MASTER

BIOLOGICAL/ENVIRONMENTAL RELATIONSHIPS
IN DESERT ECOSYSTEMS OF THE NEVADA TEST SITE

Progress Report
for Period February 1, 1976 - June 30, 1979

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March 1979

Prepared for
United States Department of Energy
under Contract No. EY-76-S-02-2307

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ABSTRACT - Technical Progress Report, February 1, 1976 - June 30, 1979

Activities covered are (1) computer and related work (corrections and updating of card decks for Nevada Test Site data, and transfer of data and programs to tapes); (2) publication of shrub (and tree) data for undisturbed Test Site vegetation in 1963 and 1975 (DOE/EV/2307-15); (3) work performed in this contract period on the publication covering the vascular plants of central-southern Nevada (TID-26881); and (4) work and publications in connection with the Endangered and Threatened species of central-southern Nevada.

Technical Progress Report, February 1, 1976 - June 30, 1979

Since the investigator is near the end of a $3\frac{1}{2}$ -year contract period, this progress report covers the period, February 1, 1976 to June 30, 1979. During this time her summer salary was covered by the contract: 2 months, 1976; 2 months, 1977; 1 month, 1978. In addition to this research time, much of her quarters off from teaching (winter quarter) were spent in some phase of the research. The areas of research, or related activities, are as follows:

(1) Computer and related work. In the winter and spring of 1976 a large effort was made in the (1) transfer of all plant and rodent data from the more than 100,000 IBM cards to tape, and (2) to review all of these data for the final time, for keypunch or other errors, and to update the scientific names to agree with those in TID-26881. The corrections and data transfers were made by Professor Paul Herget, who not only transferred the cards from 26 card trays to tape (requiring special handling because of a good deal of warpage since the time they were keypunched in the late 1960s), but ultimately made 3 complete listings of the data before the final tape version was accomplished. About a third of the old cards were replaced with new cards, so that the card decks also would carry the data corrections and name updating. Dr. Herget's services were gratis, and the contract also was not charged for the computer and software use necessary for this large job.

Subsequently, programmer Richard DeVan wrote a new program that reduced and analyzed the shrub and tree data, and the data for herbaceous perennials, for the parameters discussed under (2) below. This program was also put on the tape.

In 1973, after the close of the environmental measurements period (1962-1972), Stanley D. Zellmer, at UCLA's Laboratory of Nuclear Medicine & Radiation Biology, made a tape carrying all rainfall, air temperature, soil moisture and soil temperature data, as recorded on around 60,000 IBM cards, and the program he wrote, working with Dr. Howard A. Hawthorne, for the conversion of the soil moisture/temperature data to atmospheres of tension. During the measurements period (1963-71), it was discovered that there had been problems with the thermocouple reader, to which the technicians reading the instruments had not been sensitive, and in an effort to correct these temperatures, necessary for the conversion of the ohms readings to atmospheres of tension, several temperature modifications were undertaken in the program for the conversion. The tape also carries the calibration curves for each of the gypsum blocks, before planting, and after block removal.

The environmental tape, with the data and Hawthorne/Zellmer soil moisture program, was hand-carried to Cincinnati from Los Angeles in June, 1973, and since stored in the tape library of the University of Cincinnati Computing Center. It has recently been listed for its contents, minor format changes are being made, and its contents will be retaped, along with a January 1973 Zellmer program (on cards) that reduced the 10+ years of rainfall and air temperature data to values for each calendar year, including

means and extremes, all in the English units of measurement. This program will be modified by programmer DeVan to make all calculations in metric units, the program run, and added to the environmental tape. Also to be added to this tape are the film badge records for 10+ years (from 12,000 cards).

For the 6 or more years of winter (and summer) annual data, previously processed from 24,000 cards for the parameters of interest by programmer Frank G. Wood at UCLA, a new program will be written for use with the corrected and updated version of the data on the plant/rodent tape.

Thus, by June 30, 1979, there will be two tapes with essentially all of the Test Site data in their final form, and the programs that have been written and executed for the basic parameters for which the field data were collected during the years 1962-75. When the plant/rodent and environmental tapes are completed this spring, a second back-up tape of each will be made. When the investigator's program nears completion, one tape of each will go to the Department of Energy for ultimate disposition of the data from this long-term program.

(2) Shrub Data. The 1100 feet of modified line interception shrub (and tree) data for each site, for each of two years (1963 and 1975) were reprocessed from their corrected and updated form on the Herget plant/rodent tape. A program, written by Richard DeVan, computed for each species on each site: Numbers of plants touching upon the line, average height, total length of intercepts, and percentage cover. The parameters were calculated for living and dead plants combined, living plants only, and dead plants only.

