.  
 Canyon Hotel, 67.  
     mammals near, 71.  
 Cascade Creek, 71, 73.  
 Catbird, 19, 20, 121, 160, 175.  
 Chickadee, Mountain, 24, 25, 46, 73,  
     80, 82, 86, 104, 105, 161, 175.  
     behavior, 104.  
     song, 25, 111.  
     Long-tailed, 104, 161, 175.  
 Christmas Tree Park, 47.  
 Columbine Creek, 141.  
 Condor, The, reference to, 155.  
 Coot, 81, 111, 112, 157, 171.  
     nest, 123.  
 Cowbird, 117, 160, 173.  
 Crane, Little Brown, 171.  
     Sandhill, 46, 157, 171.  
     compared with Heron, 49, 157.  
     Whooping, 171.  
 Creeper, Rocky Mountain, 25, 86,  
     104, 170, 175.  
 Crescent Hill, 74.  
 Crossbill, 165, 173.  
 White-winged, 174.



Crow, Clark; *see* Nutcracker.  
 Western, 15, 42, 60, 84, 85, 112, 113,  
 117, 159, 173.  
 Cub Creek, 141.  
 Curlew, Long-billed, 171.

## D

Delusion Lake, 154.  
 Dipper, 15, 36, 59, 87, 88, 89-90, 107,  
 119, 122, 125, 149, 160, 175.  
   habits, 15, 119-120.  
   nest, 19.  
   winter singing, 89, 111.  
 Dove, Western Mourning, 35, 158,  
 172.  
 Duck, Pacific Harlequin, 122, 125,  
 171.  
   Ruddy, 34, 149, 171.  
   Scaup, 149, 171.  
   Wood, 122, 125, 128, 171.  
 Ducks, call notes, 36.  
   expertness in rough water, 90.  
   in beaver ponds, 43.  
   wintering in Park, 90, 147.  
 Dunraven Pass, flowers, 73.  
   forests, 72-73.  
   view from, 73.

## E

Eagle, Bald, 84, 93, 101-102, 119, 172.  
 Golden, 60, 84, 93, 101, 113, 149, 172.  
   nesting, 84-85.  
 Eagle Nest Rock, 19.  
 Elk Park, 46.

## F

Falcon, Prairie, 114, 172.  
 Finch, Cassin Purple, 33, 36, 55, 63,  
 86, 166, 173.  
   description, 45.  
   Black Rosy, 84, 174.  
   Gray-crowned Rosy, 84, 174.  
   Hepburn Rosy, 84, 174.  
 Firehole River, 90, 126, 127, 147.  
 Fishing Bridge, 101.  
 Flicker, Red-shafted, 16, 80, 103, 162,  
 165, 173.  
   comparison with Northern Flick-  
   er, 55.  
   hybridizing, 55.  
   nest, 16, 55.  
 Flat Mountain Arm, 102, 141.  
 Flowers, 22, 48, 73, 74, 76.  
   alpine, 73.  
   inured to frost, 47.  
   meadow, 22, 61.  
 Flycatcher, Hammond, 173.  
   Olive-sided, 33, 168, 173.  
   Traill, 173.  
   Western, 33, 164, 173.  
   Wright, 33, 168, 173.

Food of birds, 21, 48, 82, 88, 104.  
 Forests; *see* Trees and shrubs.  
 Fountain Geyser, 51.

