

REPORT ON THE ACTIVITIES  
OF THE  
JACKSON HOLE BIOLOGICAL RESEARCH STATION  
SUMMER 1954

L. Floyd Clarke, Director

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## PHYSICAL FACILITIES

The physical facilities at the Station were greatly improved during the past summer. A summary of these improvements is as follows:

1. The Osborn house was moved from the Park Station a distance of four and one half miles to its present location at the Research Station.
2. The Grimmacy house was moved one fourth mile to the Station.
3. All cabins plus the houses mentioned above were wired for electricity. Previously only power house and laboratory were furnished with electricity.
4. Plumbing was installed in the Osborn house. This included running a pipeline from the laboratory and the installation of a sewer system consisting of a septic tank with overflow drain.
5. Combination wood heating and cooking stoves were installed in the living units. These were four-plate stoves with oven and proved most satisfactory.
6. A shower was installed in the east end of the power house. This required setting up a hot water tank heated by propane fuel and remodeling of east end of power house.
7. Propane was connected into the Osborn house.
8. Additional storage space was built in the power house and library.
9. All equipment including that of the laboratory, shop and the living quarters was rearranged systematically. Necessary supplemental equipment was purchased.
10. Steps were constructed for the Osborn house and cabins.
11. Litter and debris were removed from the area and the dead trees were sawed for fire wood.
12. The pole fence enclosing the area was repaired.

The following are plans for improvement of the physical facilities for the summer of 1955:

1. Install cinder block foundations under the Osborn house and cabins. These blocks have already been purchased and are now at the Station ready for installation.
2. Connect all living units with REA. This will require some

additional wiring. REA will be brought into the Station sometime before January.

3. Since the power plant will no longer be used regularly, it will be moved into the shop and connected up to the power lines for emergency use in case of REA failure.

4. Install floor and partition in power house and do other remodeling necessary to use it as an additional living unit. It will be provided with a stove of the type described above.

5. Construct book shelves along south wall in living room of Osborn house and transfer library from present location in library building to these shelves. This living room will then be used in part for a library and books will be checked out for use in the laboratory.

6. Remodel present library building for living quarter and install stove of type described above.

7. Install large heating stove in laboratory. Stove has already been purchased.

8. We hope to be able to install a 500 gallon propane tank. This will eliminate the necessity of frequent trips to Jackson to get propane bottles refilled. Propane will be delivered for this tank. The cost of propane will be reduced from 32 to 17 cents per gallon.

9. An attempt is being made to obtain a house of frame construction which was built by the Paramount Studio near the cattle bridge. If this building can be obtained it will be moved to the Research Station and utilized for living quarters.

Lumber and other materials needed for the above remodeling have been purchased. Since more research workers are applying than can be accommodated with present facilities, the above described increase in accommodations is being made.

## RESEARCH PROJECTS

A brief description of research projects at the Station during the summer of 1954 follows.

### Patterns of Herd Structure in Free-ranging Elk of Wyoming

Dr. Margaret Altmann

Professor of Animal Husbandry and Genetics

Hampton Institute, Hampton Virginia

Project Number 71

This research is a continuation of previous investigations (Project 11) on the social behavior of Cervus canadensis nelsoni, the Wapiti. Socio-metric studies on wild animals are still in their early phases and, in general, do not yet permit as clearcut a knowledge of the patterns of social rank, attraction and repulsion as is true for species more accessible than elk. In a long range study an attempt was made to analyze the social patterns observed in groups of Wapiti of the Jackson Hole herd of Wyoming.

From the numerous observations made during the seven-year study some definite patterns of herd-behavior and structure were recognized. They varied with the season and were studied at spring migration, during the period the elk spent on summer range and during the rutting season. The following observations were made during spring migration: breaking of herd into subgroups, calving and cow-calf relationships, bulls forming separate small groups, guarded calf-pools, migration of nursery groups.

There were four summer range plateaus under observation. They comprised about ten to sixteen square miles each and ranged in altitude from 8,700 to 10,000 feet. A study of dominance order was made when weather conditions made it necessary for animals to seek shelter. Observations were made of nursery herds. Play activity was also observed. Local movements and trail patterns made by the herd were studied.

A seemingly unorganized group of animals when disturbed is apt to reveal a completely different picture. To study such changes laboratory scientists set up carefully planned "test-situations" and disturbances. In this study natural or man-made stresses were utilized and studies were made on the effect of the rutting and hunting season on herd structure. As "control" groups the elk in "hunted" areas were contrasted with elk groups in protected National Park habitats.