These data, for the 59 undisturbed sites, are recorded in 36 tables in DOE/EV/2307-15 (March 1979). The shrub communities are interpreted as belonging to 5 plant associations, and intergrades, on the 25 Mojave Desert sites; 8 associations on the 10 Great Basin Desert sites; and 6 associations, and ecotonal types, on the 24 sites of the desert transition. During the 12-year period there were more or less large increases in numbers of plants, mean height, and percentage cover, and decreases in the percentage of dead plants in the vegetation. All of these are inferred to reflect the higher rainfall between 1965 and 1975, as compared with the low rainfall of the period in which the 1963 data were collected.

A summary of the shrub and tree data, as an expansion and/or modification of the table on p. 17, and the conclusions will be prepared for journal publication this spring, as "Spatial and temporal variations in desert shrub vegetation of southern Nevada", or some similar title. It will be submitted probably either to the Journal of Biogeography or the Journal of Arid Environments.

The shrub data, which in total are for more than 30 linear miles of desert vegetation, can be processed and used in many other ways. But except for their use in the study of disturbed-site vegetation this coming year, and the species diversity study (where they will be used in connection with all other plant and rodent data for each site), it is questionable that the investigator will ever have sufficient interest to use them, by themselves, in other ways; if so, it will be with a collaborator who has an interest

in analyses of data for the sake of analyzing data (as for example, for coefficients of similarity among the sites, or species-association in the shrub-clumps). Almost all parameters conceivable, though, would be of interest in a system modelling effort.

(3) TID-26881. The manuscript for this book, which brought together the plant collection records accumulated over a 16-year period in central-southern Nevada and presented the record for each of the 1100 taxa on geographic and ecologic bases, was completed in September, 1975. It was several months before the printing was begun at Oak Ridge. During the winter and spring of 1976, the investigator was in frequent touch with the personnel involved in the editorial and printing processes, and made two trips to Oak Ridge in connection with the work in progress. During this period she did all of the proof-reading, first by segments, and the manuscript twice in its entirety (unfortunately she did not see proof on her last set of corrections, and the most obvious errors in the book are the result of this). The printing was completed in September, 1976, and 30 copies, supplied by the Office of Technical Information, were sent to major contributors to the project through the years, with acknowledgments of appreciation for their help.

A correction copy has been kept up to date since the time of publication, including printing or spelling errors, errors of other kinds, both of omission and commission, changes in interpretation of the taxa (by taxonomists after review of the specimens on which the book is based), and certain other changes in synonymy. With little advance notice, a correction copy can be supplied at such a time as there is to be a second printing.

(4) Endangered and Threatened Species. In early July, 1976, investigator drove to the Test Site, where she accomplished a number of things over a 5-week period. The large job was a record of each of the 5000+ sheets left in the herbarium cabinets, so that this record, together with the 8500 sheets previously moved for curatorial purposes to Cincinnati and for eventual transfer to the U. S. National Museum, gave the investigator, as Curator of the Nevada Test Site Herbarium, the total record for both segments of the herbarium she built through a 16-year period.

Two days were spent with Dr. James L. Reveal, formerly employed on the investigator's plant collecting project, in revisiting and photographing the sites of those species appearing on the Federal Register lists of Endangered and Threatened Plants. Upon return to Cincinnati in August, a report was prepared, with photographs and an accompanying map showing the location of each of the populations of the Endangered Species on the Test Site, for the use of the Nevada Operations Office.

Subsequently the entire collecting record, for the 41 species on the Federal Register lists in the area of central-southern Nevada covered by TID-26881, was assembled along with other relevant taxonomic, geographic, and habitat information, in 3 reports (COO-2307-11, -12, -13), under date of February, April, and July 1977. The "Endangered Plant Species" report

also included many photographs. These were "prepared for the records of the Energy Research and Development Administration, the Office of Endangered Species of the Fish and Wildlife Service, Dept. of Interior, and for the information of other agencies, organizations, or individuals concerned with the preservation of plant and animal species and their critical habitats, as set forth in the Endangered Species Act of 1973" (COO-2307-11). The reports were sent to numerous agencies and individuals involved in Nevada/California endangered species preservation programs.

The species covered by these reports were placed on the Federal Register lists by a committee of the Smithsonian Institution, without any discussion with or the knowledge of the investigator, who was responsible for most of the collections of the species in this region. Because of this, and a number of related circumstances, including the political atmosphere in which the species and land preservation programs have proceeded in Nevada, the investigator concludes that she has fulfilled her professional obligations to these programs with the publication of her collecting record and recommendations in these three reports, and an additional compilation in 1977 of a couple hundred other species whose distributions elsewhere should be checked out (sent to the Nevada Operations Office and several other organizations).

Camissonia heterochroma var. heterochroma, C. h. var. monoensis, and C. megalantha collections, on loan since 1977 from major herbaria and consisting largely of duplicates of the investigator's collections from central-southern Nevada, probably will be returned without change in taxonomic status of the three taxa. Investigator's conclusions from study of the specimens are that C. h. monoensis should be elevated to species status, and C. megalantha be considered a variety (or subspecies) of C. heterochroma, as was the original interpretation by Munz, but she has also concluded that more appropriately this study, necessary for the final interpretation of C. megalantha and its status as a Test Site Endangered Species, should be made and published by someone else.