## G

Gadwall, 170.  
 Gallatin Mountains, 42.  
 Gallatin River, 118.  
 Gardiner, 13, 19, 25.  
 Gardiner Canyon, 15, 55.  
 Gardiner River, 17, 20, 23, 40, 75, 89,  
 90, 110, 118, 121, 147, 148, 150,  
 151, 152, 164, 167.  
 Gas, caves, 85-86.  
   effects on birds, 85-86.  
 Geysers, 88, 119, 127, 147.  
 Gibbon River, 46, 87, 90, 147, 149.  
 Gibbon Meadows, 46.  
 Glen Creek, 36.  
 Golden-eye, American, 122, 149, 171.  
   Barrow, 34, 36, 60, 61, 89, 90, 93,  
   122, 135, 148, 149, 156, 171.  
   diving, 63.  
 Golden Gate, 36.  
 Goldfinch, Pale, 164, 174.  
 Goshawk, 149, 172.  
 Goose, Canada, 43, 47, 48, 49, 93, 98-  
 100, 111, 128, 135, 149, 155, 157,  
 171.  
   hunted by coyote, 99.  
   nesting, 98.  
   protective poses, 99.  
   wintering in Park, 90, 98.  
 Hutchins, 171.  
 Snow, 171.  
 Grebe, 155.  
   Eared, 121-122, 124, 170.  
   Horned, 170.  
   Pied-billed, 170.  
   Western, 170.  
 Grosbeak, Black-headed, 174.  
   Rocky Mountain Pine, 72, 165, 173.  
   Western Evening, 161, 163, 173.  
 Grouse Creek, 139.  
 Grouse, Columbian Sharp-tailed, 172.  
 Franklin, 172.  
 Gray Ruffed, 42, 47, 107-109, 158,  
 172.  
   courting, 108.  
   drumming, 107.  
   habits, 107.  
   nesting, 108.  
   young, 108-109.  
 Richardson, 25, 51, 107, 158, 172.  
   booming, 83.  
   habits, 83.  
   nesting, 83.  
   roosting under snow, 83.  
   with brood, 73.  
 Sage, 172.  
 varieties, 25.

Gull, Bonaparte, 170.  
California, 59, 61, 64, 94-97, 99, 119,  
135, 142, 155, 170.  
feeding with bears, 59, 97.  
nest and young, 94.  
Ring-billed, 155, 170.

## H

Harlequin Duck, 122, 171.  
coasting downstream, 125.  
Hawk, Cooper, 172.  
Desert Sparrow, 15, 25, 109, 113;  
158, 172.  
habits, 113-114.  
hovering, 74, 113.  
mousing, 39, 113.  
pursued by Robin, 25.  
Duck, 149, 172.  
Ferruginous Rough-legged, 172.  
Goshawk, 149, 172.  
Marsh, 33, 159, 172.  
hunting habits, 63, 72, 74.  
range in Park, 63.  
Pigeon, 33, 159, 172.  
striking prey, 46.  
pursued by Robin, 47.  
Prairie Falcon, 114, 172.  
Rough-legged, 113, 172.  
Sharp-shinned, 172.  
Swainson, 22, 33, 39, 42, 158, 172.  
color phases, 63, 72.  
habits, 112.  
inoffensiveness, 39, 49.  
nest, 112.  
Western Red-tailed, 22, 33, 51, 73,  
112, 113, 158, 172.  
attacked by Nutcracker, 31, 112.  
fighting, 35, 112.  
inoffensiveness, 39.  
Hayden Valley, 61, 62, 63, 94, 110, 134.  
Heart Lake, 134, 141, 154.  
Henry's Lake, 126.  
Hermit Thrush, Audubon, 86, 168,  
176.  
Heron, Great Blue, 111, 129, 157, 171.  
compared with Crane, 49, 157.  
Hoodoos, 35.  
Hummingbird, Broad-tailed, 131, 173.  
Calliope, 33, 131, 166, 167, 173.  
Park species, 131.  
pugnacity, 131.  
Rufous, 131, 166, 173.

## I

Ibis, White-faced Glossy, 171.

## J

Jackson Lake, 126, 127, 141.  
Jay, Black-headed, 43, 73, 159, 166,  
173.

Jay, Black-headed, description, 43.  
Piñon, 173.  
Rocky Mountain, 43, 64, 73, 168,  
173.  
call notes, 71.  
friendly manners, 68.  
nesting habits, 68-71.  
Junco, Intermediate, 174.  
Montana, 174.  
Pink-sided, 25, 43, 51, 56, 59, 63,  
73, 81, 86, 163, 169, 174.  
behavior in storms, 57.  
feeding on oats, 35, 57.  
nesting, 57.  
victim of gas, 86.  
Junction Butte, 111, 153.  
Jupiter Terrace, 87, 88, 147, 148, 149.

