

COOPERATIVE NATIONAL PARKS RESOURCES STUDIES UNIT

DEPARTMENT OF BOTANY

UNIVERSITY OF HAWAII AT MANOA

HONOLULU, HAWAII, 96822

808-948-8218

BIANNUAL REPORT #5

FEBRUARY 1976

July 1, 1975 to February 29, 1976

NATIONAL PARK SERVICE

Contract #CX8000 6 0031

Clifford W. Smith, Unit Director

The National Park Service and the University of Hawaii signed the memorandum of agreement establishing this -- **Cooperative National Park Resources Studies Unit** on March 16, 1973. The unit provides a multidisciplinary approach to studies on the biological resources in the National Parks in Hawaii, that is, Hawaii Volcanoes National Park, Haleakala National Park, City of Refuge National Historical Park and Puukohola National Historic Site. Through the Unit Director, projects are undertaken in areas identified by park management. These studies provide information that will facilitate the development and implementation of resource management programs. The involvement of University faculty and students in the resource management of the National Parks in Hawaii lends to a greater awareness of the problems and needs of the Service. At the same time research not directly or immediately applicable to management is also encouraged through the Unit.

Contribution numbers are assigned as follows. CPSU/UH identifies the University of Hawaii CPSU. This is followed by a three digit number assigned in sequence to each new project of this CPSU. The last number indicates the report number for that particular project.

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COORDINATING COMMITTEE

Dr. John W. Beardsley
Professor of Entomology
University of Hawaii at Manoa

Dr. Elmo Hardy
Senior Professor in Entomology
University of Hawaii at Manoa

Dr. Andrew J. Berger
Professor of Zoology
University of Hawaii at Manoa

Dr. Charles H. Lamoureux
Professor of Botany
University of Hawaii at Manoa

Dr. Hampton L. Carson
Professor of Genetics
University of Hawaii at Manoa

Dr. Dieter Mueller-Dombois
Professor of Botany
University of Hawaii at Manoa

Dr. Clifford W. Smith
Associate Professor of Botany
University of Hawaii at Manoa

PUUKOHOLA HEIAU NATIONAL HISTORIC SITE

MARINE SURVEY

Project Leader: Dr. Daniel Cheney
Assistant Professor in Biology
University of Hawaii Hilo College

Contract Number: CX8000 6 0031
Started on January 1, 1976
Anticipated Termination in January 1977

Objectives: To conduct a survey of the marine resources within 100 yards of the high water mark of the shoreline adjoining Puukohola National Historic Site.

Progress: The organization for this survey of the marine biota within the area requested is essentially complete. The site has been monitored several times noting turbulence, turbidity, and sharks. A general survey of the extent of silt had been conducted. The biological survey will not begin until April 1976 because of the uncertainty of the weather. Normally, this would not be a real concern in an area with a typical coral reef. However, half of the study area at Puukohola is a mud alluvium from the stream that drains from the site and adjacent regions. Whenever the waves create any undue turbulence, the visibility in the area becomes very low--a matter of inches. Apart from making observations very difficult, there is a very real danger of an attack by sharks. This danger is compounded by the very high density of sharks so close in shore. The shark present in these waters is the gray reef shark. The presence of these sharks is unusual because this species typically frequents open water.

There is no doubt that the study will be completed by June 1976. The final report may not be finished until the end of the summer while awaiting determinations on collections by specialists.

Submitted by: Daniel Cheney

PUUKOHOLA HEIAU NATIONAL HISTORIC SITE

PLANT SURVEY

Project Leader: Dr. Don Hemmes
Assistant Professor in Botany
University of Hawaii Hilo College

Contract Number: CX8000 6 0031

Started in May 1975

Anticipated Termination on June 30, 1976.

Objective: To conduct a survey of the plants at the **Puukohola** Heiau National Historic Site.