All herbarium sheets of the 41 Endangered and Threatened Species (except those in use or on loan to monographers) were taken to the U. S. National Museum in September 1977, along with around 1800 other sheets, including all of the grasses, cacti, and Eriogonums. The collection of 79 rodent skins and skulls, prepared as vouchers from the study sites, were given to the U. S. National Museum in September 1976.

Publications.

- 1976. Environments of kangaroo rats (Dipodomys) and effects of environmental change on populations in southern Nevada. J. Mammal. 57: 67-93.
- 1976. Rainfall and fluctuating plant populations in relation to distributions and numbers of desert rodents in southern Nevada. Oecologia (Berl.) 24: 21-42.
- 1976. Vascular plants of the Nevada Test Site and central-southern Nevada: Ecologic and geographic distributions. TID-26881. Nat. Tech. Inform. Serv., Springfield, Va. 316 p.

- 1977 (February). Endangered plant species of the Nevada Test Site, Ash Meadows, and central-southern Nevada. ERDA COO-2307-11. 77 p.
- 1977 (April). Threatened plant species of the Nevada Test Site, Ash Meadows, and central-southern Nevada. ERDA COO-2307-12. 66 p.
- 1977 (July). Addendum to COO-2307-11 and COO-2307-12 (Endangered and Threatened Species of the Nevada Test Site, Ash Meadows, and central-southern Nevada). ERDA COO-2307-13. 10 p.
1978. Ash Meadows: Nevada's unique oasis in the Mojave Desert. Mentzelia 3: 24-28.
1979. Shrub and tree data for plant associations across the Mojave/Great Basin desert transition of the Nevada Test Site, 1963-1975. DOE/EV/2307-15. Nat. Tech. Inform. Serv., Springfield, Va. 52 p.

AFFIRMATIVE ACTION COMPLIANCE PROGRAM REPRESENTATION

CONTRACT NO. EY-76-S-02-2307

MODIFICATION NO. _____

The undersigned prospective contractor represents that it:

(☒) has developed and has on file

() has not developed and does not have on file

at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2);

or

() has not previously had contracts subject to the written affirmative action program requirement of the rules and regulations of the Secretary of Labor.

Contractor: University of Cincinnati

By:

Albert C. Yater

Title:

University Dean for Grad. Ed.
and Research

Date:

3/29/79

MINORITY BUSINESS ENTERPRISES REPRESENTATION

CONTRACT NO. EY-76-S-02-2307

MODIFICATION NO. _____

The undersigned prospective contractor represents that he

() is,

(~~XX~~) is not,

a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts.

Contractor: University of Cincinnati

By:

Albert C. Yates

Title:

University Dean for Grad. Ed.
and Research

Date:

3/29/79

CERTIFICATION OF NONSEGREGATED FACILITIES

CONTRACT NO. EY-76-S-02-2307

MODIFICATION NO. _____

In connection with the proposed above-referenced Modification, the undersigned prospective contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He agrees that a breach of this certification is a violation of the Equal Opportunity clause in FPR 1-12.803-2 as included in said contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semi-annually, or annually).

Note: The penalty for making false statements is prescribed in 18 U.S.C. 1001.

Contractor: University of Cincinnati

By: Albert C. Yator

Title: University Dean for Grad. Ed.
and Research

Date: 3/29/79

CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT CERTIFICATION

CONTRACT NO. EY-76-S-02-2307

MODIFICATION NO. _____

(Applicable if the proposed above-referenced Modification exceeds \$100,000, or the Contracting Officer has determined that orders under an indefinite quantity contract in any year will exceed \$100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The undersigned prospective contractor certifies as follows:

- (a) Any facility to be utilized in the performance of the above-referenced Modification

() has, (XX) has not,

been listed on the Environmental Protection Agency List of Violating Facilities.

- (b) He will promptly notify the Contracting Officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which he proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.

- (c) He will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

Contractor: University of Cincinnati

By: Albert Cyator

Title: University Dean for Grad. Ed.
and Research

Date: 3/29/79

EQUAL EMPLOYMENT OPPORTUNITY REPRESENTATION

CONTRACT NO. EY-76-S-02-2307

MODIFICATION NO. _____

The undersigned prospective contractor represents that it

(X) has, () has not,

participated in a previous contract or subcontract subject to either the Equal Opportunity clause contained in Section 202 of Executive Order 11246, as amended by paragraph (3) of Executive Order 11375, the clause originally contained in Section 301 of Executive Order 10925 or the clause contained in Section 201 of Executive Order 11114; that it

(X) has, () has not,

filed all compliance reports required to have been filed as of the date hereof; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. (The above representation need not be submitted in connection with contracts or subcontracts which are exempt from the clause.)

Contractor: University of Cincinnati

By:

Albert C. Yates

Title:

University Dean for Grad. Ed.
and Research

Date: 3/29/79