COOPERATIVE NATIONAL PARK RESOURCES STUDIES UNIT
DEPARTMENT OF BOTANY
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BIANNUAL REPORT #9
SEPTEMBER 1977

April 1, 1977, to September 30, 1977

NATIONAL PARK SERVICE
CONTRACT NUMBERS:
CX 8000 6 0031
CX 8000 7 0002
CX 8000 7 0003
CX 8000 7 0004
CX 8000 7 0005
CX 8000 7 0006
CX 8000 7 0007
CX 8000 7 0008
CX 8000 7 0009
PX 8000 7 0026
PX 8000 7 0027
PX 8000 7 0298

Clifford W. Smith, Unit Director
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NATIONAL PARK SERVICE, WESTERN REGION

COMPUTERIZED AVIAN BIBLIOGRAPHY

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

Contract Number:  PX 8000 7 0298
Started on March 25, 1977
Termination on December 31, 1977

Objectives: To produce a computerized bibliography of the literature on Hawaiian birds which is indexed by:

1. Complete reference by senior author
2. All authors
3. Keywords
4. Sources

Progress: The project is almost complete. Corrections are being entered into the master files. When completed, a rough draft of the total bibliography will be produced for the authors to double check for errors.

Submitted by: K. W. Bridges
CITY OF REFUGE NATIONAL HISTORICAL PARK

HÔNAUNAU BAY FISH SURVEY

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

Contract Number: CX 8000 7 0002 and CX 8000 6 0031
Started in June 1973
Anticipated Termination in June 1978

Objective: To conduct a five-year survey of the fish population in Hônaunau Bay.

Progress: A continuation of the survey of the marine fish in three habitats in Hônaunau and Alahaka Bays was conducted between July 9 and 15, 1977.

Three transects, each 50 m long, were visually censused for fish, and the numbers of individuals recorded. The transects were in (1) a coral rich area, (2) a boulder-coral area, and (3) a rocky inshore area. Each transect was censused a total of three times over a period of four days, between 10:30 a.m. and 3:25 p.m.

In addition to the transects, a series of reconnaissance dives to depths of 125 feet (38 m) were conducted within Hônaunau Bay in order to determine the presence of species that were not found along the transects. Results are summarized below.

Additional research included two observational dives at night in Kealakekua Bay and the initiation of an experiment to determine if the presence of Forcipiger longirostris has an effect on the size, condition, and morphology of sympatric F. flavissimus. This experiment involved the removal of all F. longirostris from a defined area, but the F. flavissimus population was left undisturbed. A control sample of F. flavissimus was removed from a similar area adjacent to the study area. Next year, F. flavissimus will be sampled in the initial area, as well as in the control area and in another unsampled but ecologically similar area close by. From this experiment we hope to learn whether or not the removal of these fish by commercial interests is having a significant impact on the species concerned.

Reconnaissance dives in areas outside transects

All species listed below are not found in the transect areas.
1. A population of Chromis leptopus, a supposedly rare species, was found among (above) the coral within about
HAWAII VOLCANOES AND HALEAKALA NATIONAL PARKS

BIRD SURVEY

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

Contract Number:  CX 8000 7 0007 and CX 8000 6 0031
Started on January 1, 1976
Termination on September 30, 1980

Objectives: 1. To provide an updated checklist of birds in Hawaii Volcanoes National Park and Haleakala National Park Crater District.

2. To provide population density figures for each species, in each park.

3. To provide provisional distribution maps for each species, in each park.

Progress: In late May, censuses were conducted during four days of field work in lowland plant communities of the Kalapana Extension. Other than Noio or White-capped Noddy along the coast, no native bird species were observed. Ring-necked Pheasant, Spotted Dove, Melodious Laughing-thrush, Japanese White-eye, Common Myna, Spotted Munia, Cardinal, and House Finch were recorded. A final report on the birds of the Kalapana Extension of HAVO is in preparation.