Progress: This second stage of the Plant Survey could not **proceed** until the area received a heavy rainfall. The storm system which passed over the Hawaiian Islands during the weekends of February 1 and 8, 1976 deposited 2.5 inches at Puukohola. The heavy rain and the consequent mild weather were sufficient to allow the ephemeral annual species to grow and mature. The survey is in progress at the time this report is being written.

The analysis of the four vegetation types in the area is also in progress.

No problem is foreseen in completing this project and submitting the final report by June 1976.

Submitted by: Lisa Crofts
Don Hemmes
James MacNeil

CITY OF REFUGE NATIONAL HISTORICAL PARK

HONAUNAU BAY FISH SURVEY

Project Leader: Dr. Leighton Taylor
Director Waikiki Aquarium
Associate Professor in Zoology
~~University of Hawaii at Manoa~~

Contract Number: CX8000 6 0031
Started in June 1973
Anticipated Termination in June 1978

Objectives: To conduct a five year survey of the fish
population in Honaunau Bay.

Progress: The program for the continuation of this survey
and species count calls for the next visit to Honaunau Bay
in March.

There are no anticipated problems.

Submitted by: Leighton Taylor

HAWAII VOLCANOES NATIONAL PARK
PRELIMINARY ASSESSMENT OF THE STATUS OF
RARE AND ENDANGERED BIRDS

Project Leader: Dr. Sheila Conant
~~Assistant Professor~~ in General Science
University of Hawaii at Manoa

Contract Number: CX8000 6 0031
Started on January 1, 1976
Termination on September 30, 1976

Objectives: To identify all the birds occurring in the
~~Kalapana~~ Extension of Hawaii Volcanoes National Park. To
estimate the population size of each species.

Progress: The plans for carrying out this study have been
completed. The methods for estimating the bird populations
have been identified.

There are no problems anticipated other than the general
mobility of the investigators in the north-east corner of
the Kalapana Extension below the rift zone.

Submitted by: Sheila Conant

HAWAII VOLCANOES NATIONAL PARK
ROLE OF FIRE IN THE NATURAL ECOSYSTEM

Project Leader: Dr. Don Hemmes
Assistant Professor in Botany
University of Hawaii Hilo College

Contract Number: CX8000 6 0031

Started in January 1976

Anticipated termination. Not known. This is a long term project which will need occasional updating.

Objectives: To study the recovery of the vegetation from fire damage in the Six Tanks Area along the Mauna Loa Strip Road.

Progress: There have been many studies conducted in this area after the fire. The principal endeavor to date has been to attempt to locate the study areas and synthesize a new integrated approach. Some vegetation studies had been carried out in the area previous to last years fire. Some have been identified and the information on the area requested. Others have not been clearly established as having been carried out in the fire burn area.

The bracken, mamane and koa are regenerating very well. The pukiawe has still not recovered and is probably dead. Exotic grasses are reinvading the area but no firm concepts of any changes are apparent though it appears as though the frequency of Andropogon is increasing in the area.

Submitted by: Don Hemmes

HAWAII VOLCANOES NATIONAL PARK

MAPPING OF VEGETATION IN HAWAII VOLCANOES NATIONAL PARK

Project Leader: Dr. K. W. Bridges
Assistant Professor in Botany
University of Hawaii at Manoa

Contract Number: CX8000 6 0031
Started on January 1, 1976
Anticipated Termination in September 30, 1976

- Objectives:
- 1) Preparation of a computer-data base for the vegetation-types for Hawaii Volcanoes National Park.
 - 2) Preparation of a computer-data base for the rare and endangered plant species in Hawaii Volcanoes National Park.

Progress: 1) The necessary acquisition of supplies for the recording and storage of the data has been done. The base map which will be used (Mueller-Dombois and Fosberg 1974) has been copied to a stable plastic base and is now ready for data conversion. The preliminary steps at developing a data-entry protocol have been outlined and await use in the operator-training stage.

2) The supplies obtained for work on Objective 1 will also be used for this objective. Agreement has been made with another project for the use of their computer software to do the data acquisition and mapping. The photographic negative which was prepared while creating the stable plastic base map used in Objective 1 will provide a means of duplicating working maps for data recording.

