

HAWAI'IAN FOREST BIRDS CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Final Report

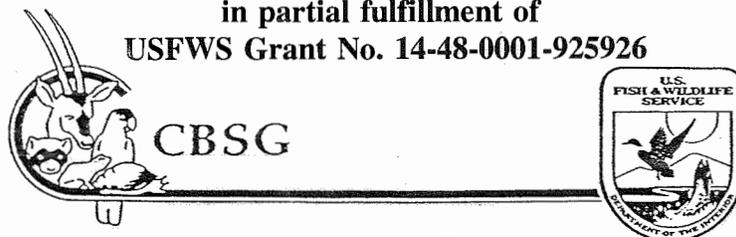
Compiled and Edited by

S. Ellis, C. Kuehler, R. Lacy, K. Hughes, and U.S. Seal

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Hawai'ian Forest Birds
Conservation Assessment and Management Plan Workshop
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**HAWAI'IAN FOREST BIRDS
CONSERVATION ASSESSMENT AND MANAGEMENT PLAN**

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EXECUTIVE SUMMARY

Hawai'ian forest bird taxa were reviewed taxon-by-taxon to assign a category of threat and to recommend intensive conservation action. The recommendations contained within the Hawai'ian Forest Bird Conservation Assessment and Management Plan have been generated on scientifically-based conservation criteria only; adjustments for political and other constraints are the responsibility of regional governmental agencies charged with the preservation of flora and fauna within Hawai'i. Decisions concerning implementation of the recommendations contained within this document (e.g., how they are implemented and under which agency's authority) are also the responsibility of these governmental organizations.

The majority of workshop participants concurred that even given our awareness and concern, the probability of any species of native Hawai'ian bird going extinct over the next 100 years exceeded ten percent. One concern was that certain catastrophic events, such as the introduction of a temperate species of mosquito that could spread malaria or another disease to birds in high-elevation forests, or introduction of a new disease that could decimate the native Hawai'ian avifauna, could easily occur over a 100-year period. Another concern was that given exponential increase in the human population and the need for land, fuel and other resources by humans, attitudes about the protection of native forests and concern for native birds might change and bird populations could rapidly decline as a result. A third concern was that given the continued high rate of extinctions in Hawai'i, and our lack of understanding and control over most of these extinctions, the long-term survival of any of the species, regardless of their current numbers, could not be guaranteed.

During the CAMP exercise, 64 distinct taxa (island populations, subspecies, or species if no subspecies are contained therein) of Hawai'ian forest birds were considered. All 60 taxa for which there were data (100%) were assigned to one of three categories of threat, based on the Mace-Lande criteria:

Critical	23 taxa
Endangered	13 taxa
Vulnerable	24 taxa

Three taxa were not assigned to a category of threat because of insufficient information. An additional five taxa were listed as Extinct?

Primary threats to Hawai'ian forest birds were identified for each taxa and were determined to be:

Disease	60 taxa
Predation by exotic species	47 taxa
Habitat loss/modification	44 taxa
Interspecific competition with exotic species	37 taxa
Hurricanes	32 taxa
Genetic factors	24 taxa
Pesticides	11 taxa

Human interference	6 taxa
Fire	6 taxa
Aircraft	6 taxa

The four major threats - disease, predation by exotic species, habitat loss/modification, and interspecific competition with exotic species - are factors that, with management, could be minimized if not eliminated.

23 of the 64 taxa (36%) were recommended for Population and Habitat Viability Assessment (PHVA) workshops. For an additional 7 taxa, PHVA workshops were conditionally recommended pending collection of further data.

Research management, defined as a management program which includes strong feedback between management activities and an evaluation of the efficacy of the management, as well as the response of the taxa to that activity, must become a component of recovery activities.

Research Management was recommended for 59 taxa (92%) in the following categories:

Survey	20 taxa
Monitoring	42 taxa
Life history research	14 taxa
Limiting factors research	29 taxa
Limiting factors management	7 taxa
Taxonomic research	6 taxa
Translocation	7 taxa

16 of the 64 Hawai'ian forest bird taxa (25%) were recommended for one of three time-frames for development of captive programs (based in part on Mace-Lande criteria):

Increase ongoing program	6 taxa
Initiate within 0-3 years	7 taxa
Initiate in the future (>3 years)	3 taxa

An additional 23 taxa (35%) were not currently recommended for captive programs, but may be reconsidered following a formal Population and Habitat Viability Assessment or when further data become available. Twenty-three taxa were not recommended for captive programs.

In addition to implementation of captive programs, it was recommended that utilization of captive technologies such as translocation, cross-fostering, transitional aviaries, double-clutching wild birds, supplemental feeding in the wild, and provision of artificial nests, be considered as a possible strategy for propagation of those species which may be rare or for which captive husbandry techniques are not established.

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SECTION 1

INTRODUCTION AND OVERVIEW

HAWAI'IAN FOREST BIRDS CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

1.1 INTRODUCTION.

Throughout the world, reduction and fragmentation of wildlife habitats and populations are occurring at a rapid and accelerating rate. In addition to the deterministic threats of habitat degradation and increasing resource use by rapidly expanding human populations, stochastic problems threaten the survival of small populations. Stochastic events tend to be random and difficult to predict, but nonetheless can be moderated by careful genetic and demographic management of small populations. As natural habitats decline, a large and growing number of taxa will need assistance and more intensive management to prevent extinction. Management methods developed specifically to address the problems of small populations, both *in situ* and *ex situ*, must be widely applied if the planet's biodiversity is to be maintained.

Preservation of island biodiversity is of particular concern. Endemic island populations are especially susceptible to extinction because of their small size, specialization in adaptation, vulnerability to environmental catastrophe, disturbance, introduced competitors and predators, and disease, as well as complex interactions between these and other factors. One of the most striking examples of the vulnerability of island endemics is in the Hawai'ian Islands. These islands have the planet's highest percentage of endemic plant and animal species, and have already lost 27% of their endemic bird species known since the islands were "discovered" by Captain Cook (Pyle, 1990). There is little or no evidence that the species decline is slowing. If current trends continue, the United States will soon surpass Australia as the leader in the number of endemic extinctions.

The native avifauna of Hawai'i is faced with an extinction crisis that began with the arrival of humans and continues today. Among the hardest-hit in this extinction crisis have been the Hawai'ian forest birds. In addition to the existence of the highest rate of endemism for birds, the Hawai'ian Islands also have had more bird introductions (162 species) and more exotic bird species established (54) than anywhere else on the planet (Pyle, 1992).