Survey work in the Haleakala Crater District and outlying areas continued with censuses conducted on three different trips: four days in Palikū and Kuiki areas during March; nine days in June, including five days on the Crater floor and four days in the Ko'olau Forest and Wai'ānapana areas; and nine days in July on the Crater floor and in Kaupü Gap. This summer's work completes the initial bird survey for the Crater District. However, seasonal variations in distribution, abundance, and behavior will continue to be monitored on quarterly trips to the Crater District. A list of birds of the Crater District has been prepared, and a final report with distribution and abundance maps is in preparation.
HAWAII VOLCANOES AND HALEAKALA NATIONAL PARKS
RARE BIRD RESEARCH PROGRAM

Project Leader: Dr. C. H. Lamoureux
Professor of Botany
University of Hawaii at Manoa

Contract Number: PX 8000 7 0026
Started on October 1, 1976
Anticipated Termination on September 30, 1977

Objectives: To formulate a research program that will provide the basic information for a resource management program for the rare and endangered birds of Hawaii's National Parks.

Progress: During the summer, I visited the following people in my efforts to evaluate current and proposed research on rare and endangered Hawaiian birds:

Fish and Wildlife Service:
  Dr. Lucille Stickel, Director,
  Patuxent Wildlife Research Center
  Dr. Ray Erickson
  Mr. J. M. Scott

U.S. Forest Service:
  Dr. Robert E. Dils,
  Director of Forest Environmental Research

Office of Endangered Species:
  Dr. Bruce MacBryde
  Dr. Roger McManus
  Dr. Paul Opler
  Dr. Jay Shippard
  Mr. E. Kridler

Institute of Pacific Islands Forestry:
  Mr. R. A. Nelson
  Mr. C. J. Ralph

National Park Service:
  Dr. T. Sudia
  Mr. D. Dunatchik
  Mr. J. Kjargaard
  Mr. R. Barbée
  Mr. J. K. Baker
  Mr. D. Reeser
  Mr. O. L. Wallis
  Mr. Francis Jaycott
  Mr. Bruce Kilgore

State Division of Fish and Game:
  Mr. D. Woodside
  Mr. R. Walker

University of Hawaii:
  Dr. C. W. Smith
  Dr. Sheila Conant

Others:
  Dr. R. Shallenberger
  Mr. W. Mull
  Mrs. Mae Mull
  Mr. F. R. Warshauer
  Mr. J. Jacobi

The final report is in draft form.

Submitted by: C. H. Lamoureux
HAWAII VOLCANOES NATIONAL PARK

ROLE OF FIRE IN THE NATURAL ECOSYSTEM

Project Leader: Terry T. Parman
Researcher
Volcano, Hawaii

Contract Number: CX 8000 7 0008 and CX 8000 6 0031
Started in January 1976
Anticipated Termination on September 30, 1979

Objectives: 1. To evaluate the recovery of six ecosystems within Hawaii Volcanoes National Park after fire.
2. To measure the effect of fire on the survival, reproduction, and growth of plants.
3. To determine whether or not the damage by fire to a particular ecosystem would merit intervention by the National Park Service.

Progress: Two years of quarterly sampling along ten selected transects within the 1975 Mauna Loa Scenic Road burn area were completed in September 1977. Analysis of data has begun and will result in the issuance of a progress report outlining the recovery of vegetation within the 1800-acre burn area.

A second technical report will be submitted for review in December 1977 which will discuss the changes in vegetation which have occurred in selected fire burn areas within Hawaii Volcanoes National Park over the past two decades.

A summary of the interim report (CPSU/UH Technical Report #18) follows:

The fire in the Hilina Pali controlled burn study site appreciably altered the community structure and the species cover percentages. The almost total lack of regeneration among native shrubs 18 months after the fire, combined with a significant increase in the mean crown height of Andropogon, creates a striking contrast in understory structure between the study and control plots. After 18 months the exotic vegetation had increased in total cover by almost 6%, whereas the endemic vegetation decreased by 26%. The total species composition within the study plot was surprisingly unaffected by the fire with no additions or deletions to the species list during the 18-month recovery period.