## K

Killdeer, 34, 87, 88, 111, 149, 157, 171.  
habits with young, 42.  
Kingbird, 14, 113, 132, 160, 173.  
Kingfisher, Belted, 16, 46, 107, 119,  
120, 166, 172.  
feeding habits, 20, 90.  
Kinglet, Ruby-crowned, 51, 166, 167,  
175.  
song, 82-83.  
Western Golden-crowned, 175.

## L

Lake Camp, 59, 142.  
Lake Hotel, 142.  
Lamar River, 151.  
Lamar Valley, 75, 81, 110, 111.  
Lark, Desert Horned, 81, 163, 173.  
habits, 116.  
Hoyt Horned, 173.  
Pallid Horned, 173.  
Lark Bunting, 174.  
Lava Creek, 75.  
Lava Creek Pond, 101, 151, 152.  
Lazuli Bunting, 20, 167, 174.  
Lewis Lake, 126, 134, 141, 154.  
Lewis River, 126, 127.  
Lindsley, Chester A., 89.  
Longspur, Alaska, 174.  
Loon, 155, 170.

## M

Madison River, 46, 47, 90, 118, 125,  
126.  
Magpie, Black-billed, 71, 86, 173.  
Mallard, 34, 36, 40, 46, 49, 51, 60, 66,  
74, 87, 88, 89, 90, 93, 101, 112,  
122, 125, 128, 135, 144-152, 155,  
156, 170.  
associating with other birds, 148-  
149.

- Mallard, bathing and preening habits, 40, 151.  
 enemies, 149.  
 expertness in swimming, 147.  
 fearlessness in Park, 148.  
 feeding, 151.  
 flight, 149.  
 habitats, 144, 147.  
 in winter, 87, 150-151.  
 mating, 151-152.  
 migration, 150.  
 moulting, 41, 152.  
 near geysers and hot springs, 147.  
 nesting, 40, 152.  
 seasonal, movements, 144-147, 150-151.  
 sleeping, 40, 45, 151.  
 "tipping," 151.  
 voices, 150.  
 young, 41, 152.
- Mammals, antelope, 74.  
 beaver, 128, 149.  
 black or brown bear, 35, 59, 71, 75, 97.  
 chipmunk, 35, 71.  
 coyote, 45, 99, 135-136, 149.  
 elk, 61, 71, 74, 136, 153.  
 fox, 45, 73.  
 grizzly bear, 61, 71.  
 ground squirrel, 35, 41, 71.  
 meadow mouse, 72.  
 mink, 45.  
 moose, 149.  
 mule deer, 71, 74.  
 muskrat, 41, 101, 149.  
 pika or rock rabbit, 35.  
 woodchuck, 35, 43, 71.
- Mammoth Hot Springs, 22, 84, 87, 89, 126, 147, 150, 166, 167, 170.  
 as a bird haunt, 22, 25, 33-34.  
 birds at, 33-34.  
 trees, 25.
- Meadowlark, Western, 14, 51, 110-111, 126, 163, 173.  
 compared with eastern Meadowlark, 21, 56.  
 nesting, 21.  
 song, 14, 21, 110-111.
- Merganser, 51, 60, 99-101, 125, 135, 148, 156, 170.  
 Hooded, 170.  
 Red-breasted, 99.  
 robbed by Gull, 62-63, 97, 99.  
 robbed by Pelican, 94, 99, 140.
- Middle Geyser Basin, 85.
- Migration, affected by late ice, 93.  
 of Brewer Blackbirds, 126-127.  
 of Mallards, 150.  
 routes in Park, 111, 125-127.  
 seen from mountains, 84.  
 vertical, 81, 125.
- Molly Island, 91, 93, 94, 95, 134, 135, 136, 137, 138, 140, 141, 142, 144, 145, 146.
- Mount Washburn, 73, 110.  
 as a bird haunt, 75-85.  
 description, 75.  
 trees and flowers, 76.
- Mourning Dove, Western, 35, 158, 172.
- "Muskrat Pond," 147, 148, 149, 152.
- N
- Nez Percé Valley, 110.
- Nighthawk, Pacific, 33, 162, 173.  
 coloring, 57.  
 nesting habits, 57.
- Norris Geyser Basin, 45.
- Nutcracker, Clark, 15, 36, 42, 55, 73, 74, 75, 86, 113, 125, 161, 162, 173.  
 description, 28.  
 food habits, 31.  
 habitat, 28-31.  
 habits, 32.  
 nesting, 32-33.  
 pugnacity, 31-32, 45.
- Nuthatch, Pygmy, 175.
- Red-breasted, 86, 104, 166, 170, 175.  
 foraging habits, 82.
- Rocky Mountain, 25, 80, 86, 104, 107, 161, 168, 175.  
 as a creeper, 107.
- O
- Obsidian Creek, 43.
- Old Faithful Inn, 52-55, 61, 127.
- Osprey, 19, 20, 61, 119, 133, 149, 158, 172.  
 as a fish eater, 51.  
 compared with Eagle, 19.  
 fishing habits, 66, 113, 140.  
 home life, 66.  
 nesting in Grand Canyon, 64.
- Ouzel, Water; *see* Dipper.
- Owl, Hawk, 172.  
 Long-eared, 172.
- Rocky Mountain Pygmy, 109, 172.
- Rocky Mountain Screech, 43, 172.
- Short eared, 43, 114, 159, 172.
- Snowy, 84.
- Western Horned, 22, 43, 84, 109, 159, 172.  
 catching ground squirrel, 41.  
 nesting, 109.
- P
- Pelican Creek, 93, 97, 110, 134.
- Pelican Hot Springs, 87.
- Pelican Valley, 134, 141.
- Pelican, Brown, 63, 140.
- White, 59, 93-94, 99, 102, 133-144, 156, 170.