A period of unrest was observed preceding the rutting season characterized by fights among the bulls, weaning of calves, and breaking up of big herds into small groups. An undisturbed rutting season was observed within Yellowstone Park noting the activities of the bulls with their harems.

The effect of hunting on the rutting season was observed in areas where hunters were active. In a situation of persecution, which was one of severe stress and strain, the elk reacted by evasion and the rutting activity was curtailed, or perhaps even suppressed. The elk cows were the first to yield and to initiate the evasion; the bulls yielded more reluctantly. The bulls maintained certain aspects of the rutting behavior; they kept spikes at a distance and kept restless vigilance against other bull elk.

(This research was financed by a grant of \$950 by the New York Zoological Society. A detailed report of this investigation is available on request.)

Sagebrush-Grass Competition  
Dr. Alan Beetle  
Associate Professor of Agronomy  
University of Wyoming  
Project Number 64

Preliminary studies were made during two short stays at the Station. Plots were laid out in the sagebrush zones preliminary to a long-term study of competition between sagebrush and grass, particularly in the seedling stage. Examination was made of the islands in Jackson Lake which proved to be excellent contrast areas with the mainland because of reduced game and livestock populations.

Land and Freshwater Molluscs of Jackson Hole  
Mrs. Dorothy Beetle  
University of Wyoming  
Project Number 72

Collections of molluscs were made to supplement others from over the State.

The Black Rosy Finch  
Dr. Norman French  
Instructor in Zoology  
University of Utah  
Project Number 66

The period from June 15 to September 1 was spent at the Jackson Hole Biological Research Station of the University of Wyoming in order to complete studies of the Black Rosy Finch begun earlier (Project No. 53). The first two weeks were devoted to the final preparation of a report entitled "Life History and Behavior of the Black Rosy Finch" which was submitted as a thesis to the University of Utah.

In July efforts were turned toward securing samples of specimens of these birds from various parts of the breeding range. Specimens of breeding birds are rare in institutional and private collections and are necessary for a taxonomic study of the group. Collecting was largely unsuccessful although some valuable information was acquired. A single hybrid specimen (Leucosticte atrata and tephrocotis) was secured in the Bitterroot Mountains of the Montana-Idaho border. No specimens were collected or seen in the mountains of central Idaho. The Black Rosy Finch was found to be a breeding species in the Crazy Mountains of Montana. This is an extension of the breeding range, especially for the State of Montana. This record serves to focus attention on the Big Belt and Little Belt mountains, somewhat north of the Crazy Mountains and similarly isolated, where it may be possible to find Gray-crowned Rosy Finches breeding or perhaps more intergrades between the two supposed species. The locality in the Big Horn Mountains from which Black Rosy Finches have been reported was checked for a second time by the investigator who again failed to find the birds there. It remains for the interior of this range to be examined for breeding rosy finches.

The project for the month of August was to begin revision of the thesis on the Black Rosy Finch in preparation for publication. Some progress was made in this direction.

(Mr. French received a grant of \$450 from the New York Zoological Society.)

Evaluation of Elk Summer Range Including Study of  
Range Competition between Cattle and Elk  
Morton May  
Graduate Student, University of Wyoming  
Project Number 65

This project was set up to include a study of range transects and general field observations. The work this summer was designed as a preliminary study to a long-range project on elk-cattle relations on summer range. The project report has not been submitted.

(Mr. May received a grant of \$200 from the New York Zoological Society.)

Studies on the Variation and Distribution of Certain Drosophila Species

Dr. Dwight Miller  
Associate Professor of Zoology  
University of Nebraska  
Project Number 74

This study included a collection of species of Drosophila as follows:

<u>D. victoria</u> .....	4
<u>D. busckii</u> .....	6
<u>D. melanogaster</u> .....	3
<u>D. pseudoobscura</u> .....	2
<u>D. suboccidentalis</u> ..	1155
<u>D. subquinaria</u> .....	76
<u>virilis group</u> .....	39
<u>D. funebris</u> .....	77
<u>D. athabasca</u> .....	173
	<hr/>
	1535

A study was made of the taxonomy, distribution, population density, and ecology of species of Drosophila as compared with studies made in other localities. Live flies of these species collected were taken back to the laboratories at the University of Nebraska in order to set up cultures for more detailed studies of taxonomy and cytology.