Submitted by: T. T. Parman
HAWAII VOLCANOES NATIONAL PARK

MAPPING OF VEGETATION IN HAWAII VOLCANOES NATIONAL PARK

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

Contract Number: CX 8000 6 0031
Started on January 1, 1976
Continued through June 1977

2. Preparation of a computer-data base for the rare and endangered plant species in Hawaii Volcanoes National Park.

Progress: Color and black-and-white maps have been produced from the Vegetation map for Hawaii Volcanoes National Park. An overlay has been made so that these maps are shown with the major roads, landmarks, and the park boundaries. Topography has been added to the computer-database.

A new interpretive map showing the distribution of Andropogon has been produced on the request of the fire ecology study. This map (in a black-and-white version) is included in the fire report (CPSU/UH Technical Report #18).

The computer-database is currently being used in prototype information display studies being carried out by the University of Hawaii Geographic Information and Display project (UH-GIDS). It is expected that remote sensing imagery comparisons will be made by the UH-GIDS project to determine their utility versus the current vegetation map database.

No further progress has been made on the input of the rare and endangered plant species map as we are still waiting for the final basemap.

A manuscript describing (and illustrating) the use of a geographic information system in the context of the National Park system is nearing completion and will be submitted for publication this calendar year.

Submitted by: K. W. Bridges
Contribution Number CPSU/UH 007/5

HAWAII VOLCANOES NATIONAL PARK

VEGETATION RECOVERY FOLLOWING GOAT REMOVAL

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

Contract Numbers: CX 8000 7 0006 and CX 8000 6 0031
Started on November 1, 1975
Anticipated Termination on September 30, 1978

Objectives: 1. To monitor the changes in vegetation in previously established sites.
2. To produce a new vegetation map for the coastal lowland.
3. To project the probable path of recovery and identify potential problems in the new ecosystems.

Progress: All existing exclosures were remonitored: (a) Mauna Loa Strip Road, (b) coastal lowland, and (c) western park fence.

With Terry Parman several new transects were established for monitoring:—three in the Kalapana area (eastern lowland) and one below 'Ainahou at the coast. A location for another transect was suggested near 1,000 feet (300 m) elevation and one in a Canthium odoratum stand near Naulu forest for a structural analysis.

The eastern lowland was surveyed and the westward advance of Andropogon virginicus was noted during a preliminary evaluation of the coastal lowland for the vegetation map.

Poli o Keawe Pali areas were surveyed; several rare tree groups were found to be destroyed by the 1976 earthquake.

Submitted by: D. Mueller-Dombois
HAWAII VOLCANOES NATIONAL PARK

PLANT SURVEY OF THE KALAPANA EXTENSION

Project Leader: Mr. Frederick R. Warshauer
Graduate Assistant in Botany
University of Hawaii at Manoa

Not under contract
Started in November 1974
Continued through June 1977

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

Progress: The final report of this project is in an initial draft stage. Unfortunately, a complication has developed in the mapping program. The basemap used to locate the rare and endangered species was a new map of lava flows along the East Rift Zone. The map is only in draft form and the author was reluctant to allow the use of the map until he had verified several tentative contours. Since there is a strong correlation between the age of the lava flows and the vegetation they support, the most informative way to present the data would be to identify the rare and endangered species on specific lava flows.

I am currently trying to resolve this complication.

Submitted by: C. W. Smith
HAWAII VOLCANOES NATIONAL PARK

ŌHI'A RAIN FOREST STUDY

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

Contract Number: CX 8000 6 0006
Started on September 15, 1975
Terminated on September 30, 1977

Objectives: There are five integrated objectives (subprojects) within this study:
1. Floristic and structural analyses of Ōhi'a forests in dieback areas
2. Soil and substrate analyses for a habitat type classification
3. Role of pathogens in Ōhi'a dieback
4. Vegetation map of Ōhi'a 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: The final phase of the field work for this project was completed in August of this year.

