1958

Biological Station Summer Session, 1958

Montana State University (Missoula, Mont.)

Flathead Lake Biological Station

1958 Summer Session

Montana State University

Biological Station

June 21 to August 16

Flathead Lake, Bigfork, Montana

McDonald Lake in the Mission Mountains—Mitchell

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The Biological Station is a unit of the Summer College of Montana State University. All courses offered at the Station except Field Zoology and Summer Flora are designed at the upper division and graduate levels. Students who have reached the junior level in college and who have satisfactorily completed necessary course prerequisites are eligible for admission. Other students may petition the Director for entrance. Biology teachers are invited to take advantage of those courses designed particularly to fit their teaching needs. Investigators in all fields of natural history and biological research are encouraged to utilize the facilities of the station.

GEOGRAPHIC LOCATION

The main station grounds are located on the east shore of Flathead Lake where the north end of the Mission Mountains rises abruptly from the lake shore. The station also owns several acres of land on various islands and along Polson Bay at the south end of the lake. Although the more formal course work is given in the seven well-equipped laboratories, all courses emphasize field work. Trips from one to four days' duration are taken to various ecological areas of Western Montana.

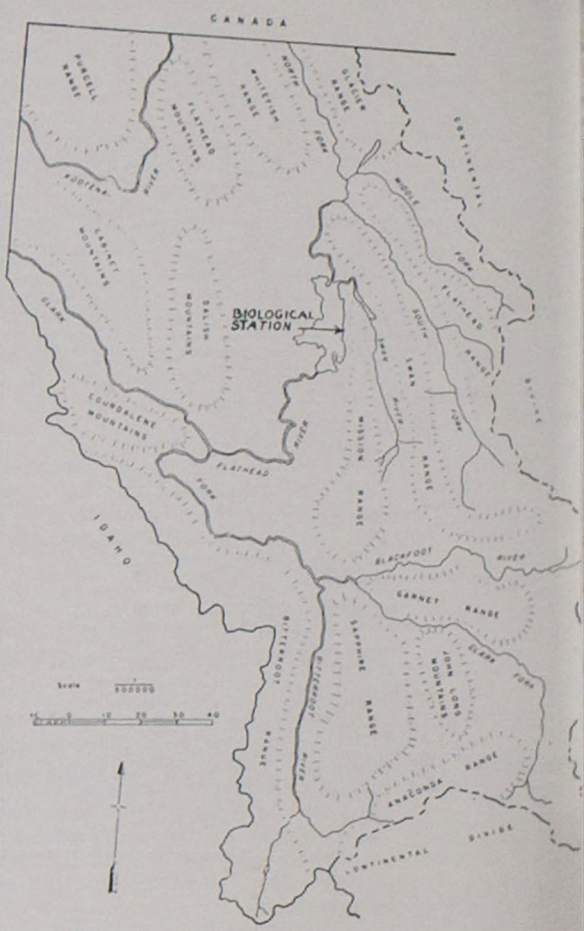
Flathead Lake lies in the Flathead valley at the southern end of the Flathead and Purcell Trenches of the Rocky Mountains. The valley is bordered by mountain ranges showing marked differences in geological structure and lies about 40 airline miles west of the Continental divide, just south of the Canadian border. The entire valley and the adjacent slopes of the surrounding mountains form one of the upper reaches of the Columbia River Drainage. In Glacier National Park the headwaters of the Hudsonian and Mississippian drainage systems are also accessible for study.

Limnology and Entomology Laboratory on Yellow Bay

OPPORTUNITIES FOR STUDY AND RESEARCH

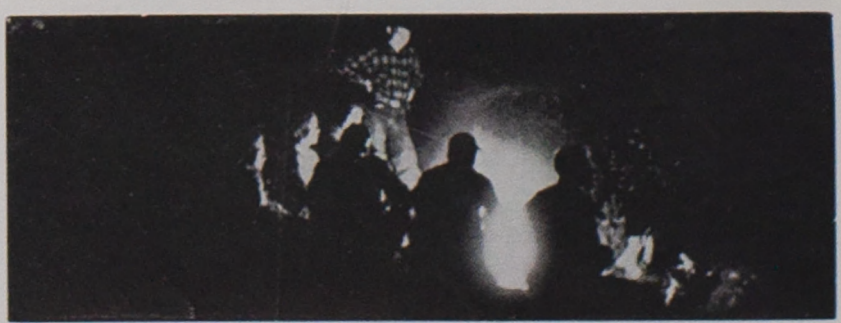
Flathead Lake and the Station grounds are at an elevation of approximately 3000 feet. The Mission and Swan Ranges reach an altitude of 10,000 feet and several peaks in the Livingston and Lewis Ranges of Glacier National Park exceed 10,000 feet. The variety of habitats found in this range of altitude offers unlimited possibilities for research in botany, zoology and ecology.