Population Densities of Small Mammals in Different Vegetation Types  
and the Procurement of Live Red-backed Mice and Other Microtine Mice  
for Experimental Studies

James Opsahl  
Biologist with the Illinois Natural History Survey  
Project Number 73

This project was begun in 1952 at which time the investigator became acquainted with the various major vegetation types in Jackson Hole and the surrounding mountains. The small mammal populations in a willow swamp and in a lodgepole-spruce-fir forest were studied. Several animals were obtained for use the following winter in laboratory experiments on metabolism. In 1953 two more areas were studied--nearly pure lodgepole pine forest and a sagebrush flat.

During this past summer two more areas were studied. One area was established in the spruce-fir forest on the upper slopes (altitude 9960 ft.) of Brooks Mountain north of Togwotee Pass. In this area the following animals were collected: four red-backed mice, six white-footed mice, and one other microtine. The second area was at timberline on Brooks Mountain (altitude 10,500 ft.). Six white-footed mice and one Microtus were collected. An ecological study was made of these habitats.

A number of areas were trapped for experimental mice.

It was apparent that the die-off of microtine mice which occurs cyclically had taken place in Jackson Hole since last fall. Of interest is the fact that the red-backed mice were somewhat hardier than the other species.

(All these ecological data together with laboratory experimental studies on animals collected are being used by Mr. Opsahl as a Ph.D. thesis to be submitted at the University of Illinois. One more summer will be required to complete this study. Mr. Opsahl received a grant of \$190 from the New York Zoological Society.)

Parental Care in Cliff Swallows  
Dr. Arnold Petersen  
Department of Biology  
St. Olaf's College  
Northfield, Minnesota  
Project Number 70

This study included observations on the behavior of adult and young swallows with emphasis on feeding behavior, and growth rate of young in relation to size of brood. Project report has not been submitted.

(Mr. Petersen received a grant of \$400 from the New York Zoological Society.)

Avifaunal Structure in the Teton Mountains  
Dr. George W. Salt  
Assistant Professor of Zoology  
University of California at Davis  
Project Number 69

Censuses of bird populations were the objective this summer as in 1952. This year, because of the limited time available, all efforts were concentrated on Indian Paintbrush Canyon. This canyon was chosen in 1952 as being a good example of a Teton canyon and one with a topography easy to traverse. The trail runs its entire length from the valley level at Spring Lake to the divide between its summit and Leigh and Cascade canyons at 10,500 feet. The ascent is more nearly constant than in some of the other canyons and it has good vegetation representing practically all the types found in the canyons.

The technique consisted in subdividing the route into sections, each section having a uniform vegetation such as lodgepole, meadow, spruce-fir or alpine woodland. Over the known distance of the trail through one section a count was made of all birds found and notes made of their activity. In my cataloguing there are ten sections in the approximately eight miles of trail from bottom to top. Some of these are divided into subsections

because they include small areas of radically different vegetations. For each section records were kept individually.

Somewhat over half the field time this summer was spent censusing the sections in the lower half of the canyon. For one reason, the vegetation in the lower canyon is heavier and the bird populations larger and more complicated. Second, a late snowfall kept the upper basin filled with snow until mid-July. This not only made walking difficult but resulted in an abnormally low bird population compared to 1952. For the lower six sections between six and ten censuses were taken for each section representing about an hours' field work per census. For the upper sections the number of counts were lower, about four for each.

From the results combined with the results from 1952, when the bulk of the effort was in the valley, it is possible to get a fairly clear idea of the composition of the bird faunas. The results indicate that elevation, per se, is relatively unimportant in controlling bird distribution at Jackson Hole, and that vegetation structure plays the major part. In addition, the vegetation types appear to form a fairly clear series of successional stages leading to a climax of spruce-fir at all but the highest elevations. It seems most logical, therefore, to reorganize the research into a study of avian faunas in relation to plant succession. To do this a few other plant associations previously passed by will have to be studied in addition to making additional censuses on those incompletely studied. The investigator hopes to be able to do this in the summer of 1955.

(Dr. Salt received a grant of \$200 from the New York Zoological Society.)

Taxonomic and Ecological Study and Collection of Alpine Flora and Pollen  
Dr. Harry V. Truman  
Associate Professor of Biology  
Denison University, Granville, Ohio

This project was initiated and continued under the auspices and privileges of a Post Doctoral Fellowship granted through the courtesy of the University of Wyoming for the duration of sabbatical leave from Denison University (which pays full salary to the recipient).