The most recent checklist of the birds of Hawai'i (Pyle, 1992) lists 23 of the 71 endemic taxa known to have occurred in Hawai'i at the time of Captain Cook's exploration as presumed extinct. Those numbers may be conservative; the continued existence of as many as a dozen more species is seriously questioned. The Kama'o, Oloma'o, 'O'o'a'a, Bishop's 'O'o, 'O'u, Kaua'i 'Akialoa, Kaua'i Nuku-pu'u, Maui Nuku-pu'u, O'ahu creeper, Moloka'i creeper, Maui Akepa, and Po'ouli may no longer exist. For the most part these species were at extremely low numbers when last surveyed 10-15 years ago and have not been seen for years, and, based on detection failure in recent surveys, may no longer survive. If these species are added to the presumed extinct list, then 49% of Hawai'i's native resident bird taxa have disappeared (R. Pyle, pers. comm). Considering native forest birds alone, the percentage of taxa lost is even more alarming. Pyle (pers. comm.) suggests that no more than five or six of

the 12 species mentioned above are extinct at this time. In the worst-case scenario, if the 12 taxa listed above are added to the presumed extinct list, as many as 33 of the 57 small forest birds (58%) that are known from Hawai'i in historic times are or are now likely extinct.

The Hawai'ian extinction crisis does not affect only those taxa which are highly specialized. Even the more common species appear to be at risk. One hundred years ago the most widespread forest bird species were the 'O'o and the 'I'iwi (P. Banko, pers. comm.). The 'I'iwi no longer survives on west Maui and may no longer survive either on Lana'i or O'ahu. It appears that the 'Amakihi no longer survives on Lana'i; similarly, the Creeper is now gone from west Maui.

There has been some progress toward actions needed to preserve and manage endangered forest bird species. Nearly 1,000,000 acres of habitat have been set aside in State Forest Reserves, Wildlife Sanctuaries, and Natural Area Reserves, with different levels of protection for each of these three types of state areas. Important forest bird habitat has been placed under protection in the Hakalau Forest on the island of Hawai'i, in the National Wildlife Refuge on O'ahu, and in large areas of forest habitat are protected in national parks on Maui and Hawai'i. Extensive ecosystem management has been instituted over the past 15 years. State, Federal, and private landowners are building fences, attempting to control ungulates and predators, protecting native plant communities, and reforesting degraded habitats. Critically needed research on limiting factors is underway and statewide forest bird surveys have been resumed to monitor bird populations.

In spite of these efforts, species continue to be lost. The trend appears to be one of a gradual, slow decline in small populations, and, to date, not a sudden collapse of larger populations. If this trend continues, those species that presently are already reduced to small population sizes, like the Puaiohi, will also soon be lost. It is not possible to determine, at present, whether more "common" species, like the 'I'iwi, are also on the same path to extinction.

The statewide forest bird surveys carried out by the U.S. Fish and Wildlife Service (Scott et al., 1986) from 1976-1981 have provided a useful assessment of forest bird numbers. When first published, these surveys were a comprehensive tool to evaluate the status of forest birds. Many of the population estimates in this document are based on these data.

As recently as 1976, little was known about the status of most Hawai'ian birds; many areas within the islands were as yet ornithologically unexplored (Berger, 1972) because of the difficulty of survey under arduous field conditions within the island rain forests (Scott et al., 1986). While the status of many of the Hawai'ian forest birds has been fairly well-documented, the integral role that may be played by some Hawai'ian forest birds in the rain forest is not yet well-understood. It is possible that the role of many species within these ecosystems may not be elucidated before they become extinct. As such, it will be difficult to determine broader effects of species extinctions on the ecosystems as a whole.

As critical as the situation facing Hawai'ian forest birds has become, and as urgent as the need is for immediate actions to halt the decline, the underlying factors causing the decline in forest birds are poorly understood. It has been suggested that competition for food with introduced taxa has played a significant role in the decline of many native species (Berger, 1981; Mountainspring & Scott, 1985). Other significant limiting factors include: habitat modification by humans as well as introduced domestic animals or exotic plants; disease, especially malaria; predation by exotics; genetic factors; as well as inherent problems with small populations. All are thought to affect forest birds to varying degrees but the relative importance of each is unknown. Still other limiting factors may not yet have been determined. At the very least, however, the likelihood of survival for Hawai'ian forest bird taxa can be increased with more intensive management of identified limiting factors that are controllable, focusing on minimizing the effects of disease, predation by introduced exotic species, habitat loss and/or modification, and competition with exotic species.

The successful preservation of wild species and ecosystems in Hawai'i as well as elsewhere necessitates development and implementation of active, integrated management programs by people and governments living within the range area of the species in question. The recommendations contained within this document have been generated on scientifically-based conservation criteria only; adjustments for political and other constraints are the responsibility of regional governmental agencies charged with the preservation of flora and fauna within Hawai'i. Decisions concerning implementation of the recommendations contained within this document (e.g., how they are implemented and under which agency's authority) are also the responsibility of these governmental organizations.

1.2 CONSERVATION ASSESSMENT AND MANAGEMENT PLANS

Within the Species Survival Commission (SSC) of IUCN-The World Conservation Union, the primary goal of the Captive Breeding Specialist Group (CBSG) is to contribute to the development of holistic and viable conservation strategies and management action plans. Toward this goal, CBSG is collaborating with agencies and other Specialist Groups worldwide in the development of Conservation Assessment and Management Plans (CAMPs), both on a global and a regional basis, with the goal of facilitating an integrated approach to species management for conservation.

CAMPs provide strategic guidance for the application of intensive management techniques that are increasingly required for survival and recovery of threatened taxa. CAMPs are also one means of testing the applicability of the Mace-Lande criteria for threat as well as the scope of its applicability. Additionally, CAMPs are an attempt to produce ongoing summaries of current data for groups of taxa, providing a mechanism for recording and tracking of species status.

In addition to management in the natural habitat, conservation programs leading to viable

populations of threatened species may sometimes need a captive component. Such components can range from the development of active, long-term captive populations or utilization of technologies developed and refined under captive conditions. In general, captive populations and programs can serve several roles in holistic conservation: 1) by providing scientific resources for information and technology that can be used to protect and manage wild populations; 2) as genetic and demographic reservoirs that can be used to reinforce wild populations either by revitalizing populations that are languishing in natural habitats or by re-establishing, via translocation or utilization of captive technologies, populations that have become depleted or extinct; ; and 3) as living ambassadors that can educate the public as well as generate funds for *in situ* conservation.

It is proposed that, when captive populations or technologies developed in captivity can assist species conservation, captive and wild populations should, and can be, intensively and interactively managed with interchanges of animals or genetic material occurring as needed and as feasible. Captive populations should be a support, not a substitute for wild populations. There may be problems with interchange between captive and wild populations with regard to disease, logistics, and financial limitations. In the face of the immense extinction crisis facing Hawai'ian forest birds, these issues must be addressed and resolved within the next several years.

1.2.1 The CAMP Process.

The CAMP process assembles expertise on wild and captive management for the taxonomic group under review in an intensive and interactive workshop format. The purpose of the Hawai'ian Forest Bird Conservation Assessment and Management Plan (CAMP) workshop was to assist in the development of a conservation strategy for Hawai'ian forest bird taxa, and to continue to test the applicability of the Mace-Lande criteria for threat (Mace & Lande, 1991). In December of 1992, 31 individuals met in Hilo, Hawai'i to review, refine, and develop further conservation strategies for Hawai'ian forest birds. This group was self-selected from nearly 40 individuals invited to attend, but represented field biologists and wildlife managers, non-governmental organizations, wildlife experts, conservation biologists, academic scientists, and captive managers. Workshop participants are listed in Section 18, Appendix III.