The final report is in an advanced draft form. Three seminar papers on the Ōhi'a Rain Forest Study will be presented at the U.S. Forest Service Forest Disease Research Program Seminar on "The Ōhi'a Decline," on October 25, 1977:
1. "The Ōhi'a Dieback: Is It a Creeping Epidemic or a Natural Phenomenon?" presented by D. Mueller-Dombois
2. "Quantification of the Dieback," presented by J. Jacobi
3. "Ōhi'a Population Structures in Dieback and Non-dieback Areas," presented by R. Cooray

Submitted by: D. Mueller-Dombois
HAWAII VOLCANOES NATIONAL PARK

COLONIZATION OF INTERTIDAL ZONE AT KEAUHOU

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

Not under contract
Started on May 1, 1976
Terminated

Objectives: To study the colonization of the new intertidal zone at Keauhou.

Progress: None.

The investigators have all moved to different jobs in various parts of the world. I am attempting to obtain their results if only to incorporate the raw data into the CPSU or HAVO files.

Submitted by: C. W. Smith
HAWAII VOLCANOES NATIONAL PARK

INVESTIGATION OF AVIAN MALARIA IN HAWAII'S NATIONAL PARKS

Project Leader: Charles van Riper III
Assistant Researcher
University of Hawaii at Manoa

Contract Number: CX 8000 7 0009
Started in May 1977
Anticipated Termination in May 1980

Objectives:

1. To determine susceptibility of native Hawaiian birds to malarial parasites.
2. To determine if the night-flying mosquito (Culex pipiens) is the vector of avian malaria in Hawai'i.
3. To determine methods of transmission and potential vectors of other avian blood parasites in Hawai'i.
4. To determine what percentage of the birds in the National Park are affected today.
5. To determine if introduced bird species can act as potential reservoirs of avian blood parasites in Hawai'i.

Progress: The immediate objectives of this phase of the study were (1) study site establishment in Hawaii Volcanoes National Park, (2) project specifics established in Honolulu, (3) bird cage construction, (4) laboratory facilities established at HAVO, and (5) preliminary bird netting.

The project leader and non-faculty professional have established permanent residence at Hawaii Volcanoes National Park. Both non-faculty associate and non-faculty professional have been hired and have started work. Computer access has been arranged for at the University of Hawaii at Hilo.

A number of facilities have been readied for the project. The laboratory has been completely screened and is mosquito proof. Rabbits, a possible food source (blood) for mosquitoes, have been obtained and are presently being maintained in hutch adjacent to the laboratory. All elevational sites for experimental plots and mosquito collection have been finalized; some locations have been changed from those outlined in the original proposal.

Equipment has been ordered for the project, and we are still awaiting the arrival of some items. Cages, however, have arrived and been assembled for occupancy by individual birds. We are still awaiting the construction by Park personnel of larger aviaries in the laboratory. A canary
HAWAII VOLCANOES NATIONAL PARK

PLANTING PROGRAM

Project Leader:  Dr. Clifford W. Smith
                  Director, CPSU/UH
                  Assistant Professor of Botany
                  University of Hawaii at Manoa

Not under contract:  service provided through Unit Support
                    and General Activities Contract Number CX 8000 7 0002

Started in January 1977
Anticipated Termination in November 1977

Objective:  To evaluate the current planting program at HAVO.

Progress:  I have spent a considerable amount of time
           discussing with numerous people the virtues and problems of
           the planting program at HAVO.  The program has been
           sporadically active for the past 50 years.  Though a logical
           approach to saving rare and endangered plants in the past,
           the current program has open-ended objectives which are not
           precisely defined.  In a technical report to be released
           for discussion in the near future, it is suggested that the
           current approach be curtailed and a new program established
           after thorough research.  The objectives of the planting
           program are not questioned: the methodology is.  The most
           important aspect of the review is the suggestion that each
           species or ecosystem to be planted be evaluated in detail,
           that the objectives be clearly stated with indications of
           what criteria would be used to evaluate whether or not the
           program was effective and when it should be terminated,
           that alternative methodologies for attaining the goals be
           evaluated, and that considerable attention be paid to the
           concept of critical habitat.