The general objective of the project is to extend the collector's knowledge of taxonomic and ecological relationships of the high altitude flora of the area through the following specific activities:

1. The collection and preservation of representative species of alpine and sub-alpine flowering plants.
2. The collection of pollen from the above species to be used in further taxonomic studies and in the preparation of a proposed pollen atlas.
3. The accumulation of Kodachromes of suitable selections from the above species for teaching and lecture purposes.

4. The extension, through the facilities of The Rocky Mountain Herbarium which were made available for this project, of the bibliographies in the field of plant taxonomy of both the collector and Denison University.

The areas of collection and the number of species collected in each are as follows:

Beartooth Mountains .....	73
Yellowstone Park .....	88
Jackson Hole .....	136
Teton Range .....	72
Togwotee Pass and approaches .....	55
Snowy Range and Sierra Madre Mountains ..	90
Laramie Plains and Sand Creek Pass .....	21

The sum of the above figures, 535, is misleading as an indication of the total number of species collected because overlapping of species collected in the various areas has not yet been determined. However, it is estimated that between 400 and 500 species are represented in the above counts. This comprises an excess of 2000 specimens which are in the process of preparation for distribution in four herbaria: those of the Jackson Hole Biological Research Station, Yellowstone National Park and Denison University, and The Rocky Mountain Herbarium. All identifications are being verified through the literature and mounted material available in the Rocky Mountain Herbarium. Collections in Teton National Park and Yellowstone National Park were made through the courtesy of permits granted by the National Park Service.

Pollen was collected at the time of pressing from 230 numbered specimens and preserved in similarly numbered envelopes. The numbered specimens will be referred to as POLYTOPES of the collected pollens and filed in the herbarium of Denison University. Pollen will be collected in a similar manner from dried specimens of the remaining species during their processing. Permanent mounts will eventually be made to be used for reference in further pollen studies.

A total of 75 Kodachromes were taken of specimens, aggregates of specimens and ecological aspects of a representative selection of the collected species. These will be used for teaching purposes and in public lectures.

A bibliography of pertinent literature in the field of plant taxonomy is being prepared in duplicate from the sources available in The Rocky Mountain Herbarium. This will be added to the files of Denison University Herbarium and the collector.

Influence of Nerves on the Regeneration and Regression  
of Limbs in Amphibia  
Dr. Charles Thornton  
Professor of Biology  
Kenyon College, Gambier, Ohio  
Project Number 68

The problems investigated derived from previous studies by C. S. Thornton which demonstrated (a) that limb regeneration in the larval salamander Amblystoma opacum is dependent on an extensive but temporary innervation of the epidermis covering the limb tip; the intraepidermal nerves stimulate the epidermis of the limb tip to form a thickened cap of cells which apparently is essential to the inauguration of regeneration, and (b) that injured, denervated limbs undergo excessive and extensive regression (see Thornton and Kraemer, '51, Jour. Exper. Zool., 117, 415-440; Thornton, '53, Jour. Exper. Zool., 122, 119-150).

The following experiments were carried out at the Jackson Hole Biological Research Station.

A. In order to investigate further the significance of intraepidermal nerves to the stimulation of limb regeneration, frog tadpoles of the species Rana pretiosa were collected in the vicinity of the Station and divided into two groups according to age. The tadpoles of Group I possessed small hind limbs in Stage Ib (Forsyth, '46) of development and were capable of regeneration. The tadpoles of Group II possessed large hind limbs (Stage IIIa) which were incapable of regeneration. The hind limbs of all the tadpoles were amputated through the mid-thigh region. Two individuals in each group were preserved at two-day intervals for a period of four weeks in order to obtain successive stages of regeneration (in Group I) or failure of regeneration (in Group II). The amputated limbs of the two groups of tadpoles are now being sectioned and stained by the Bodian method in order to compare the status of epidermal innervation in the limb tips of the regenerating limbs with that of the non-regenerating limbs.