The work on both objectives is progressing satisfactorily. Operator training for the map-data entry will begin within two weeks and actual data entry will be completed within a month. This has not been done already only because of the unexpected delay in the installation of a phone for data transfer from the data collection computer to the data analysis computer. The second objective requires the availability of specific location data. Mapping on these data points will begin as soon as such data are turned over to us; a minimal length of time is expected to be required once the protocol for this objective has been established and tested.

REFERENCE: Mueller-Dombois, Dieter and F. Ray Fosberg 1974.
Vegetation map of Hawaii Volcanoes National Park (at 1:52,000).
UH/NPS UNIT Cooperative National Park Res. Study Unit,
Tech Rept. No. 4.

Submitted by: Kent Bridges

HAWAII VOLCANOES NATIONAL PARK
VEGETATION RECOVERY FOLLOWING GOAT REMOVAL

Project Leader: Dr. Dieter Mueller-Dombois
Professor in Botany
University of Hawaii at Manoa

Contract Number: CX8000 6 0031
Started on November 1, 1975
Anticipated Termination in September 30, 1978.

Objectives: (1) To monitor the vegetation response that results from excluding feral goats from the seasonally dry environments in Hawaii Volcanoes National Park. (2) To report on the developing vegetation patterns for the purpose of clarifying further management goals in habitat restoration.

Progress: Three exclosures were established at two sites ~~in~~ the coastal lowland of the Park that have been under continual surveillance since 1971. Monitoring is done on a biannual basis, once during the wet season and once during the dry season. A first paper has just appeared in Phytocoenologia 3(1):1-29, which reports on the initial vegetation recovery (a copy is attached). During the last survey in February 1976, the monitoring sample has been enlarged to take account of the currently rapidly changing vegetation outside the exclosures. It is anticipated that the coastal lowland vegetation may be remappable in one or two more years, since the current map of 1965 (in CPSU, TR 4) is changing sufficiently in that area to soon be rendered out of date. Another goat monitoring area was established in the mountain parkland, where seven exclosures are monitored regularly at five sites (at 6600', 6200', 5250', 4950' elevation). In this ecosystem, feral pigs overlap with goats, and the exclosures serve to document both pig and goat displacement effects. The first results on this study were published in two papers (Ecology 54(4): 870-876 and Phytocoenologia 3(2/3):346-373), both of which are attached. A third monitoring area was recently (February 1976) established at the eastern park fence near 2800' elevation.

Submitted by: Dieter Mueller-Dombois

HAWAII VOLCANOES NATIONAL PARK
CYTOGENETIC STUDIES ON HIBISCADELPHUS

Project Leader: Dr. Gerald Oarr
Assistant Professor in Botany
University of Hawaii at Manoa

Not under contract.

Started on November 1, 1976

Anticipated termination: June 30, 1976

Objectives: To study the cytogenetics of Hibiscadelphus giffardianus and H. hualalaiensis and their hybrids.

Progress: On November 28, 1975, (the day before the big one) I went to Hawaii Island, met with Ken Baker, and together we observed Hibiscadelphus giffardianus, H. hualalaiensis, and F₁ and F₂ generation hybrids ~~between~~ these taxa. Where available, bud material for meiotic analysis was collected. The following morning was spent recuperating from Madame Pele's nocturnal escapades. The rest of the day was devoted to collecting propagules and meiotic material of Dubautia scabra and D. ciliolata for subsequent study.

Examination of bud material of Hibiscadelphus giffardianus, H. hualalaiensis, and their F₁ hybrid has revealed normal bivalent pairing ($2n = 20_{II}$) during meiosis in all instances. Bud material of later generations has not yet been examined.

Cuttings of Dubautia scabra and D. ciliolata were not successfully rooted. However, numerous achenes of D. ciliolata collected on this trip contain embryos, so it should be possible to establish this species in the greenhouse. The bud material of D. scabra and D. ciliolata has been examined, and in all instances meiosis was normal ($2n = 14_{II}$ in both species).