Although the predominant vegetation types are those of the montane and sub-alpine forests, there are also present many representations of the coast forest, sage brush, grassland and tundra formations.



COOPERATING AGENCIES

The facilities and active cooperation of many state and federal agencies are available to the staff and research workers of the Biological Station. Research projects are conducted independently and in cooperation with biologists and naturalists in Glacier National Park, at the Rocky Mountain Laboratory in Hamilton, at the National Bison Range at Moiese, with the Fish and Wildlife Service Wildlife Research Unit at the Missoula campus, and with the State Fish and Game Department in various sectors of the state. Both long-range and short-term research projects are feasible under these arrangements.



Mountain Climbing

Bear grass—Palmer

Studying Alpine Birds—Dow

Description of Courses

Credits earned at the Biological Station are transferable to other colleges and universities the same as credits earned in the Departments of Botany and Zoology on the University campus. Undergraduates may take only those courses numbered below 500.

Credit is given in quarter hours. The recommended load for students is nine hours for the eight week session. Maximum load for any student is twelve and the minimum load is six hours. Only exceptional students will be granted permission to carry courses in excess of nine hours. Although a six-hour course normally meets two days a week and a three-hour course meets one day a week, all classes are scheduled an extra day each week to reserve time for two-day trips.

A student electing Problems Courses in either Botany or Zoology must secure the consent of the instructor in charge before action can be taken on his application by the executive committee.

Five-week Session

A Conservation Workshop of five weeks' duration is offered from July 21 to August 22 and is dovetailed into the regular eight-week course.

Conservation Education Workshop

The Workshop stresses those problems and principles of conservation which are particularly characteristic of the Northwest. Proper management of natural resources is the keynote of the workshop, and field trips are designed primarily to emphasize management practices. Credit is variable from 3 to 9 hours. The workshop is under the direction of Professors Gebhart and Waters, assisted by professional men in the conservation field. Anyone interested in this program should write the Director, Biological Station, for more detailed information.

Institute in Biology

The National Science Foundation has granted the Biological Station funds to offer an Institute in Biology for High School Teachers during the summer of 1958. All participants in the Institute will register for a course in General Ecology (5 cr.) and a Seminar (1 cr.). In addition each student will be permitted to register for one 3 credit course of his choosing and for which he has the prerequisites.

Institute in Radiation Biology

The Atomic Energy Commission and the National Science Foundation have granted funds to offer an institute in Radiation Biology for High School Teachers during the summer of 1958. All participants will register for a course in Radiation Biology (5 cr.) and a Seminar (1 cr.). In addition each student will be permitted to register for one 3 credit course of his choosing and for which he has the prerequisites.

For further information write Director, Biological Station, Montana State University, Missoula Montana.

Courses Offered:

Boldface type indicates lecture day.

BOTANY

*124. **Summer Flora.** 3 cr. No prerequisite. A laboratory and field course in the use of a manual for the identification of the flowering plants. Also, methods of collecting, pressing, and mounting plants. Plants of the prairie, forests, and high mountain areas are studied. Botany Laboratory. **Friday**, Saturday. Harvey

349. **Problems in Morphology.** 2-6 cr. May be repeated during succeeding quarters not to exceed a total of 6 credits. Prerequisites, Botany 341 or 343 and consent of instructor. Individual or group work (consisting of research problems, special readings, discussions, etc.) dealing with aspects of plant morphology not taken up in regular courses. Staff.

361. **Fresh Water Algae.** 3 cr. Prerequisite, Botany 121, 122, 123 or equivalent (a year's laboratory course in Botany). Identification, classification, distribution, life histories and limnological relationships of the algae of the Northern Rocky Mountains. Botany Laboratory. Friday, **Saturday**. Prescott.

363. **Bryophytes.** 3 cr. (Omitted in 1958).