Submitted by:  C. W. Smith
HALEAKALA NATIONAL PARK
RESOURCES BASIC INVENTORY

Project Leader: Dr. Clifford W. Smith
Director, CPSU/UH
Associate Professor of Botany
University of Hawaii at Manoa

Contract Numbers: CX 8000 7 0003 and CX 8000 6 0031
Started in June 1975
Anticipated Termination in June 1978

Objectives: 1. To produce an annotated checklist of the insects, birds, flowering plants, conifers, ferns, mosses, liverworts, and lichens.

2. To produce distribution maps for all the above.

3. To provide a comprehensive collection of all specimens for Haleakala National Park.

4. To produce a monograph on the organisms of the Crater District, with comments on their distribution.

Progress: The major field-work for this project was completed during an extensive trip to the Crater during June 1977. Studies were concentrated in the Ho'olu-a Cabin area, the lower central and western portions of the Kaupō Gap, the inner face of the northern wall from Pu'u Mamane to Palikū, and the Kalapawili Ridge. Two 100 x 100 m permanent quadrats were also established, one inside and one outside a recently enclosed portion of Myrsine forest in the Kaupō Gap. A transect from Red Hill down to Park Headquarters running through territory just outside the Park was also sampled at regular intervals. Quantitative data on the density and stand-structure of mamane were also collected. Much more was accomplished this year because of the RBI team's previous familiarity with the organisms and ecosystems within the Crater District from the two years' previous studies.

The impact of goats on the western side of the Kaupō Gap is extremely severe. It is suggested that an exclosure be constructed at around 4,500 ft close to the Christmasberry tree. This Christmasberry tree should then be removed. Though we are particularly concerned with goat damage in the western portion of the Kaupō Gap, it is interesting to note that a new species of Panicum was collected in the area, and
HALEAKALA NATIONAL PARK
KĪPAHULU VALLEY RESEARCH PROGRAM PROPOSAL

Project Leader: Dr. Clifford W. Smith
Director, CPSU/UH
Associate Professor of Botany
University of Hawaii at Manoa

Contract Number: PX 80007 0027
Started on January 1, 1976

Objectives: To propose a research program that will provide a detailed study plan. The purpose of this plan will be to provide a basis for NPS management to develop research guidelines for Kīpahulu Valley and to provide the justification and specifics necessary to support funding and implement the needed research programs.

Progress: Two technical reports have been generated from this contract at the recommendation of the Superintendent, HALE. The first, CPSU/UH Technical Report #19, "Proposal to Study Feral Pigs in Kīpahulu Valley, Haleakala National Park," has been published. The second, Technical Report #20, "Kīpahulu Valley Research Plan," is undergoing review.

Submitted by: C. W. Smith
HALEAKALA NATIONAL PARK
KAUMAKANI RIDGE RESOURCES BASIC INVENTORY

Project Leader:  John Kjargaard
Park Ranger (Resource Management)
Haleakala National Park

Not under contract
Started on January 1, 1976
Reactivated through December 1977

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 area with restricted entry in Haleakala National Park.

Progress: None to date. Due to an injury and a prior commitment for the summer, the stand analyses in the various communities along the Kaumakani Ridge were not undertaken. The analyses are scheduled for October 22-24, 1977.

Submitted by:  C. W. Smith
HALEAKALA NATIONAL PARK

STUDIES ON HAWAIIAN TARWEEDS

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

Not under contract
Started in August 1975
Continued through December 1977

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

Progress: The immediate aim of this project is to determine whether or not the Haleakalā and Mauna Kea silverswords are different varieties or species. The question is important for the resource managers at HALE because the Haleakalā silversword has been identified as a potential rare and endangered species.

Collecting trips were made to both Haleakalā and Mauna Kea during the flowering season. Flowers were obtained from Haleakalā materials but not from the Mauna Kea plants, none of which were flowering. Observations were made on one Mauna Kea plant being propagated at the Mauna Kea Field Station, HAVO. Our inclination is to consider them as separate varieties at present but this cannot be firmly established until we see flowers from plants in their natural habitat.