Submitted by: Gerald Carr
Ken Baker

HAWAII VOLCANOES NATIONAL PARK
PLANT SURVEY OF THE KALAPANA EXTENSION

Project Leader: Mr. Rick Warshauer
Graduate Assistant
University of Hawaii at Manoa

Not under contract.

Started in November 1974

Anticipated Termination in September, 1976.

Objectives: To locate and typify the distribution of rare and **endangered** plants within the authorized Kalapana Extension.

Progress: The investigation of the Kalapana Extension up to and including the 1,500 foot level is virtually complete.' The area above 1,500 feet and East of Napau Crater has yet to be surveyed.

The area of the National Park along and below the East Rift Zone is probably one of the most interesting parts of the Park from the natural history viewpoint. It has the most variability in vegetation per unit area in the Park consisting of a mosaic of forest and scrub vegetation types. The mosaic is the result of the pattern of young and old pahoehoe and a'ala flows interacting with a steep gradient of rainfall across the area. Most of the rare and uncommon plants tend to be clustered on the oldest substrates which have a discontinuous and patchy distribution in the area. The localization of these areas is very difficult though the tentative position can be established by careful examination of air photos. Future efforts will be aided by a new geological map of the area in preparation by Mr. Robin Holcomb of the U.S. Geological Survey.

Though located in an area of intense volcanic activity, it is thought that the long term maintenance of the most mature and diverse communities is assured. The rapid succession of the younger kipukas within easy dispersal distance of the older areas would suggest that this area is outside the scope of the established Park management procedures. The long-term preservation of any stage of community development is dependent on the fate of all of the surrounding land. In this respect the whole area should be considered valuable habitat. This area includes what is probably the finest and possibly the only remaining section of healthy lowland dry forest left in Hawaii.

Submitted by: Rick Warshauer

HAWAII VOLCANOES NATIONAL PARK

OHIA RAIN FOREST STUDY

Project Leader: Dr. Dieter Mueller-Dombois
Professor in Botany
University of Hawaii at Manoa

~~Contract Number: CX8000 6 0006~~
Started in September 15, 1975
Termination Expected in June 30, 1977

Objectives: There are five integrated objectives within this study.

1. Floristic and Structural Analyses of Ohia Forests in Dieback Areas.
2. Soil and Substrate Analyses for a Habitat Type Classification.
3. Role of Pathogens in Ohia Dieback.
4. Vegetation Map of Ohia Rain Forest in Dieback Terrain.
5. Experimental Studies to Corroborate Field Observations.

The overall objective is to search for the cause of the dieback in the context of an integrated, interdisciplinary ecosystem analysis.

Progress: A 2 km long, 6 m wide belt-transect was established in a native Hawaiian ohia (Metrosideros collina subsp. polymorpha) rain forest in which most of the canopy trees have died from an unknown cause. Eighty percent of the field data have been collected, including data on size classes of snags and live trees, tree reproduction, associated vegetation and on several substrate parameters. Ohia reproduction is abundant and apparently unimpaired by the canopy dieback. Root and soil samples for fungal pathogens yielded Phytophthora cinnamomi and Pythium vexans, but no correlation of these fungi with the dieback of canopy trees could be established. Pathogenicity tests are underway. Two other subprojects were initiated in January 1976, both aiming at an ecological differentiation of the extensive ohia rain forest. This forest occurs on different lava substrates (aa and pahoehoe), on soil from volcanic ash in various stages of weathering and on a range of as yet undetermined soil water regimes.

Submitted by: D. Mueller-Dombois

HALEAKALA NATIONAL PARK

RESOURCES BASIC INVENTORY

Project Leader: Dr. Clifford Smith

~~Director UHCPSU~~
Associate Professor in Botany
University of Hawaii at Manoa

Contract Number: CX8000 6 0031

Started in June 1975

Anticipated Termination in June 1978

Objectives: To conduct a Resources Basic Inventory of the organisms in Haleakala National Park.