Participants worked together in small working groups, divided by islands, to: 1) determine best estimates of the status of all Hawai'ian forest birds; 2) assign each taxon to a Mace-Lande category of threat; and 3) identify areas of action and information needed for conservation and management purposes.

Since many taxa were found in several geographic locations, each taxon was examined by island subpopulation; the assessments and recommendations of each of the working groups for each subpopulation were circulated to and discussed by the entire group prior to final consensus by all participants, as represented in this document. Summary recommendations concerning research management, assignment of all taxa to threatened status, and captive breeding were supported by the workshop participants.

1.2.2 CAMP Workshop Goals.

The goals of the Hawai'ian Forest Bird CAMP workshop were:

- 1) To review the population status and demographic trends for Hawai'ian forest birds, to test the applicability of the Mace-Lande criteria for threat, and to discuss management options for all Hawai'ian forest bird taxa.
- 2) To provide recommendations for *in situ* and *ex situ* management, research and information-gathering for all Hawai'ian forest bird taxa, including: recommendations for PHVA workshops; more intensive management in the wild; taxonomic research, survey, monitoring, investigation of limiting factors, husbandry or other specific research.
- 3) Produce a discussion draft Conservation Assessment and Management Plan for Hawai'ian forest birds, presenting the recommendations from the workshop, for distribution to and review by workshop participants and all parties interested in Hawai'ian forest bird conservation.

1.3 HAWAI'IAN FOREST BIRDS CONSERVATION ASSESSMENT AND MANAGEMENT PLAN SUMMARY

A great deal of information on the status and trends of Hawai'ian forest bird species had been gathered and summarized in preparation for the meeting. During the workshop, each taxon was discussed individually, first within each of three working groups focusing on one island or island group, then by the assembled congress. Where a taxon occurred in two or more geographic locations, each working group considered the status of that taxon within each geographic area. The term "taxa" as used hereafter includes each systematic taxon, and also the separate populations of some taxa which occur on different islands or on both East and West Maui Island.

1.3.1 Assignment to Mace-Lande Categories of Threat

All Hawai'ian forest bird taxa were evaluated on a taxon-by-taxon basis in terms of their current and projected status in the wild to assign priorities for conservation action or information-gathering activities. The workshop participants applied the criteria proposed for the redefinition of the IUCN Red Data Categories proposed by Mace and Lande (1991). The Mace-Lande scheme assesses threat in terms of a likelihood of extinction within a specified period of time (Table 1). The system defines three categories for threatened taxa:

- | | |
|-------------------|--|
| Critical | 50% probability of extinction within five years or two generations, whichever is longer. |
| Endangered | 20% probability of extinction within 20 years or 10 generations, whichever is longer. |
| Vulnerable | 10% probability of extinction within 100 years. |

Definitions of these criteria are based on population viability theory. To assist in making recommendations, participants in the workshop were encouraged to be as quantitative or numerate as possible for two reasons: 1) Conservation Assessment and Management Plans ultimately must establish numerical objectives for viable population sizes and distributions; 2) numbers provide for more objectivity, less ambiguity, more comparability, better communication, and hence cooperation. During the workshop, there were many attempts to estimate if the total population of each taxon was greater or less than the numerical thresholds for the three Mace-lande categories of threat. In many cases, current population estimates for Hawai'ian forest birds were not available or were available for taxa within a limited part of their distribution. Many population estimates were based on data from the last comprehensive forest bird surveys completed in 1981 (Scott et al., 1986). In all cases, conservative numerical estimates were used. **Where population numbers are estimated, these estimates represent first-attempt, order-of-magnitude guesstimates that are hypotheses for falsification. As such, the workshop participants emphasize that these guesstimates should not be used as an authoritative estimate for any other purpose than was intended by this process.**

Table 1. MACE-LANDE CATEGORIES AND CRITERIA FOR THREAT

POPULATION TRAIT	CRITICAL	ENDANGERED	VULNERABLE
Probability of extinction	50% within 5 years or 2 generations, whichever is longer	20% within 20 years or 10 generations, whichever is longer	10% within 100 years
	OR	OR	OR
	Any 2 of the following criteria:	Any 2 of following criteria or any 1 CRITICAL criterion	Any 2 of following criteria or any 1 ENDANGERED criterion
Effective population N_e	$N_e < 50$	$N_e < 500$	$N_e < 2,000$
Total population N	$N < 250$	$N < 2,500$	$N < 10,000$
Subpopulations	≤ 2 with $N_e > 25$, $N > 125$ with immigration < 1/generation	≤ 5 with $N_e > 100$, $N > 500$ or ≤ 2 with $N_e > 250$, $N > 1,250$ with immigration < 1/gen.	≤ 5 with $N_e > 500$, $N > 2,500$ or ≤ 2 with $N_e > 1,000$, $N > 5,000$ with immigration < 1/gen.
Population Decline	> 20%/yr. for last 2 yrs. or > 50% in last generation	> 5%/yr. for last 5 years or > 10%/gen. for last 2 years	> 1%/yr. for last 10 years
Catastrophe: rate and effect	> 50% decline per 5-10 yrs. or 2-4 generations; subpops. highly correlated	> 20% decline/5-10 yrs, 2-4 gen > 50% decline/10-20 yrs, 5-10 gen with subpops. highly correlated	> 10% decline/5-10 yrs. > 20% decline/10-20 yrs. or > 50% decline/50 yrs. with subpops. correlated
	OR		
Habitat Change	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects
	OR		
Commercial exploitation or Interaction/introduced taxa	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects

In assessing threat according to Mace-Lande criteria, workshop participants also used information on the status and interaction of habitat and other characteristics. Information about population trends, fragmentation, range, and environmental stochasticity, real and potential, were also considered.

Numerical information alone was not sufficient for assignment to one of the Mace-Lande categories of threat. For example, based solely on numbers, a taxon might be assigned to the Vulnerable or Safe category. Knowledge of the current and predicted threats or fragmentation of Hawai'i's remaining natural habitats, however, may lead to assignment to a higher category of threat. For example, there was some discussion whether populations such as the Common 'Amakihi and 'Apapane on the Island of Hawai'i, which have populations of 870,000 and 1,000,000, respectively, and have a wide distribution throughout island forests, should be classified as Safe rather than Vulnerable. It was suggested by one participant that the probability of the entire population of Common 'Amakihi or 'Apapane going extinct within 100 years is less than ten percent given their current large numbers, wide distribution, and the fact that these populations have persisted in recent years despite the loss of habitat and introduction of disease and exotic plants and animals that have contributed to declines in other species. It was argued that the rate of decline of certain species in the future is likely to be lower than in the past because of our greater awareness of problems facing the Hawai'ian avifauna, and our increased efforts to protect and rehabilitate native forests and to remove limiting factors.