Submitted by: G. Carr
A. Meyrat
HALEAKALA NATIONAL PARK

MAMMAL EXCLOSURE STUDIES:
COMPETITION BETWEEN NATIVE AND EXOTIC PLANT SPECIES

Project Leader: James D. Jacobi
Research Assistant in Botany
University of Hawaii at Manoa

Contract Number: CX 8000 7 0005
Started in August 1973
Anticipated Termination on September 30, 1979

Objectives: 1. To assess the competitive effects of Holcus Zanatus (velvet grass or Yorkshire fog) in Deschampsia grassland and Sophora scrub.

2. To monitor the effect of excluding exotic mammals from the above communities.

Progress: The data from previous measurements in this study have been analyzed. Some tentative conclusions have been reached which should be substantiated by the next survey of the area to be completed in October 1977.

An interim technical report will be written after this next field survey.

Submitted by: J. Jacobi
HALEAKALA NATIONAL PARK

SURVEY OF THE LOWER KĪPAHULU VALLEY STREAMS

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

Not under contract
Started on November 1, 1975
Terminated

Objectives: To conduct an inventory of stream biocoenoses and riparian vegetation of the lower and middle courses of Palikea and Pīpiwai Streams and to monitor basic physicochemical parameters.

Progress: The final report (CPSU/UH Technical Report #17) follows:

Two surveys of the lower Palikea-Pīpiwai-'Ohe'o stream system were conducted: the first in November 1975 encountered high stream flow following a freshet; the second in May 1976 was made during a period of lower stream flow. These surveys concentrated on physical parameters of the stream system and on the stream fauna. In addition, observations were made on riparian vegetation, and factors that are potentially dangerous to the maintenance of stream quality.

The three "streams" in this system--'Ohe'o, Palikea, and Pīpiwai--were shown to be quite distinct lotic systems as reflected in differences in their physicochemical characteristics, biota, and riparian vegetation. These differences result from the morphology of the stream channels, and in part are due to the fluvial dynamics of the streams.

Due to the diadromous nature of much of the Hawaiian stream fauna, the perpetuation of the animal populations is dependent on the maintenance of the stream flow to the sea in an uninterrupted and unaltered fashion. For this reason, protection of the lowest reaches of 'Ohe'o Stream is critical for the continued existence of the rich native fauna of Pīpiwai.

Continued sedimentation in lower Kīpahulu Valley will likely have deleterious effects on the lower parts of the stream. A substantially higher visitor load could have negative effects unless precautions are implemented. It appears that the utilization of lower Kīpahulu for park recreation and education purposes can be accommodated as long as these findings are kept in mind. With some care, the park will be able to continue these functions as well as perpetuate its heritage.

Submitted by: J. I. Ford
R. A. Kinzie III
Objectives: 1. The production of a map of the ecosystems of Haleakala National Park Crater District, to include a large-scale master map which will be reproduced in such a manner that it will overlay the standard "quad" maps.

2. Quantitative descriptions of each vegetation unit.

3. Correlation analysis of recognized ecosystems with soil and environmental data.

Progress: During the summer of 1977, quantitative floristic and environmental data were collected in the field. A total of 42 relevés, or study sites, were established in the park, distributed so as to sample all structural and floristic units as mapped from the previous summer's field work. The relevés were also placed in as even a geographic distribution as possible throughout the area to be mapped. This sampling strategy was planned before going into the field with some adjustments and additions being made in the field.

At each relevé site, certain environmental parameters, such as slope, aspect, elevation, and soil type were measured or described. A species list was made at each site which stratified the vegetation into layers based on plant height. Cover for each species was recorded using the Braun-Blanquet cover-abundance scale and the life form of each species was noted. The size of a relevé was determined by the structure of the vegetation being sampled.

Ten soil pits were dug. The vertical zonation of the soil was described and soil samples were taken at each pit.