B. Larvae of the tiger salamander, Amblystoma tigrinum melanostictum, were collected from a small pond near Pacific Creek and brought to the Station. The left limbs (fore) of 40 of the larvae underwent section of the normal limb nerves thus rendering the forelimb nerveless and immobile. These denervated limbs received autoplasmic transplants of tail spinal cord. Ten days after the transplantation operation the left forelimbs were amputated just below the position occupied by the spinal cord grafts. The limb nerves were sectioned every 10 days in order to prevent normal limb innervation from being established. At the end of three weeks 12 of the amputated limbs gave clear gross evidence of regeneration. Since normal limb innervation was absent in these limbs, regeneration must have been stimulated by regenerating nerve sprouts from the spinal cord grafts. (It is well established that limb regeneration is impossible without nerves.) The limbs of all larvae in this experiment will be sectioned and stained by means of the Bodian silver impregnation method in order to study the precise relation of the tail spinal cord graft to the regenerating limb

tissue. Since the number of cases is small these results will be considered only as preliminary.

C. In order to test the theory that injured cartilage produces a substance which causes regression in denervated, injured limbs of *Amblystoma* larvae (Thornton, op. cit.), 40 *A. tigrinum* larvae underwent homoplastic transplants of cartilage into their left forelimbs. Ten days following the transplantation (when the skin incision through which the cartilage was introduced had completely healed) the left limbs of the 40 larvae were denervated and maintained in a nerveless condition by successive denervations over a period of four weeks. At no time during the course of the experiment was the limb skeleton directly injured. Nevertheless, in all cases receiving foreign cartilage implants early stages in the regression of the skeleton of the left (denervated) limb were observed. As controls, 28 larvae received implants of small pieces of paraffin in their left forelimbs. The left limbs of these larvae were denervated 10 days later and maintained nerveless for four weeks. No signs of regression have been observed in any of these limbs. The nature of the nervous control over limb regression is a subject for future investigation.

Preliminary studies for setting up two long-range projects to begin in 1955 were made.

1. Study of ecological succession in burned areas of the Wilderness Area. This study is to be made by Dr. Reed W. Fautin, Professor of Zoology, University of Wyoming and others. It has the enthusiastic approval of the U. S. Forest Service.

2. Study of the effects of pollution on Swan Lake. Some preliminary observation studies on the lake conditions were made. The sewage from the Coulter Bay area where the town of Moran will be moved is to be drained into Swan Lake. The Teton Park Service is very anxious to have a study made on the effect of pollution on the lake. This study will be made by Dr. George Baxter, Assistant Professor of Zoology and L. Floyd Clarke, Professor of Zoology, University of Wyoming and others.

Following is a list of the applicants to date who wish to do research during the summer of 1955 at the Station:

- Dr. Charles S. Thornton - Continue research on Amphibian regeneration.
- Dr. Margaret Altmann - Behavior study of moose.
- Mr. James Opsahl - Continue population study of rodents.
- Dr. Garth Kennington - Fat melting point of animals in relation to altitude.
- Dr. Gerald Scherba - Altitudinal zonation of the ant fauna of Jackson Hole.
- Mr. Larry Bliss - Correlative study of microclimate and plant growth.
- Dr. George Salt - Continue study of avifauna.
- Dr. Alan Beetle - Continue study of sagebrush-grass competition.

Mr. Morton May - Continue study on elk range.  
Dr. Reed W. Fautin - Succession on burned areas.  
Dr. L. Floyd Clarke - Effects of pollution on Swan Lake.  
Dr. George Baxter - Effects of pollution on Swan Lake.  
Dr. W. G. Solheim - Effects of pollution on Swan Lake.

#### SEMINARS

A regular schedule of seminars was held at the Station in which papers were presented either on research work underway by the investigator or subject matter related to the research project. The seminars proved most interesting and educational to all who participated. Because of informal discussion the investigators profited by the suggestions and criticisms of others. The interested personnel of both the Forest Service and Teton National Park Service were invited to participate in the seminars.

Seminars were held on the following subjects:

Patterns of Social Behavior in Elk - Margaret Altmann.  
Plants of Jackson Hole and Adjacent Areas - Harry Truman.  
Life History and Behavior of the Black Rosy Finch - Norman French.  
Avifaunal Structure in the Teton Mountains - George Salt.  
Parental Care in Cliff Swallows - Arnold Petersen.  
Evaluation of Elk Summer Range - Alan Beetle and Morton May.  
Ecology of Red-backed Mouse - James Opsahl.  
Amphibian Regeneration Experiments - Charles Thornton.  
Studies on the Variation and Distribution of Certain Drosophila  
Species - Dwight Miller

Several additional informal sessions were held for the purpose of showing slides and general discussion. The congenial atmosphere at the Station was enhanced by picnics and other social gatherings in which refreshments were served and in which everyone at the Station participated.