The majority of workshop participants concurred that even given our greater awareness and concern, the probability of any species of native Hawai'ian bird going extinct over the next 100 years exceeded ten percent, and therefore all Hawai'ian forest bird species were assigned to one of the three categories of threat. One concern was that certain catastrophic events, such as the introduction of a temperate species of mosquito that could spread malaria or another disease to birds in high-elevation forests, or introduction of a new disease that could decimate the native Hawai'ian avifauna, could occur over a 100-year period. Another concern was that given exponential increase in the human population and the need for land, fuel and other resources by humans, attitudes about the protection of native forests and concern for native birds might change and bird populations could rapidly decline as a result. A third concern was that given the continued high rate of extinctions in Hawai'i, and our lack of understanding and control over most of these extinctions, the long-term survival of any of the species regardless of their current numbers could not be guaranteed.

Because of these considerations, all of the Hawai'ian forest bird taxa were assigned to Mace/Lande categories of Critical, Endangered, or Vulnerable by workshop participants, even though a few taxa had extant populations numbering in the hundreds of thousands. In several cases, there was not enough information available for assignment to one of the three categories of threat; these taxa are listed as unknown or questionable. Assignment to Mace-Lande categories of threat for the 64 taxa examined during this CAMP exercise are presented in Table 2. Specific taxa within each category are presented in Section 6.

Table 2. Threatened Hawai'ian Forest Birds - Mace-Lande Categories of Threat.

MACE-LANDE CATEGORY	NUMBER OF TAXA	PERCENT OF TOTAL
Critical	23	36
Endangered	12	19
Vulnerable	21	33
Unknown/questionable	3	4
Extinct?	5	8
TOTAL	64	100

Eight taxa were listed as Unknown/questionable or Extinct? Questions of contingency strategies for these taxa were discussed at length, particularly with regard to the need for search and find surveys and opportunistic collection for captive programs for taxa which may be functionally extinct in the wild. These contingency strategies are discussed in more detail in Section 4. This issue was similarly discussed at the first meeting of the Pacific Islands Recovery Coordinating Committee meeting in early 1993. Available data for taxa whose existence is questionable or whose populations may number fewer than ten individuals are listed in Table 11 in Section 7, along with information concerning the last documented sightings of the taxa.

1.3.2 Regional Distribution of Threatened Taxa.

All taxa from the islands of Hawai'i, Kaua'i, Maui, O'ahu, and Moloka'i were listed as threatened; as were 67% of taxa from Lana'i and 60% of taxa from smaller islands such as Ni'ihau and Laysan. Lower percentages of threatened taxa on Lana'i and the smaller islands can be attributed to three taxa for which there was not sufficient data to assign a category of threat. Regional distribution of threatened taxa is presented in Table 3. Summary data for individual islands is presented in Section 8. Detailed spreadsheets and individual accounts for taxa on each island are presented in Sections 9-15.

Table 3. Regional distribution of threatened Hawai'ian Forest Bird taxa within Mace-Lande categories of threat.

MACE-LANDE	Hawai'i	Kaua'i	Maui	O'ahu	Moloka'i	Lana'i	Smaller Islands
Critical	3	6	6	4	2	2	0
Endangered	4	2	3	0	1	0	2
Vulnerable	7	6	3	2	2	0	1
Extinct?	0	0	0	0	0	0	0
TOTAL	14	14	12	6	5	2	3
PERCENT THREATENED	100%						

1.3.3 Threats Facing Hawai'ian Forest Birds.

For the purposes of the CAMP process, threats were defined as "immediate or predicted events that are causing or may cause significant population declines." By far, the greatest threats facing Hawai'ian forest birds are factors that, with appropriate management, can be minimized if not eliminated - disease, predation by introduced exotic species, and habitat loss and/or modification. The fifth greatest threat, hurricanes, are acts of God and cannot be controlled. Threat data, in terms of Mace-Lande status, are presented in Table 4. In descending order, the remaining threats are: genetic problems or factors; pesticides; human interference; fire; and aircraft. Other threats present to a small degree for some taxa include: climatic changes; hunting; and tsunamis. Specific threats for each island are presented in Tables 12, 15, 18, 21, 24, 27, and 30. Participant of this workshop identified 15 primary threats to Hawai'ian forest birds.

Table 4. Threats facing Hawai'ian forest birds according to Mace-Lande status.

MACE-LANDE	Disease	Predat'n exotics	Habitat modif/ loss	Interspec compet exotics	Hurric	Genetic probs	Pestic	Human interfer	Fire	Aircraft
Critical	26	25	23	19	22	23	6	3	4	5
Endangered	11	10	8	8	6	1	4	2	2	0
Vulnerable	23	12	13	10	4	0	1	1	0	1
TOTAL	60	47	44	37	32	24	11	6	6	6

As critical as the situation facing Hawai'ian forest birds has become, and as urgent as the need is for immediate actions to halt the decline, the underlying factors causing the population declines in forest birds are poorly understood. It has been suggested that competition for food with introduced taxa has played a significant role in the decline of many native species (Berger, 1981; Mountainspring & Scott, 1985). Other significant limiting factors include: habitat modification by introduced animals or plants; predation by exotics; genetic factors; inherent problems with small populations; and disease. Avian malaria, now found at elevations as high as 6,000 feet, is suspected to have been a major causal factor in population declines thus far at low and mid-elevation areas within the islands. Recent drought in the lowland areas of the Hawai'ian Islands may also be a limiting factor. Each of these factors are thought to affect forest birds to varying degrees but the relative importance of each is unknown. Still other limiting factors may not yet have been determined.

1.3.4 Recommendations for Intensive Management and Research Actions.

For all taxa, recommendations were generated for the kinds of intensive action necessary for conservation, both in terms of wild and captive management. These recommendations, summarized in Table 5, were: Population and Habitat Viability Assessment (PHVA) workshops; wild management and research; and captive programs. PHVA workshops provide a means of assembling available detailed biological information on the respective taxa, evaluating the threats to their habitat, development of management scenarios with immediate and 100-year time-scales, and the formulation of specific adaptive management/recovery plans with the aid of simulation models. In many cases, workshop participants determined that the current level of information for a taxa was not adequate for conduction of a PHVA; in those cases, recommendations are listed as "PHVA Pending."

Table 5. Management and research recommendations made for Hawai'ian Forest Birds in relation to their category of threat assignment.

MACE-LANDE	PHVA	PHVA PEND	RSRCH MGMT	CAP PRGM REC
Critical	9	2	22	3
Endangered	7	2	12	6
Vulnerable	7	1	23	6
Unknown	0	2	2	0
TOTAL	23	7	59	15

Workshop participants attempted to develop an integrated approach to management and research actions needed for the conservation of Hawai'ian forest bird taxa. In all cases, an attempt was made to make management and research recommendations based on the various levels of threat impinging on the taxa.

Without good understanding of underlying causes for decline, it is difficult to clearly define specific management actions needed for the conservation of most Hawai'ian forest bird species. There was strong consensus by workshop participants that "research management" must become a component of recovery activities for all agencies involved with forest bird management. Research management can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the bird taxa to that activity.