365. **General Systematic Botany.** 6 cr. Prerequisites, Botany 121, 122, 123 or equivalent (a year's laboratory course in Botany). The identification and classification of vascular plants; principles of nomenclature; ecological distribution; methods of collecting, pressing, and mounting plants. Three two-day trips are taken into alpine habitats as well as one-day trips to aquatic habitats, typical palouse prairie, western white cedar-western white pine and yellow pine-Douglas fir forests and several mixed habitats. Approximately 120 species in forty families are studied. Botany Laboratory. **Monday**, Tuesday, **Wednesday**. Harvey.

*366. **Agrostology.** 3 cr. Prerequisites, Botany 111 or 121 and 123 or equivalent (a year's laboratory course in Botany). Botany 365 recommended. Identification, classification, and ecological relationships of grasses, sedges, and rushes. Two two-day field trips are taken into alpine habitats and one to the mixed prairie east of Glacier National Park. One-day trips are taken to typical palouse prairie and various marshy areas where sedges and rushes are numerous. Approximately 50 species of grasses, 10 rushes and 20 sedges are studied. Botany Laboratory. **Friday**, Saturday. Harvey.

368. **Aquatic Flowering Plants.** 3 cr. Prerequisite, Botany 365. Identification, classification, and ecological distribution of the higher aquatic plants. The Flathead Lake area is particularly rich in aquatic flowering plants. The small lakes and ponds among the glacial debris of the valley floor provide varying local habitats suitable to a wide range of species. Botany Laboratory. **Thursday**, Friday. Prescott.

369. **Problems in Taxonomy.** 2-6 cr. May be repeated during succeeding quarters not to exceed a total of 6 credits. Prerequisites, Botany 365 and consent of instructor. Individual or group work (consisting of research problems, special readings, discussions, etc.) dealing with aspects of plant taxonomy not taken up in regular courses. Staff.

549. **Advanced Morphology.** 2-6 cr. Consent of Instructor. Staff.

569. **Advanced Taxonomy.** 2-6 cr. Consent of Instructor. Staff.

600. **Advanced Botanical Problems.** Credit variable. The department is prepared to arrange for properly qualified graduate students to carry on research in plant anatomy, cytology, ecology, morphology, mycology, pathology, physiology, and taxonomy, leading to a Master's degree. Maximum credit allowable 15. Staff.

699. **Thesis.** Credit variable. Maximum credit allowable 15.

ZOOLOGY

106. **Field Zoology.** 3 credits. A field and laboratory course in the collection, identification, and preservation of animals. Students not only collect and study animals in the field, but also learn to associate the individual species with certain habitat characteristics. Field work is followed by identification in the laboratory with the use of taxonomic keys. Invertebrate Laboratory. **Thursday**, Friday. Brunson.

*Enrollment demands will determine which of these two courses will be offered.

Collecting along shore of St. Marys Lake

Overnight Camp at Isolated Lake—Mitchell

308. **Ornithology.** 3 credits. Prerequisite: One laboratory course in vertebrate zoology. Life history, habits, identification and distribution of birds. Weekly field trips are taken to a variety of habitats extending from the marshlands of the Flathead Valley, the islands of Flathead Lake to the alpine region of Glacier National Park. Mammalogy Laboratory. Friday, **Saturday.** Baldwin.

309. **Mammalogy.** 6 credits. Prerequisite: Comparative vertebrate anatomy. The life history, habits, identification and distribution of mammals, with particular reference to those of the Rocky Mountain region. Four two-day and three-day collecting trips are taken into representative mammal habitats. One of these trips will be taken to the National Bison Range and two to Glacier National Park. The small mammals of a plot on the Station grounds are censused annually by the live trap method. Mammalogy Laboratory. **Monday**, Tuesday, **Wednesday.** Hoffmann.

310. **Ichthyology.** 3 credits. (Omitted in 1958).

361. **Limnology.** 6 credits. Prerequisite: Elementary Zoology and one collegiate course in Chemistry. Ecology of lakes, streams and ponds, with emphasis on the physical, chemical and biotic factors which determine their biological productivity. Although most of the work is done on Flathead Lake, a three-day trip is taken to some mountain lake and a complete limnological survey is made of that body of water. The last field trip is one to a glacier in Glacier National Park where students observe the history of the water through a succession of lower lakes to the valley floor. Limnology Laboratory. **Monday**, Tuesday, **Wednesday.** Brunson.