Progress: The final draft of the narrative report of last year's field work is out for review by all participants. It is expected that this document will be submitted to the National Park Service for review within the next week or so. Checklists are still being updated as reports from experts come in. A provisional checklist of species seen or collected will be published before this year's summer fieldwork begins. Some vegetation analysis is beginning to appear but since the results are of such a tentative nature they will not be reported on. However, these results will be kept in mind during the upcoming field survey in Haleakala Crater.

Planning for this Summer's fieldwork is almost complete. The only issue not completely resolved at present is the date of the expedition. We are still trying to resolve some clashes in national meetings and optimum times to visit the Crater.

The plan for this year's study has been amended from that proposed in the budget document. We do not propose to study the lower elevations of Kipahulu Valley. There is already a preliminary survey of the area. (Haleakala National Park, March 30, 1975 edited by John I Kjargaard). With the surveys of Kaumakani Ridge and Lower Kipahulu Valley Streams reported on in this Biannual Report (pp. 13 & 16), there is sufficient data available for the management of this area for the time being. At the same time, the purpose of this R.B.I. is to study Haleakala Crater and not Kipahulu Valley. The extra time will be used to study the Kaupo Gap further. We realize this area to be quite rich and needing much more attention. We also propose to do a preliminary survey of the Kuuiki area.

HALEAKALA NATIONAL PARK
KIPAHULU VALLEY RESOURCES BASIC INVENTORY

Project Leader: Dr. Clifford Smith
Director, UHCPSU
Associate Professor in Botany
- University of Hawaii at Manoa

Contract Number: CX 8000 6 0031
Started on January 1, 1976
Anticipated termination in June 1980

Objectives: To establish a set of alternative plans for a Resources Basic Inventory study of Kipahulu Valley. Each plan will itemize its advantages and disadvantages. A budget will then be formulated for each plan.

Progress: I have held a number of private discussions with people knowledgeable in the area (Dr. C. Lamoureux, Dr. A. Berger, Dr. J. Beardsley, Mr. J. Kjargaard, Mr. S. Montgomery, Mr. J. Jacobi). From them I have obtained a consensus opinion that a full-scale RBI is necessary utilizing the basic information from the Nature Conservancy Expedition Report. The Nature Conservancy Expedition has been criticized by several people for its lack of both scope and depth.

One piece of information, and a consequence of the earlier expedition, is that the trails could still be seen a year later by the presence of the weeds introduced. However, another report states that when one expedition member returned three months later he had great difficulty finding the trail. He did not mention any undue weeds and he was knowledgeable enough to be able to recognize them. I am trying to get these conflicting reports resolved but since they are all by word of mouth it is proving hard to find the source of both reports.

Finally, pig damage to the native forest is a real concern in this area. I have talked with Mr. J. Giffin, a State Fish and Game officer, who is acknowledged as the authority on pigs in the Hawaiian environment. If any realistic management policy to preserve Kipahulu Valley is to be formulated the impact of pigs must be assessed in detail. Mr. Giffin says that carrying capacity of most rain forests is 20-25 pigs per square mile. Comments from participants in the Nature Conservancy Expedition suggest that parts of Kipahulu Valley are carrying populations way above the carrying capacity.

Submitted by: Clifford Smith

HALEAKALA NATIONAL PARK
KAUMAKANI RIDGE RESOURCES BASIC INVENTORY

Project Leader: John Kjargaard

Not under contract.
Started on January 1, 1976
Anticipated termination: June 30, 1976

Objectives: To conduct a preliminary Resources Basic Inventory of Kaumakani Ridge, Kipahulu Valley. The National Park management needs the information as soon as possible to determine whether or not this ridge should be included in the wilderness region of Haleakala National Park.

Progress: The study was carried out the weekend of January 15-18, 1976. The weather conditions were very poor with torrential rain storms and gusty winds most of the time.