Seven basic categories of research management activities were identified: survey (e.g., search and find); monitoring; translocation; taxonomic research or clarification; management of limiting factors; limiting factors research; and life history research. The frequent need for survey information to evaluate population status, especially for those taxa listed as Critical, emphasizes the need to quickly implement intensive methodologies for determining the existence of at least 13 taxa. As important, close monitoring was recognized as an important research management strategy for more than 65% of Hawai'ian forest bird taxa.

The best research management strategy may be to coordinate efforts within ecosystems, that is, pooling research management for taxa identified as needing such efforts within common areas. Control of disease, introduced exotic predators, and habitat loss - defined above as the primary threats to the survival of Hawai'ian forest birds - should be given priority with regard to the development of research management programs. Research management programs should incorporate coordinated evaluation of efficacy of methods with ongoing monitoring and/or census data for Hawai'ian forest bird taxa.

Research management recommendations are summarized in Table 6. Specific research management recommendations for each island are presented in Tables 13, 16, 19, 22, 25, 28, and 31.

Table 6. Hawai'ian Forest Birds research management recommendations by Mace-Lande threat category.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical	17	11	4	2	4	10	2
Endangered	1	8	2	0	3	9	7
Vulnerable	0	23	1	4	0	10	5
Unknown	2	0	0	0	0	0	0
TOTAL	20	42	7	6	7	29	14

1.3.5 Captive Technologies and Captive Propagation Programs.

For a few of the Hawai'ian forest bird taxa, it was determined that a captive program component would be necessary to contribute to the maintenance of long-term viable populations. It was proposed that, when captive populations can assist species conservation, captive and wild populations should be intensively and interactively managed with interchanges of animals occurring as needed and as feasible. There may be problems with interchange between captive and wild populations with regard to disease, logistics, and financial limitations. Some precedent for releases of captive-hatched birds has been set by the USFWS with the San Clemente loggerhead shrike, a species whose population was reduced to 14 individuals. Eggs from wild shrikes were brought into captivity, artificially incubated and hand-reared, and released back to San Clemente Island.

The feasibility of dedicated facilities on the mainland focusing exclusively on Hawai'ian forest bird propagation, in addition to existing and planned programs in Hawai'i, may bear further discussion. In the face of the immense extinction crisis facing Hawai'ian forest birds, these issues must be addressed and resolved within the next few years. In particular, it will be important to convene a broad-based veterinary group to further address issues of disease and management, both for wild and captive populations. Recommendations from the 1984 Workshop on Avian Disease in Wild Birds on Pacific Islands (Wilbur, 1984) have been minimally implemented to date and should also be re-examined.

The dilemma facing managers of Hawai'ian forest birds is immensely intricate: both captive and wild management may present risks that could result in further species decline. For this reason, it is vital to consider all options. It is essential, here, to note that the establishment of self-sustaining captive populations is not the only management option available for Hawai'ian forest birds. Because wild populations of so many taxa are small, and captive propagation techniques are not well-established for passerines, other options also should be considered. Incorporating "captive propagation technology" or "field application of captive propagation techniques" (e.g.,

double-clutching, translocation, transitional aviaries, cross-fostering and supplemental feeding) and field management techniques (e.g., into long-term conservation programs) is also valuable, and may allow maximization of the productivity of birds under field conditions. In some cases, more these techniques may also prove more feasible and cost-effective than establishing new captive programs with the more endangered species.

Workshop participants agreed that if captive propagation technology is to be effectively incorporated in the conservation strategy for Hawai'ian forest birds, the existing but limited captive program for non-endangered Hawai'ian forest birds should be intensified and expanded immediately. This would enable aviculturists to: 1) develop satisfactory capture techniques; 2) work on problems of diet, enclosure and breeding requirements for Hawai'ian softbills; and 3) provide training experience for staff with regard to "softbill" maintenance and captive breeding. This type of expertise will be critical even if cross-fostering, transitional aviaries, or translocation are chosen as management options. For example, in order to translocate some of these birds field workers will need to be able to keep them alive after capture (perhaps for days). Additionally, if double-clutching is chosen as a management option it is critical that aviculturists refine artificial incubation and hand-rearing expertise in related species. In other words, for these strategies to work, adequate facilities and staff will be essential.

As mentioned above, there are several possible strategies for the propagation of those species which may be rare or for which captive husbandry techniques are not established. These strategies include:

- 1) **Translocation** from one island to another.
- 2) **Cross-fostering** of eggs or chicks from one nest to another.
- 3) **Transitional aviaries.** In cases where captive management is not possible or too difficult, one option may be to develop a series of large "transitional" aviaries in the forest for management of birds under a semi-natural setting. Birds would be able to forage for native food items and gradually be introduced to supplemental feeding and captive diets under less stressful conditions. Additionally this would give biologists the opportunity to: a) study the birds in a semi-natural environment before removal from the forest; and b) protect them from predators.
- 4) **Double-clutching wild birds.** This strategy would entail removal of eggs/chicks instead of capturing adults. Adult insectivores are difficult to keep alive after capture. However, the technology exists to hand-rear insectivores. The priority rating for capture should be: nestlings, fledglings, eggs, sub-adults, then adults. Collection of nestlings and fledglings are given priority because the techniques are more established for hand-rearing nestlings/fledglings for most Hawai'ian forest bird species (or surrogates) than for artificial incubation of eggs; the likelihood for survivability is greater with older birds than for those at the egg stage. Collecting eggs/chicks for hand-rearing would enable aviculturists to circumvent the stress factors involved in capture and wean chicks on to "captive insectivore diets". Removal of eggs or chicks also allows wild adults to "double-clutch" and decreases the impact of adult bird removal from the wild population.
- 5) **Supplemental feeding in the wild.** This strategy would employ providing supplemental food items to birds within the natural habitat.

6) **Artificial nests.** Establishment of additional artificial nests in the wild might enhance breeding success by providing more suitable sites within habitats for which successful breeding is nest site limited.

In making recommendations for captive propagation programs for the Hawai'ian forest bird taxa considered during this workshop, the first question posed was whether current avian husbandry technology is available to maintain and propagate taxa **in adequate numbers to establish self-sustaining captive populations.** In other words, is the technology available to establish captive populations where production will be greater than mortality?