- Pelican, White, and coyotes, 135-136.  
 association with other birds, 135.  
 bathing and preening, 141.  
 breeding, 142.  
 breeding range, 141-142.  
 courtship, 141.  
 disposition, 135.  
 diving, 63, 140.  
 enemies, 135-136, 138, 144.  
 fishing grounds, 140-141.  
 fishing habits, 94, 139-140.  
 flight, 134, 136.  
 majestic beauty, 93.  
 migration, 139.  
 nest, 94.  
 numbers, 139.  
 parasites, 136.  
 range, 134.  
 requirements for nesting, 142.  
 voice, 139.  
 young, 94, 143.
- Pewee, Western Wood, 173.
- Phalarope, Northern, 171.
- Wilson, 97, 157, 171.
- Phoebe, Say, 86-87, 132, 173.
- Pine Grosbeak, Rocky Mountain, 72, 165, 173.
- Pintail, 60, 122, 128-129, 148, 156, 171.
- Pipit, 73, 81, 168, 175.  
 nesting, 84.
- Prismatic Lake, 85.
- Purple Finch, Cassin, 33, 36, 55, 63, 86, 166, 173.  
 description, 45.
- R
- Rail, Carolina; *see* Sora.
- Raven, 15, 60, 84, 85, 87, 113, 159, 173.  
 mobbing Eagles, 60.  
 tormented by Brewer Black-birds, 60-61.
- Red-head Duck, 149, 171.  
 robbed by Coot and Baldpate, 112.
- Redpoll, 174.
- Robin, Western, 15, 16, 25, 26, 42, 43, 45, 47, 51, 55, 86, 87, 89, 104, 107, 111, 126, 129, 161, 176.  
 albino, 62.  
 catching water insects, 34.  
 habits, 27, 81.  
 killed by storms, 27.
- Rosy Finch, Black, 84, 174.  
 Gray-crowned, 84, 174.  
 Hepburn, 84, 174.
- Ruddy Duck, 34, 149, 171.
- Rustic Fall, 36.
- S
- Sandpiper, Baird, 97, 171.  
 Least, 97, 171.  
 Pectoral, 171.
- Sandpiper, Spotted, 20, 26, 46, 51, 61, 87, 88, 97, 119, 135, 157, 171.  
 nesting site, 71.  
 habits, 120-121.
- Western Solitary, 87, 97, 157, 171.
- Sapsucker, Red-naped, 103-104, 162, 165, 173.
- Williamson, 26, 103, 160, 162, 173.  
 habits, 79.  
 mating antics, 79.  
 nesting, 79-80.
- Sawyer, E. J., 130, 135, 155.
- Scaup Duck, 149, 171.  
 Lesser, 171.
- Scoter, 171.  
 White-winged, 171.
- Shorebirds, 93, 97.
- Shoshone Creek, 127.
- Shoshone Lake, 127, 134, 141, 144.
- Shoveller, 122, 149, 171.
- Shrike, Northern, 114, 175.  
 White-rumped, 175.
- Silver Gate, 35.
- Siskin, Pine, 33, 86, 164, 170, 174.
- Snake River, 118, 125, 126, 127, 134, 141.
- Snipe, Wilson, 87, 90, 111, 131, 147, 149, 157, 171.  
 feeding habits, 131-132.
- Snow Bunting, 174.
- Snow Pass, 26.
- Soda Butte Creek, 152.
- Solitaire, Townsend, 82, 86, 168, 175.  
 song, 82, 111.
- Sora or Carolina Rail, 75, 171.
- South Arm, 101, 139.
- Southeast Arm, 101, 142, 154.
- Sparrow, Brewer, 174.  
 English, 34, 174.  
 Gambel, 174.  
 Lincoln, 42, 117, 169, 174.  
 Mountain Song, 14, 16, 20, 34, 87, 88, 89, 111, 169, 174.  
 song, 14.
- Slate-colored Fox, 165, 168, 174.
- Western Chipping, 16, 51, 62, 86, 170, 174.
- Western Lark, 174.
- Western Savannah, 61, 63, 117, 169, 174.  
 song, 133.
- Western Tree, 121, 174.
- Western Vesper, 39, 42, 117, 133, 163, 169, 174.  
 habitat, 116.  
 singing, 39.
- White-crowned, 26, 42, 47, 51, 55, 56, 71, 81, 162, 169, 174.  
 habits, 27-28.  
 nest, 33.  
 singing, 27, 35, 129.
- White-throated, 174.