Problems in the writing of the computer program to correct distortions in the original black-and-white photographs used for mapping resulted in abandonment of the computer-digitizing approach to creating a planimetrically-correct
HALEAKALA NATIONAL PARK

INVENTORY OF PUA'ALU'U STREAM, KI'PAHULU VALLEY

Project Leader: Dr. Robert A. Kinzie III
Associate Professor of Zoology
University of Hawaii at Manoa

Not under contract
Started in September 1977
Anticipated termination in September 1978

Objectives: 1. To assess the biological resources of Pua'alu'u Stream and gully walls.
2. To estimate the population size of the rare goby *Lentipes concolor* ('o'opu 'alamo'o).
3. To make recommendations to the resource managers on the status of the stream for conservation.

Progress: The major exploratory investigation is in progress. A preliminary assessment made by Mr. John Ford follows:

Pua'alu'u was sampled at two locations: immediately above the highway bridge and upstream for approximately 50 yards, and at the mouth of the stream up to a position approximately 200 yards below the highway bridge. Discharge at this time appeared to be roughly 3 mgd, and the water was quite clear. The stream flows over a series of short riffles and numerous small falls between the bridge and the stream mouth. The plunge pools at the base of each falls are relatively deep (approximately 10-15 feet). At the stream mouth, water cascades down a weathered basalt rock face into a very small, sandy pool at the mouth of the stream before entering the sea. There seems to be no development in the watershed, and no alterations to the stream banks or to riparian vegetation. Soil types within the drainage area are rough mountainous land and rock land in the gulch, and Maka'ala silty clay along the upper meadowlands surrounding the gulch. Excessive sedimentation of the stream bed was not evident.

Large populations of the goby fish *Lentipes concolor* ('o'opu 'alamo'o) were observed at each location sampled. *L. concolor*, endemic to Hawai'i at the generic level, is listed as rare and endangered by the Endangered Species Committee of the American Fisheries Society (Miller 1972)'.

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OTHER UNIT ACTIVITIES

Hawaii Regional Office


Puukohola Heiau N.H.S.

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City of Refuge N.H.P.

... ...

Hawaii Volcanoes N.P.

1. Attended informal discussion on Hawaii Volcanoes National Park resource management objectives and priorities.

2. Reviewed various proposals from resident scientists at Hawaii Volcanoes National Park.

3. Established new transects for monitoring the recovery of the vegetation following goat removal.

Haleakala National Park

1. Established monitoring plots inside and outside the recently enclosed Myrsine woodland in Kaupō Gap.

2. Evaluated the biological resources of an area for a possible boundary extension on the western side of the Park.

3. Conducted an initial survey of Pua'alu'u Stream in Kipahulu. This survey will be followed by a detailed examination of the stream in October.


## 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  
   No longer available
3. The Ohia Dieback Problem in Hawaii  
   No longer available
4. Vegetation Map, HAVO  
   Available
5. Revised Checklist of Vascular Plants, HAVO  
   Available
6. 01-Year Final Report  
   Available
7. 02-Year First Progress Report  
   No longer available
8. HAVO Fern Checklist  
   No longer available
9. HALE 1975 RBI Narrative  
   No longer available
10. Halapē Marine Survey  
    Available
11. Kī-pahulu Expedition 1976  
    Available
12. Ohia Decline: The Role of *Phytophthora cinnamomi*  
    Available
13. PUHE Marine Fauna  
    No longer available
14. Hawaiian Bird Bibliography  
    No longer available
15. PUHE Plant Survey  
    Available
16. PUHE Marine Flora  
    Available
17. Limnological Survey of Lower Palikea and ʻPipiwhai Streams, Kīpahulu, Maui  
    Available
18. The Hilina Pali Fire: a Controlled Burn Exercise  
    Available
19. Kīpahulu Valley Feral Pig Proposal  
    Available

### Other Reports

02-Year Final Report  
Available

Ohio Rain Forest Study--First  
First Progress Report  
No longer available

Proceedings, First Conference in Natural Sciences, HAVO  
Available

Biannual Report #5, February 1976  
Available
Biannual Report #6, June 1976  
Available
Biannual Report #7, September 1976  
Available
Biannual Report #8, March 1977  
Available