Recommendations for captive programs were made assuming the following conditions have been met:

- 1) "state of the art" facilities
- 2) "state of the art" equipment
- 3) adequate number of staff
- 4) avicultural expertise in softbill propagation
- 5) artificial incubation and hand-rearing experience for softbills
- 6) continued training for staff
- 7) veterinary/pathology/laboratory support
- 8) working relationship with field biologists to help answer basic natural history questions unknown for some species of Hawai'ian birds (critical data for successful captive propagation) e.g.:
 - adult/chick diet
 - mating system and courtship behavior
 - intra-specific and inter-specific aggression tendencies
 - incubation period
 - nest description
 - natural history/habitat data (behavior, elevation, climate, floral composition of habitat)

All Hawai'ian forest bird taxa were evaluated relative to their current need for captive propagation. Recommendations were based upon a number of variables, including: immediate need for conservation (population size, Mace-Lande status, population trend, type of captive propagation program), need for or suitability as a surrogate species, and determination of difficulty in maintaining in captivity relative to food requirements. Limiting factors for captive programs (see Appendix I) as well as difficulty of captive management (see Appendix II) were also considered. Based on all of the above considerations, in addition to threats, trends, and Mace-Lande category of threat, recommendations for captive programs were made. Ten of the 65 taxa considered were recommended for new captive programs within the next six years; for six taxa, it was recommended that ongoing programs (including the mainland surrogate program) should be increased from current levels. Recommendations, by category of threat, are presented in Table 7.

Table 7. Captive program recommendations for Hawai'ian Forest Birds by Mace-Lande threat category.

MACE-LANDE	Increase ongoing program	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data	Not currently recommended
Critical	2	1	0	15	2
Endangered	0	4	2	1	5
Vulnerable	4	2	1	3	14
Unknown	0	0	0	0	2
Extinct	0	0	0	5	0
TOTAL	6	7	3	23	23

1.3.5a Decision Key for Captive Program Recommendations.

A decision key (see page 19) was constructed by workshop participants to assist in the decision of which taxa, species, populations or subpopulations of Hawai'ian forest birds would benefit from captive management for species recovery. This key can be used as a means of management planning and as a focusing-tool for both rare and common species but was initially intended for those species which are rare, with populations numbering from 0-10 (as in Table 11). This key was designed by workshop participants to assist field researchers/managers in setting a course of action if birds were, for example, opportunistically caught in a mist net.

A seven-step key (seven priority-levels) of decisions was developed by workshop participants. Factors comprising the levels of priority used are:

- 1) Assignment to Mace-Lande category of threat (Critical, Endangered, Vulnerable)
- 2) Taxonomic uniqueness (e.g., taxonomically unique or not)
- 3) Number of islands inhabited (e.g., one vs. multiple islands)
- 4) Population trend (declining vs. stable)
- 5) Availability of husbandry techniques for species (known technique or applicable/surrogate work in hand vs. technique not known or likely a difficult species to husband)
- 6) Aviculture facilities/staff (present vs. none/planned/developing)
- 7) Sufficient numbers of birds for the level/type of recovery proposed (sufficient numbers vs. too few)

Each step comprises a set of two questions as shown in parentheses above; one leading to a continuation of the decision process (e.g. the "yes" side) and the other to the re-qualification of that level's question. At the successful end of a run of "yesses" the outcome for the taxon would be: a) birds to be collected for captive propagation; or b) birds would not be collected but

would be evaluated for collection or possibly be subject to alternative intensive management scenarios (see Taxon by Taxon Evaluations in Section 18, Appendix I.).

This key is based primarily on similar formats that are used for biological keys. It consists of series of pairs of mutually exclusive statements. Each pair of statements are numbered consecutively on the left side of the page. The user should read both parts of the first pair of statements and judge which of the two statements best describes the specimen or taxon in question. If, for example, the user decides that the second set of statements in the second pair (2') best matches the specimen or species in question, the user then proceeds to pair 3. The user then proceeds by the process of elimination to make a decision concerning the specimen or taxon in question.

DECISION KEY FOR CAPTIVE PROGRAM RECOMMENDATIONS

1	Mace-Lande classification	
	Critical or Endangered.....	2 or 2'
	Vulnerable.....	2 or 2'
	Safe.....	8
2	Taxonomically unique.....	3 or 3'
2'	Not taxonomically unique.....	3'
3	Found on one island.....	4
3'	Found on multiple islands.....	4 or 4'
4	Population declining, historical distribution larger.....	5 or 5'
4'	Population is at least stable.....	5 or 5'
5	Husbandry techniques, surrogate work, or alternate techniques (e.g., cryopreservation, other) in place.....	6
5'	Husbandry techniques, surrogate work, or alternate techniques (e.g., cryopreservation) not in place/difficult/unknown.....	6 or 6'
6	Aviculture facilities and staff currently available.....	7 or 7'
6'	Aviculture facilities planned or not in place.....	8'
7	Sufficient population size (>10) for captive program.....	8
7'	Too few (0-10) for captive program.....	8'
8	Collect for captive program	
8'	Do not collect for captive program	

1.3.5b Strategies for Rare or Uncapturable Taxa.

Workshop participants attempted to develop strategies for rare and/or operationally "uncapturable" taxa (taxa with populations of 0 - 10), since in some cases these taxa may be seen or even inadvertently captured. For such species, the following recommendations were made:

- 1) If such a specimen is caught, it should be banded, released and followed-up for short-term study. Banding and follow-up to assess status and recoverability is needed to assess appropriate management strategy. Individually banding and color-marking will enable differentiation of individuals. Radio-tracking rare birds would provide the quickest feedback of needed information but should be implemented only if properly planned and permitted (Endangered Species) and implemented by qualified and trained staff. Developing the techniques, equipment and training staff should be a goal of the contingency planning for rare species.
- 2) Operating under the assumption that one rare bird will assist researchers in finding others, the researcher should return immediately to the site, equipped to stay 3-4 weeks with team helpers to accomplish the following:
 - a. mapping of sightings and determination of range.
 - b. determination of the number of individuals, ages, sexes, etc.
 - c. determination of net sites for captures (if determined by the above key)
- 3) Options for other sorts of management in the field (e.g., construction of a forest aviary, egg or chick manipulation, etc.) should be immediately investigated, as noted at the beginning of this section.

1.3.5c Taxon-by-taxon evaluations.

In order to assist in making recommendations for captive programs, each group of Hawai'ian forest birds was evaluated with regard to the potential for captive propagation, and a series of codes developed to assist in the evaluation of each taxon.

Codes.

Each genus or species name is followed by a series of letters indicating: 1) the overall level of avicultural difficulty; 2) the feeding strategy; and 3) those areas of husbandry or captive maintenance for which techniques are **not** established. Examples of documented captive breeding for related species are also included (1991 ISIS Abstract; National Academy of Science Report on the 'Alala; A. Lieberman, unpubl. data; P. Luscomb, unpubl. data; C. Kuehler, unpubl. data; F. Duvall, pers. comm.). The codes and definitions are as follows:

Overall Husbandry Difficulty

1-3 Ranking of husbandry difficulty: 1 being the least difficult and 3 being the most difficult.

Feeding Strategy

F	Frugivore
G	Granivore
O	Omnivore
I	Insectivore
C	Carnivore

Program Type

Recommendation for the type of captive program defined by its genetic and demographic objectives and hence the target population required to achieve these objectives.

- E** Captive population should be developed and managed that is sufficient to preserve 90% of the genetic diversity of a population for 100 years. Program should be developed within 3 years. This is an emergency program based on the present availability of genetically diverse founders.
- N** Captive population should be developed and managed that is a nucleus 50-100 individuals organized with the aim to represent as much of the wild gene pool as possible. This program may require periodic importation of individuals from the wild population to maintain this high level of genetic diversity in a limited captive population. View this type of program as protection against potential extirpation of wild populations.
- S** Captive population should be developed to be used as a surrogate for other populations that may be more rare or more difficult to maintain.