Specimen Ridge, 73, 116.  
 Spring flowers, 21.  
   insects, 21.  
   harbingers, 87.  
 Storms, effects on birds, 81, 84.  
 Streams, influence on bird life, 118-119.  
 Stygian Cave, 86.  
 Swallow, 26, 88.  
   Bank, 169, 175.  
   Barn, 52, 161, 174.  
   Cliff, 13, 33, 34, 75, 161, 174.  
     adaptation in nesting, 52.  
     nesting habits, 67-68.  
     migration, 127.  
   Northern Violet-green, 16, 33, 51, 167, 175.  
     at Grand Canyon, 66-67.  
     description, 16.  
   Rough-winged, 175.  
   Tree, 14, 16, 33, 34, 36, 47, 51, 55, 75, 80, 102, 126, 161, 175.  
     food, 51.  
     migration, 126.  
     nesting, 41.  
 Swan Lake, 36, 40, 149, 150.  
 Swan Lake Basin, 36, 39, 128.  
 Swan, Trumpeter, 153-155, 157, 171.  
   description, 153.  
   disposition, 153.  
   flight, 154.  
   habitats, 153.  
   in a wilderness setting, 153.  
   nesting, 154.  
   records in Park, 154.  
   voice, 154.  
 Whistling, 90, 102, 149, 171.  
 Swift, White-throated, 173.