#### LIBRARY

The books and journals were organized into a more convenient arrangement to make them more readily accessible to the investigators. Subscriptions were renewed through the University of Wyoming Library for all journals previously received. New subscriptions for journals were entered and new books were purchased. We expect a member of the University of Wyoming Library staff to catalogue all books and periodicals and give them accession numbers.

An attempt was made to contact all who have carried out research at the Station in the past and to obtain reprints of articles from them pertaining to that research. A number of reprints have been received and will be placed in the library.

#### COOPERATION WITH OTHER AGENCIES AND OFFICIAL VISITS

Mr. Arthur Buckingham, supervisor of the Forest Service, as well as other Forest Service personnel continued to be most cooperative and helpful in all ways including helping in carrying out research projects underway and granting to research workers the privileges necessary to carry out research activities in forest areas.

Mr. Frank Oberhansley, superintendent of Teton National Park and Dr. Adolph Murie, biologist with National Park Service, Mr. Jepson, chief naturalist, and other Park Service personnel cooperated in every possible way including granting of permits and help and advice in carrying out projects.

Without the cooperation of those mentioned above, effective research at the Station would be impossible.

Mr. George Sprugel, field representative of the National Science Foundation, paid an official visit to the Station. The purpose of this visit was to observe the facilities at the Station, to obtain information on research work which has been or is now being carried out, and to obtain first-hand information on the potentialities of the Station for carrying out biological research. He expressed himself as being very favorably impressed with the work accomplished and the potentialities offered.

Mr. Don Besst, property and inventory supervisor of the University of Wyoming, spent several days taking inventory of equipment at the Station.

The visit of Dr. Fairfield Osborn, president of the New York Zoological Society, to the Station is very greatly appreciated. His visits, as well as visits of other members of the New York Zoological Society, are always welcome and appreciated. They furnish tangible evidence of the continued interest in the work at the Station.

Short visits by several biologists were appreciated. These biologists furnished valuable suggestions to those carrying out investigations at the Station.

FINANCIAL REPORT

1953-1954

Item	Budgeted Amount	Expended Amount	Unexpended Amount
Part-time Assistants .....	\$ 550.00	\$ 550.00	\$
Equipment .....	184.50	184.26	.24
Stoves, blankets, septic tank, and miscellaneous items.			
Supplies .....	100.00	99.97	.03
Fuel and miscellaneous items.			
Contractual .....	1311.50	1311.50	
Includes moving buildings, auto repair, general construction and repair, and circulars.			
Fixed Charges .....	4.00	4.00	
Travel .....	100.00	68.00	32.00
Total .....	<u>\$2250.00</u>	<u>\$2217.73</u>	<u>\$ 32.27</u>

1954-1955  
(To November 1, 1954)

Part-time Assistants .....	800.00	400.00	400.00
Equipment .....	350.00	120.33	229.67
Stoves and miscellaneous items.			
Supplies .....	700.00	266.28	433.72
Fuel for automobiles, heat, power plant; miscellaneous.			
Contractual .....	454.23*	28.86	425.37
Auto repair, telephone, laundry, plumbing.			
Materials .....	289.00**	174.32	114.68
Cinder blocks for foundation and lumber for floors.			
Travel .....	300.00	137.60	162.40
Total .....	<u>\$2893.23</u>	<u>\$1127.39</u>	<u>\$1765.84</u>

\*\$4.23 of this amount received for personal telephone calls by investigators.

\*\*This amount was received in payment for lodging by research workers at the Station.

SUMMARY OF EXPENDITURES FOR 1954 OPERATIONS  
(Funds from 1953-54 and 1954-55 budgets)

Personnel	
Caretaker .....	\$ 750.00
Student Assistant .....	200.00
Travel .....	316.39
Auto Repair .....	394.85
Titles and licenses for automobiles ..	4.00
Equipment .....	304.59
Moving of buildings to Station .....	775.00
Building construction and repairs ....	134.91
Building materials .....	174.32
Fuel .....	151.50
Miscellaneous supplies .....	103.96
Circulars .....	35.60
Total .....	<u>\$3345.12</u>

Grants-in-aid by the New York Zoological Society amounted to \$2390.00.

An honorarium of \$500.00 to the Director of the Biological Research Station received from the New York Zoological Society was applied on the salary of the Director. As a result of the University of Wyoming taking over the administration of the Station, the person appointed as Director was changed from 9-month to 11-month salary.