364. **Natural History of Invertebrates.** 3 credits. Prerequisite: Invertebrate Zoology. The ecology, taxonomy and distribution of the invertebrates of the Rocky Mountain area. Although all invertebrates other than insects and helminths are studied, emphasis is placed upon the molluscs of the region. At least three overnight trips are taken. The Mission, Whitefish and Cabinet Mountains and Glacier National Park are visited to secure representative invertebrate types. About 30 species of molluscs, 5 species of sponges and the red Hydra are included in the forms studied. Invertebrate Laboratory. **Thursday**, Friday. Brunson.

365. **Entomology.** 6 credits. Prerequisite: Two laboratory courses in Zoology, including invertebrate zoology. Introduction to the morphology, physiology, taxonomy and ecology of the Insecta. (Omitted in 1958.)

366. **Aquatic Insects.** 3 credits. Prerequisite: Zoology 141 and 142 (Elementary Invertebrates) or equivalent and consent of instructor. A study of the insect fauna, both immature and adult, of aquatic habitats of Western Montana. Ecology Laboratory. Thursday, **Friday.** Castle.

431. **Problems in Vertebrate Morphology and Taxonomy.** 1-5 cr. Prerequisites, 25 credits in Zoology including adequate background courses in the subject and consent of the instructor. Primarily a problems type course, involving semi-independent work. By variation of content, the course may be repeated during succeeding quarters. Staff.

433. **Problems in Vertebrate Ecology.** 1-5 cr. Prerequisites, 25 credits in Zoology including adequate background courses in the subject and consent of the instructor. Primarily a problems type course, involving semi-independent work. By variation of content, the course may be repeated during succeeding quarters. Staff.

434. **Problems in Invertebrate Morphology and Taxonomy.** 1-5 cr. Prerequisites, 25 credits in Zoology including adequate background courses in the subject and consent of the instructor. Primarily a problems type course, involving semi-independent work. By variation of content, the course may be repeated during succeeding quarters. Staff.

436. **Problems in Invertebrate Ecology.** 1-5 cr. Prerequisites, 25 credits in Zoology, including adequate background courses in the subject and consent of the instructor. Primarily a problems type course, involving semi-independent work. By variation of content, the course may be repeated during succeeding quarters Staff.

561. **Limnological Methods.** 3 cr. (Omitted in 1958.)

600. **Advanced Zoological Problems.** 1-5 cr. Opportunity is given graduate students with sufficient preparation and ability to pursue original investigations. Staff.

699. **Thesis.** Credit variable. Maximum credit allowable 15.

Limnology class on Flathead Lake

Citellus columbianus —Palmer

Class studying a population of Black Widow Spiders

General Information

FEES

A student fee of $72.50 (maximum) is charged for both resident and non-resident students.

Resident and non-resident investigators, for whom research space and general laboratory materials will be supplied, are charged a fee of $50.00.

Dependents of students and investigators must pay a cabin fee. However, there is no charge for children below three years of age.

Board at the commissary is $16.50 per week. This must be paid at the time of enrolling.

Inasmuch as the Biological Station is a part of Montana State University, government educational benefits to veterans under Public Laws 894 and 550 apply at the Station in the same manner as they do on the University campus. Veterans should indicate on the application blank the congressional act under which they will enroll.

Full subsistence will be paid by the Veterans Administration if enrolled for nine or more credit hours.

BOARD AND LODGING

Board is provided at the Station commissary. All people living at the Station are required to board at the commissary.

Students and faculty live in cabins. Each cabin is provided with beds, mattresses, pillows, chairs, table and minor items of equipment. Cabins are supplied with electric lights and electric (AC) outlets.

A combination bath house and latrine, centrally located, has hot showers in addition to regular wash stands. Washing machines and stationary laundry tubs are available for use in both men's and women's sections of the bathhouse. A small ironing room is also available. No irons are supplied by the Station.

ADVANCED DEGREES

Qualified students who are officially enrolled in the Graduate School may take course work and do research at the Station toward a master's degree. Master's degrees are offered in Botany, Zoology, and Wildlife Technology. Students interested in earning a master's degree through successive summers at the Biological Station should write to the chairman of the department of either Botany or Zoology for additional information.