T

Tanager, Western, 16, 34, 55, 63, 86, 129, 163, 166, 174.  
   description, 52.  
   discovered by Lewis and Clark, 52.  
   flycatching, 16.  
   food habits, 52.  
   nesting, 52.  
 Teal, 46, 60, 149.  
   Blue-winged, 93, 101, 148, 152, 156, 171.  
     nesting, 101.  
   Cinnamon, 171.  
   Green-winged, 36, 101, 122, 128, 147, 148, 149, 156, 171.  
 Tern, Black, 97, 170.  
   Caspian, 170.  
     nesting on Molly Island, 135.  
 Teton Mountains, 126.  
 Thrasher, Sage, 175.

Thrush, Audubon Hermit, 86, 168, 176.  
   Olive-backed, 176.  
   Willow, 175.  
 Tower Creek, 74.  
 Tower Fall, 74, 91, 110.  
 Tower Fall Ranger Station, 74.  
 Towhee, Green-tailed, 20, 86, 89, 129, 166, 167, 174.  
   description, 20.  
   song, 20, 34.  
   Spurred, 174.  
 Trail Creek, 155.  
 Trees and shrubs, 22, 25, 39, 72, 73, 74, 103.  
   as conservers of water, 102.  
   as nesting sites, 102-103.  
 Trout Creek, 152.  
 Turbid Lake, 147, 148.  
 Turnstone, Ruddy, 172.

## U

Upper Geyser Basin, 52, 119, 127, 151, 162, 166.

## V

Vireo, Western Warbling, 86, 107, 167, 175.

## W

Warbler, Audubon, 34, 35, 43, 59, 75, 86, 129, 130, 164, 175.  
   feeding habits, 48, 62.  
   nest, 48.  
 Calaveras, 86, 130, 175.  
 Macgillivray, 86, 164, 175.  
   habits, 130.  
 Myrtle, 48, 129, 175.  
 Orange-crowned, 130, 164, 167, 175.  
 Pileolated, 34, 129, 164, 175.  
   characteristics, 39, 130-131.  
 Townsend, 86, 130, 175.  
 Yellow, 16, 33, 129, 164, 175.  
   nest, 130.  
   song, 16.  
 Waxwing, Bohemian, 84, 163, 168, 175.  
 West Thumb, 59, 87, 147.  
   hot water basin, 90.  
 Whitney, A. G., 135, 155.  
 Willet, Western, 97, 157, 171.  
 Wood Duck, 122, 125, 128, 171.  
 Woodpecker, Alpine Three-toed, 172.  
   Arctic Three-toed, 160, 172.  
   Bachelder, 103, 162, 165, 172.  
   Lewis, 159, 173.  
     habits, 132.  
   Red-headed, 173.  
   Rocky Mountain Hairy, 103, 162, 165, 172.

Wood Pewee, Western, 173.  
Wren, Rock, 74-75, 169, 175.  
    Western House, 170, 175.  
    Western Marsh, 175.

Y

Yanceys, 100.  
Yellow-legs, 171.  
    Greater, 97, 158, 171.  
Yellowstone Canyon, 64, 73, 102, 118,  
    147.  
Yellowstone Falls, 64.  
Yellowstone Lake, 59-61, 64, 73, 76,  
    91, 94, 99, 101, 102, 111, 118,  
    119, 126, 133, 134, 137, 138, 139,  
    141, 142, 144, 147, 149, 153, 154,  
    155, 156, 158.

Yellowstone Lake, description, 93.  
    waterfowl at outlet, 60, 90.  
Yellowstone Park, as a bird haunt,  
    13.  
    description of north part, 110.  
    forests; *see* Trees and shrubs.  
    waters, 118.  
Yellowstone River, 60, 62, 76, 90, 94,  
    99, 101, 102, 111, 118, 126, 134,  
    140, 144, 147, 150, 151, 155, 156,  
    158.  
    Upper Yellowstone, 93, 101, 125,  
        152, 156.  
Yellow-throat, Western, 16, 34, 111,  
    114, 129, 164, 167, 175.  
    nesting, 114.  
    song, 16, 111, 114.