1.3.5d Taxon-by-Taxon Summary of Captive Propagation Program Recommendations.**1. Ongoing Captive Propagation Programs (O)**

A number of birds are currently the subject of ongoing captive programs, either for productivity of birds for release in Hawai'i (Nene, 'Alala), or as surrogates with the Hawai'i Forest Bird Surrogate Program involving several mainland zoos (outlined in Section 18, Appendix II). Workshop participants recommended that efforts with ongoing programs be increased.

SPECIES	PROGRAM TYPE	DIFFICULTY
Nene	N	1
'Alala	E	1
Oma'o	S	1
Hawai'i 'Amakihi	S	2

Hawai'i 'I'iwi	S	2
Hawai'i 'Apapane	S	2

2. Initiate Captive Propagation Program in Hawai'i within next 3 years. (I1)

It was agreed that captive propagation programs needed to be initiated in Hawai'i immediately. This group included species targeted because of their immediate conservation need, as well as appropriate surrogate species to support both these and future propagation programs.

SPECIES	PROGRAM TYPE	DIFFICULTY	FEEDING
Puai'ohi	E	1	F
Maui Creeper	S	3	I
Maui Parrotbill	E	3	I
Akiapola'au	E	3	I
Palila	N,S	1	F
Hawai'i 'Apapane	S	2	N
Akohekohe	S,N	2	N

3. Initiate Captive Propagation Program in Hawai'i within next 5 years. (I2)

A second group of species should be targeted for captive propagation in the near future (to start within the next 5 years).

SPECIES	PROGRAM TYPE	DIFFICULTY	FEEDING
Kaua'i Akepa	N,S	3	I
Kaua'i Creeper	N,S	3	I
Maui 'I'iwi	S	2	N
Hawai'i 'Elepaio	S	3	I

4. No recommendation for captive propagation at this time, pending outcome of field surveys or taxonomic review. (Np)

SPECIES	PENDING
Oloma'o	Search
Kama'o	Search
Nihoa Millerbird	Evaluation of translocation
'Elepaio (ridgewayi)	Taxonomic Review
'Elepaio (bryani)	Taxonomic Review
O'ahu 'Elepaio	Taxonomic Review
Kaua'i 'O'o	Search
Bishop's (Maui) 'O'o	Search
Hawai'i 'O'u	Search
Kaua'i 'O'u	Search

Lana'i 'Amakihi	Search and Taxonomic Review
Kaua'i 'Akialoa	Search
Kaua'i Nuku-pu'u	Search
Maui Nuku-pu'u	Search
Moloka'i Creeper	Search
O'ahu Creeper	Search
Maui Akepa	Search
West Maui 'I'iwi	Search and Taxonomic Review
Moloka'i 'I'iwi	Search and Taxonomic Review
O'ahu 'I'iwi	Search and Taxonomic Review
Lana'i 'Awapane	Taxonomic Review
Po'ouli	Search

5. No Captive Program Recommended

SPECIES

'Io
 Kaua'i 'Elepaio
 Nihoa Finch
 'Anianiau
 Hawai'i Akepa
 'Awapane (Kaua'i, West Maui, Moloka'i, O'ahu)
 Pueo
 Laysan Finch
 'Amakihi (Kaua'i, O'ahu, Maui, Moloka'i)
 Hawai'i Creeper
 Kaua'i 'I'iwi

**HAWAI'IAN FOREST BIRDS
CONSERVATION ASSESSMENT
AND MANAGEMENT PLAN**

Final Report

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**Produced by Participants of the
Hawai'ian Forest Birds
Conservation Assessment and Management Plan Workshop
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SECTION 2

**CONSERVATION ASSESSMENT AND MANAGEMENT PLAN
SPREADSHEET CATEGORIES,
SPREADSHEETS FOR CRITICAL, ENDANGERED, AND VULNERABLE TAXA**

2.1 HAWAIIAN FOREST BIRDS CONSERVATION ASSESSMENT AND MANAGEMENT PLAN SPREADSHEET CATEGORIES

The Conservation Assessment and Management Plan (CAMP) spreadsheet is a working document that provides information that can be used to assess the degree of threat and recommend conservation action.

The first part of the spreadsheet summarizes information on the status of the wild and captive populations of each taxon. It contains taxonomic, distributional, and demographic information useful in determining which taxa are under greatest threat of extinction. This information can be used to identify priorities for intensive management action for taxa.

TAXON

SCIENTIFIC NAME: Scientific names of extant taxa: genus, species, subspecies.

WILD POPULATION

RANGE: Geographical area where a species and its subspecies occur.

EST #: Estimated numbers of individuals in the wild. If specific numbers are unavailable, estimate the general range of the population size.

SUB-POP: Number of populations within the taxonomic unit. Ideally, the number of populations is described in terms of boundary conditions as delineated by Mace-Lande and indicates the degree of fragmentation.

TRND: Indicates whether the natural trend of the species/subspecies/population is currently (over the past 3 generations) increasing (I), decreasing (D), or stable (S). Note that trends should NOT reflect supplementation of wild populations. A + or - may be indicated to indicate a rapid or slow rate of change, respectively.

AREA: A quantification of a species' geographic distribution.

AAA:	> 5,000 sq km; geographic island
AA:	< 5,000 sq km; geographic island
AA-1:	< 1,000 sq km; geographic island
AA-2:	< 100 sq km; geographic island
AA-3:	< 10 sq km; geographic island

M/L STS: Status according to Mace/Lande criteria (see Section 3, page 6).

C = Critical

E = Endangered

V = Vulnerable

U = Unknown

EXT = Extinct

THREATS: Immediate or predicted events that are or may cause significant population declines.

A = Aircraft

C = Climate

D = Disease

F = Fishing

G = Genetic problems

H = Hunting for food or other purposes

Hyb = Hybridization

I = Human interference or disturbance

Ic = Interspecific competition

Ice = Interspecific competition from exotics

L = Loss of habitat

La = Loss of habitat because of exotic animals

Lf = Loss of habitat because of fragmentation

Lp = Loss of habitat because of exotic plants

M = Marine perturbations, including ENSO and other shifts

P = Predation

Pe = Predation by exotics

Ps= Pesticides

Pl= Powerlines

Po= Poisoning

Pu= Pollution

S = Catastrophic events

f: fire

h: hurricane

t: tsunami

T = Trade for the life animal market

PHVA/WKSP: Is a Population and Habitat Viability Assessment Workshop recommended?

Yes or No? NOTE**A detailed model of a species' biology is frequently not needed to make sound management decisions.