FIELD TRIPS

Transportation will be provided for all regular class trips. All field trips are under the supervision of an instructor. Many of the field trips will be completed within one day, although at least one overnight trip in each course may be expected. Meals on such trips are supplied by the commissary. The Station cannot as yet offer transportation for independent research workers; however, space on scheduled field trips will be made available to them.

REMUNERATIVE WORK

Opportunities for work are not numerous. Graduate assistantships are available in most courses. To be eligible for one of these assistantships, a student should have had the course or its equivalent in some other institution. Research assistantships are also available. There will be opportunity to work by the day or by the hour at janitor work, day labor on the Station grounds and driving trucks. Applications for work should be sent to the Director.

RECREATION

Opportunities for recreation are many. Mountain climbing, hiking, swimming, boating and fishing offer the best means of relaxation. Some of the best fishing in western United States is found within a few hours' drive of the Station. Fine catches of rainbow, cutthroat and Dolly Varden trout and landlocked salmon are made the year round in Flathead Lake. Ideal trout fishing may be had in most of the streams and rivers in the community. There are excellent Forest Service and Indian Service trails in the Mission and Swan Mountains. There are also many fine trails with overnight accommodations at chalets in Glacier National Park.

EQUIPMENT NEEDED

The student is responsible for supplying his own bedding, linens, toilet articles and proper clothing. As a rule, summer rains will come the last week of June and the first week of July. However, local showers occur at high altitudes, so that rain equipment that is light to carry is desirable. Nights are cool, and temperatures are low at high altitudes. Therefore the student should be supplied with warm clothing, preferably wool. Since many of the classes will do mountain climbing during the course of the summer, students are strongly advised to have adequate footwear. Regular mountain boots are advisable for climbing. For those intending to do aquatic work, tennis shoes or hip boots will probably be the best type of foot wear. Recreational equipment should be supplied by individual students.

Blankets, towels, and linen must be provided by the student. It is also suggested that he/she bring a flashlight, small mirror, and curtains (for three windows, 36x24).

Inasmuch as many overnight trips will be taken, back-packs and sleeping bags (such as the inner bag of arctic type) are recommended.

Books and class supplies can be obtained from the student book store.

It is recommended that all persons attending the Biological Station be innoculated against Rocky Mountain Spotted Fever—either at home or at the Station.

Since the Station area is a game reserve, dogs and other pets are not allowed. Firearms may not be brought on the premises without advance written permission from the Director. All guns will be kept in the gun room.

ENROLLING

Application for admission to courses should be made before May 1, using the blank provided in the catalog. Additional blanks will be provided on request. Applications will be reviewed on May 1 and notification of acceptance will be mailed soon after. Applications made after May 1 will be considered in the order in which they are received.

Students who have not previously enrolled at the Station must submit a complete official transcript together with recommendations from two instructors. Graduate students must first enroll in the Graduate School of Montana State University. Applications blanks may be secured from the Dean of the Graduate School, Montana State University, Missoula, Montana.

A $10.00 deposit must be included with the application for admission to the Biological Station. This will be refunded if the applicant withdraws his application before June 1. At the time of registration, this deposit will be credited to the cabin fee. Official registration will be held at the Station on Saturday, June 21. Classwork begins Monday, June 23 and extends through the full session of 8 weeks.

Studying Benthic Invertebrates

Application for Admission

MONTANA STATE UNIVERSITY
BIOLOGICAL STATION

Missoula, Montana

SUMMER SESSION, 1953

Name _____ Age _____
Last First Middle

Mailing Address _____

Graduate ___ Undergraduate ___ Year _____ Major Field _____

Institutions previously attended (with year of graduation):

College or University _____

Degrees With Dates _____

Veteran _____; PL 894 _____; PL 550 _____

(continued on next page)

Above Grinnel Glacier

If a member of some instructional staff, give status: _____

_____

Schedule of courses desired:

First Choice: _____ _____

Second Choice: _____ _____

If Research Work: (a) Independent _____, (b) Under Supervision _____

If under supervision, with whom or in what field? _____

Are you interested in taking a post-session trip? _____

Cabin requirement: _____

Roommate preferences _____

If married, will wife or family accompany you? _____

If so, give number and ages of children _____

(Instructions for arrival and other pertinent information will be mailed to applicants.)

(Additional bulletins may be obtained by writing to the Director.)

Bibliography of Recent Papers

—Based on work done in part at the Biological Station of Montana State University—

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The Mission Range