The flora and fauna of the area was studied and many specimens were collected. However, the thoroughness of the survey was limited due to the inclement weather. The dominant species of plant were collected including all endemic species that were accessible. Though it was intended to collect mosses, liverworts and lichens, the poor weather conditions forced this aspect of the survey to be abandoned. Some preliminary ecological notes were made though the poor visibility inhibited any assessment of the major ecosystems in the area.

The preliminary report on this study should be available in the near future. The flowering plants have been identified. Some determinations on the insects are still outstanding.

Submitted by: John Kjargaard
Paul Higashino

HALEAKALA NATIONAL PARK
STUDIES ON HAWAIIAN TARWEEDS

Project Leader: Dr. Gerald Carr
Assistant Professor in Botany
University of Hawai at Manoa

Not under contract
Started in August 1975
Anticipated termination in December 1976

Objectives: To collect developing flower buds of Hawaiian tarweeds and their hybrids for chromosomal analysis. To collect cutting of the various species of tarweeds and to establish them in the greenhouses at the University in Manoa. The ultimate objective of this and related studies is to establish the relationship between the genera and species of tarweeds.

Progress: Soon after I arrived in August I went to Haleakala National Park to collect specimens. Unfortunately, all the flowering plants were beyond the stage useful for meiotic analysis. Several hybrids between Dubautia and Argyroxiphium were encountered, a number of them in locations where they were not previously known to occur. However, the majority were not in flower. I also collected cuttings of several species of Dubautia encountered in and about Haleakala National Park. These cuttings would hopefully become part of a collection of living tarweeds for future hybridization studies. Unfortunately, none of the specimens formed viable plants most of them succumbing to fungal parasites.

Bud material of several other species of plants indigenous or endemic to Hawaii was also collected so that their chromosome numbers could be determined.

Submitted: Gerald Carr

HALEAKALA NATIONAL PARK
MAMMAL EXCLOSURE STUDIES

Project Leader: Mr. James Jacobi
Graduate Assistant in Botany
University of Hawaii at Manoa

Not under contract.

Started in August 1973.

Anticipated termination: None established. This is a long term project and should be continued for another ten years.

Objectives: To quantitatively determine the influence of feral mammals on the vegetation within and outside exclosures.

- a. The effect of pigs on the Deschampsia grasslands on Kalapawili Ridge.
- b. The effect of goats on the mamane scrubland at at Honokahua.

Progress: The pig exclosure has been in place for two and one half years. Data has been collected during this period from within this exclosure and along transects established throughout the grassland. The recovery of the vegetation within the exclosure is being intensively monitored. The presence and/or activity of pigs from rooting outside the exclosure is also recorded in detail. Some hypotheses formulated at the onset of the project are being tested. There are no conclusive results to date.

In 1965 a small goat exclosure was established at Honokohua by the Haleakala National Park personnel. At that time a photographic survey was conducted. The area and the surrounding region was resurveyed, mapped and photographed in 1975. Detailed notes were taken of goat activity in the surrounding area. To my surprise there has been no substantial change within the exclosure during the last ten years. In particular there has been no regeneration of mamane within the area. Hypotheses are being formulated to explain this phenomenon. Some experiments are being carried out to verify or disprove the hypotheses.

Submitted by: James Jacobi
Paul Higashino

HALEAKALA NATIONAL PARK
SURVEY OF THE LOWER KIPAHULU VALLEY STREAMS

Project Leader: Dr. Robert Kinzie
Assistant Professor in Zoology
University of Hawaii at Manoa

Not under contract
Started on November 1, 1975
Anticipated Termination by June 30, 1976

Objectives: To conduct an inventory of stream biocoenoses and riparian vegetation of the lower and middle courses of Palikea and Pipiwai and to monitor basic physico-chemical parameters.

Progress: Immediately prior to this survey there had been heavy rains in the watershed. National Park Service personnel reported that the stream was very high the day before we arrived. When we began our survey the stream was still rather high and evidence of even higher water was obvious. By the last day of the survey the stream was at a moderate to low level. It is probable that these torrential flows altered the composition and distribution of the stream biota. This fact coupled with the well known hazards of the "one-time sample" should be kept in mind when interpreting these results.