## BIRDS AS PROTECTORS OF WOODLANDS

"A large number of birds participate in the destruction of forest insects, and it is fortunate that this is the case, for the insect foes of trees are legion. More than 500 different kinds of insects are known to live upon a single species of tree, and the number of individuals of these pests that are sometimes present is practically infinite. Bark infesting insects are among the most destructive enemies of the forest; they have been known to kill almost every tree of certain species over hundreds of square miles. Wood borers hasten the decay and disintegration of trees and are especially injurious to shade trees; leaf-feeding insects frequently strip trees or make them appear as if scorched by fire, and, in some cases, have threatened to destroy all of the trees upon which they feed over vast areas. The total damage to trees by insect pests is enormous, and several years ago was estimated to exceed \$110,000,000 annually. Not only is the damage extremely large, but the difficulties of directly combating insect pests in forests are so great that man is able to do comparatively little. The services of natural enemies of the destructive insects should therefore be highly appreciated. If they serve to reduce the damage by only a small percentage, the gain to the country is a very large sum. Among these enemies, birds are conspicuous. Their services are well known and have long been acknowledged. No reasons have thus far developed for considering any other group of the natural enemies of forest insects in general, more important than birds."

W. L. McATEE.

*American Forestry,*

Vol. 21, pp. 681-682; 1915.



## CURRENT STATION NOTES

---

### THE RELATION OF BIRDS TO PARKS AND FORESTS

It is now very generally conceded by students of wild life and by foresters that in wild forest lands and parks the birds are the most efficient means we have of holding in check the excessive increase of harmful insects. This is, of course, not only a practical argument for protecting birds but also one of the strongest economic arguments for their preservation, in both the National Forests and the National Parks. But in addition to this benefit the presence of birds in our National Parks has an interest and charm wholly independent of their protective value. The Yellowstone without its Western Tanager, Mountain Bluebird, Western Meadowlark, Rocky Mountain Jay, Dipper, Osprey, California Gull and White Pelican would, as abundantly illustrated in Mr. Skinner's account of the birds, lose much of its fascination for thousands of visitors who come here to see its far-famed wonders.

The visitor who dashes through the Park, with no particular interest in the less striking aspects of nature, is not likely to take time to very thoroughly appreciate any of the wonders about him. But the recreational and educational value of the less startling features—the forest trees and flowers, the birds and other animal life—cannot be overestimated. We must strive to develop in our Park visitors a more contemplative and appreciative attitude of mind toward wild nature in these solitudes. This is perhaps the most important and difficult lesson to learn, and one which lies at the very foundation of our opportunity and responsibility in passing on these great Parks to future generations in virgin freshness.

### THE BIRDS OF THE YELLOWSTONE

The present number of the *Bulletin*, devoted to the birds of the Yellowstone National Park, is the fourth contribution from the Roosevelt Station to our knowledge of the wild life of this, the greatest wild life preserve in America. The author of this paper, Mr. M. P. Skinner, has lived for nearly a generation in the Park, and while he has served it in several capacities he has always devoted himself to the study of birds. For the past several years, until recently, he has been the official Yellowstone Park Naturalist, the

first one to be appointed in the National Park Service. Without doubt every such Park should not only have its Naturalist, but there should be in most cases several of them, as the field is too large for one man, however capable. It is only a question of time until all our more important parks must be fully equipped with a scientific and a technical staff, in addition to the administrative officials. So long as the Parks had few visitors, and were almost wholly wild, the administrative officers were able to handle the situation, but now with their hundreds of thousands of visitors, they are rapidly becoming so congested as to be threatened with grave injury, a danger which only a technical staff, constantly on guard, can fully anticipate and ward off.

The Roosevelt Wild Life Station welcomes every opportunity to assist in this sort of constructive work. Several studies of the wild life of the Yellowstone have accordingly been made, as follows: Mr. Edward R. Warren on the beaver (published in part in the *Roosevelt Wild Life Bulletin*, Vol. 1, No. 2); Dr. Richard A. Muttkowski on the food of trout (*Bulletin*, Vol. 2, No. 4); and Mr. Edmund Heller on the big game animals (*Bulletin*, Vol. 2, No. 4). These studies were made possible through the cooperation of Mr. Howard H. Hays, President of the Yellowstone Park Camps Company; the naturalists who donated their services; and several enthusiastic friends of the Station and the Park who contributed funds. Further similar investigations are now in progress.