Palikea Stream: This stream shows evidence of being subject to frequent and heavy spates, The stream bed is well scoured and there is an absence of gravel sized sediment and riparian vegetation appears well set back from the stream course. The stream macrofauna exhibits low species diversity though some species (Atya bisulcata, larval Odonata, and endemic Tipulid and Chironomid larvae) are very abundant in the middle stream course (from the dam to the gauging station). Others, (Awaous stamineus, Sicydium stimpsoni endemic gobies) were very ~~at~~ in the lower stream course (the Seven Pools area). The riparian vegetation of the lower and most of the middle stream course are exotics. Only in the vicinity of the gauging station do native plants assume any importance.

Piwai Stream: It shows evidence (born out by information from park personnel) of having a much more constant discharge. The sediments are heterogenous with a good proportion of fine material. The riparian vegetation extends to the margins of the stream'course and create much shade. The general appearance of the stream bed is less scoured than Palikea. Pipiwai's

OTHER UNIT ACTIVITIES

Hawaii Regional Office	Conferred with Mr. Barrel on several occasions on various technical problems.
Puukohola Heiau N.H.S.	No specific discussions though I have visited the area twice.
City of Refuge N.H.P.	1. Discussed proposal for a survey of the tide pools in Honaunau Bay with Superintendent Shimoda.
Hawaii Volcanoes N.P.	<ol style="list-style-type: none"> 1. Conferred with Superintendent Barbee and staff soon after his arrival about the National Park Service science program as it applies to HAVO. 2. Conferred with the Fire management consultants concerning research that is necessary to augment and refine the Fire Management Policy being formulated at HAVO. 3. Conducted sugar analyses on <u>Hibiscadelphus</u> nectar to support Mr. Ken Baker's research. 4. Expediting scientific illustrations for Mr. Ken Baker's papers on <u>Hibiscadelphus</u>.
Haleakala N.P.	<ol style="list-style-type: none"> 1. Conferred with Superintendent Huntsinger and Crater District Manager Dunatchik concerning research priorities and the science program within the National Park. 2. Conducted analyses for 2,4-D residues in water and mud from Kipahulu Valley. Results negative.

MEETINGS ATTENDED

1. National Association of Conservation Officers, Annual Meeting, Honolulu. Two important lectures attended.
 - a. Mr. Greenwalt of the Department of Interior on the Endangered Species Act.
 - b. Mr. Tagawa, Hawaii State Forester, on the applicability of the Endangered Species Act to the Hawaiian flora and fauna.

REPORTS AND PUBLICATIONS

Bryophyta Hawaiica Exsiccata, Series I, Decade 4,
Numbers 31, 32, 34, 35, 36, 38 and 40.
Edited by W. J. Hoe. 1975

Bryophyta Hawaiica Exsiccata, Series I, Decade 5,
Numbers 41-50. Edited by W. J. Hoe. 1975

CPSU/UH PAST REPORTS STATUS

Technical Reports

- | | | |
|----|---|--------------------------------|
| 1. | 01-Year First Progress Report | No longer available |
| 2. | Proposal for the Study of Rare and Endangered Birds in Hawaii's National Parks by A. J. Berger | No longer available |
| 3. | The Ohia Dieback Problem in Hawaii by D. Mueller-Dombois | No longer available |
| 4. | Vegetation Map of Hawaii Volcanoes National Park by D. Mueller-Dombois and F. R. Fosberg | Available |
| 5. | Revised Checklist of Vascular Plants of Hawaii Volcanoes National Park by F. R. Fosberg | Available |
| 6. | 01-Year Final Report | Available |
| 7. | 02-Year First Progress Report | Available |

Other Reports

- | | |
|--|---------------------|
| 02-Year Final Report | Available |
| Ohia Rain Forest Study-First Progress Report by D. Mueller-Dombois | No longer available |