## THE ROOSEVELT WILD LIFE MEMORIAL

### As a State Memorial

The State of New York is the trustee of this wild life Memorial to Theodore Roosevelt. The New York State College of Forestry at Syracuse is a State institution supported solely by State funds, and the Roosevelt Wild Life Forest Experiment Station is a part of this institution. The Trustees are State officials. A legislative mandate instructed them as follows:

"To establish and conduct an experimental station to be known as 'Roosevelt Wild Life Forest Experiment Station,' in which there shall be maintained records of the results of the experiments and investigations made and research work accomplished; also a library of works, publications, papers and data having to do with wild life, together with means for practical illustration and demonstration, which library shall, at all reasonable hours, be open to the public." [Laws of New York, chapter 536. Became a law May 10, 1919.]

### As a General Memorial

While this Memorial Station was founded by New York State, its functions are not limited solely to the State. The Trustees are further authorized to cooperate with other agencies, so that the work is by no means limited to the boundaries of the State or by State funds. Provision for this has been made by the law as follows:

"To enter into any contract necessary or appropriate for carrying out any of the purposes or objects of the College, including such as shall involve cooperation with any person, corporation or association or any department of the government of the State of New York or of the United States in laboratory, experimental, investigative or research work, and the acceptance from such person, corporation, association, or department of the State or Federal government of gifts or contributions of money, expert service, labor, materials, apparatus, appliances or other property in connection therewith." [Laws of New York, chapter 42. Became a law March 7, 1918.]

By these laws the Empire State has made provision to conduct forest wild life research upon a comprehensive basis, and on a plan as broad as that approved by Theodore Roosevelt himself.

### Form of Bequest to the Roosevelt Wild Life Memorial

I hereby give and bequeath to the Roosevelt Wild Life Forest Experiment Station of The New York State College of Forestry at Syracuse, for wild life research, library, and for publication, the sum of ....., or the following books, lands, etc.

ROOSEVELT WILD LIFE BULLETIN, Vol. 2, No. 1. October, 1923.

1. The Control of Blood-sucking Leeches, with an Account of the Leeches of Palisades Interstate Park.....Dr. J. Percy Moore
2. Preliminary Report on the Parasitic Worms of Oneida Lake, New York . . . . .Dr. Henry S. Pratt
3. Acanthocephala from the Fishes of Oneida Lake, New York.  
Dr. Harley J. Van Cleave
4. Current Station Notes . . . . .The Director and Editor

ROOSEVELT WILD LIFE BULLETIN, Vol. 2, No. 2. February, 1924

1. The Ecology of the Plankton Algæ in the Palisades Interstate Park.  
Including the Relation of Control Methods to Fish Culture.  
Dr. Gilbert M. Smith

ROOSEVELT WILD LIFE BULLETIN, Vol. 2, No. 3. March, 1924.

1. The Status of Fish Culture in Our Inland Public Waters, and the Role of Investigation in the Maintenance of Fish Resources.  
Dr. William C. Kendall
2. Current Station Notes . . . . .The Director and Editor

ROOSEVELT WILD LIFE BULLETIN, Vol. 2, No. 4. February, 1925.

1. The Relation of Wild Life to the Public in National and State Parks . . . . .Dr. Charles C. Adams
2. The Big Game Animals of Yellowstone National Park.  
Edmund Heller
3. The Food of Trout in Yellowstone National Park.  
Dr. Richard A. Muttkowski
4. Current Station Notes . . . . .The Director and Editor

ROOSEVELT WILD LIFE BULLETIN, Vol. 3, No. 1. February, 1925.

1. The Birds of the Yellowstone National Park.....Milton P. Skinner
2. Current Station Notes.....The Director and Editor