Yes or No/Pending: pending further data from surveys or other research

RESEARCH MANAGEMENT:

It should be noted that there is (or should be) a clear relationship between threats and subsequent outlined research/management actions. The "Research/Management" column provides an integrated view of actions to be taken, based on the listed threats. Research management can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the bird species to that activity. The categories within the column are as follows:

T	=	Taxonomic and morphological genetic studies
Tl	=	Translocations
S	=	Survey - search and find
M	=	Monitoring - to determine population information
Hm	=	Habitat management - management actions primarily intended to protect and/or enhance the species' habitat (e.g., forest management)
Lm	=	Limiting factor management - "research management" activities on known or suspected limiting factors. Management projects have a research component that provide scientifically defensible results.
Lr	=	Limiting factor research - research projects aimed at determining limiting factors. Results from this work may provide management recommendations and future research needs
Lh	=	Life history studies

CAPTIVE PROGRAMS

REC: Recommendation for development and time frame of captive program

Oi	=	Ongoing captive program should be intensified or increased
I-1	=	Initiate a captive program immediately, within 0-3 years
I-2	=	Initiate a captive program in the future, within the next 5 years
N	=	Not currently recommended
Np	=	Not currently recommended but may be reconsidered pending further data

PROG TYPE: Recommendation for the type of captive program defined by its genetic and demographic objectives and hence the target population required to achieve these objectives.

- E** = Captive population should be developed and managed that is sufficient to preserve 90% of the genetic diversity of a population for 100 years. Program should be developed within 3 years. This is an emergency program based on the present availability of genetically diverse founders.
- N** = Captive population should be developed and managed that is a nucleus 50-100 individuals organized with the aim to represent as much of the wild gene pool as possible. This program may require periodic importation of individuals from the wild population to maintain this high level of genetic diversity in a limited captive population. View this type of program as protection against potential extirpation of wild populations.
- S** = Captive population should be developed to be used as a surrogate for other populations that may be more rare or more difficult to maintain. The level of management is not as intensive as a nucleus program and instead focuses more on development of husbandry techniques.

DIFF: This column represents the level of difficulty in maintaining the species in captive conditions. It should be noted that there is little experience with the development of self-sustaining captive populations of passerines.

- 1** = Techniques are in place for capture, maintenance, and propagation of similar taxa in captivity, which ostensibly could be applied to the taxon. Least difficult.
- 2** = Techniques are only partially in place for capture, maintenance, and propagation of similar taxa in captivity, and many captive techniques still need refinement. Moderate difficulty.
- 3** = Techniques are not in place for capture, maintenance, and propagation of similar taxa in captivity, and captive techniques still need to be developed. Very difficult.

NUM: Number of individuals in captivity

2.2 Hawai'ian Forest Bird Taxa by Mace-Lande Category.

Table 8. Critical Hawai'ian forest bird taxa.

	TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
				SCIENTIFIC NAME	RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF
4	Branta	sandvicensis		Maui	<200	1	S?	AA-2	C	Pe,I,D,G,L, Sh,Sf	YES	M,Lm,Lr				
5	Branta	sandvicensis		Hawai'i	<339	1	D	AAA	C	Pe,Ps,Lm,I, D,G,L	YES	Tl,Lr,Lm,M				
6	Branta	sandvicensis		Kaua'i	100	2	I	AA-1	C	Pe,D,G,Sh	YES	M,Tl				
15	Asio	flammeus		Lana'i	±50	0	D	AA-2	C?	D,I,Ps,Pe Ice	PEND SURV	M,Lr	N	--	--	0
16	Asio	flammeus		O'ahu	±200	0	D	AA	C	D,Ps,Pe,I	PEND SURV	M,Lr	N	--	--	0
22	Corvus	hawaiiensis	('Alala)	Hawai'i	13	2	D	AA-1	C	Pe,D,G,I L, Lm,S	YES	M,Lm,Lr, Lh,Tl	Oi	E	1(0)	11
26	Myadestes	lanaiensis	rutha (Oloma'o)	Moloka'i	0-10	1	D	AA-3	C	D,G,Ice,Lm, Pe,Sh	?	S	Np	--	--	0
27	Myadestes	myadestinus	(Kama'o)	Kaua'i (Alaka'i Swamp)	0-10	1	D	AA-1	C	D,Pe,Sh, Ice,A	NO	S	Np	--	--	0
28	Myadestes	palmeri	(Pua'i'ohi)	Kaua'i (Alaka'i Swamp)	20-50	1	D-UNK	AA-1	C	D,Pe,Sh, Ice,A,G	NO	M,Lh,Lr	I-1	E	1(F)	0
36	Chasiempis	sandwichensis	gayi (O'ahu 'Elepaio)	O'ahu	200-500	2	D	AA-1	C	D,Pe,Ice,Lm	NO	M,Lr,Lm	Np	--	--	0
38	Moho	braccatus	(Kaua'i 'O'o)	Kaua'i (Alaka'i Swamp)	EXT?	1	D	AA-3	C	D,Pe,Sh,Ice G,A	NO	S	Np	--	--	0
39	Moho	bishopi	(Bishop's/Maui 'O'o)	Maui	unk	1	D	AA-2	C	D,G,Ice, Pe,Sh	NO	S	Np	--	--	0

TAXON		WILD POPULATION											CAPTIVE PROGRAMS			
	SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
44	Psittirostra	psittacea	(Hawai'i 'O'u)	Hawai'i	EXT?	--	D	UNK	C/ Ext ?	D,G,Sh,Pe	NO	S	Np	--	--	0
59	Hemignathus	lucidus	hanepepe (Kaua'i Nuku-pu'u)	Kaua'i (Alaka'i Swamp)	0-10	1	D	--	C	D,Pe,Sh,Ice Lm,G,A	NO	S	Np	--	--	0
60	Hemignathus	lucidus	affinus (Maui Nuku-pu'u)	Maui	<10	1	D?	AA-2	C	D,G,Ice,Lm, Sh,Pe	YES- spp	S	Np	--	--	0
67	Paroreomyza	maculata	(O'ahu creeper)	O'ahu	0-10	2?	D	AA-1	C	D,Pe,L,Lm, G,Ice	NO	S	Np	--	--	0
70	Loxops	coccineus	ochraceus (Maui Akepa)	Maui	0-10	1	D	AA-2	C	D,G,Lm,Ice, Sh,Pe	NO	S	Np	--	--	0
77	Vestiaria	coccinea		West Maui	UNK	1	D	AA-3	C	D,Lm,Ice, Pe,G,Sh,	YES- spp	S,M	Np	--	--	0
78	Vestiaria	coccinea	(Moloka'i 'I'iwi)	Moloka'i	<50	1	D?	AA-3	C	A,D,G,Ice, Lm,Pe,Sh	YES- spp	S,Lr	Np	--	--	0
79	Vestiaria	coccinea	(O'ahu 'I'iwi)	O'ahu	<50	2	D	AA-1	C	D,G,Sh,Pe, Lm,Ice	NO	S,M,Lr	Np	--	--	0
83	Himatione	sanguinea	(Lana'i 'Apapane)	Lana'i	<100	1	D	AA-3	C	I,D,G,Ice,Lp Lf,La,Sh,Sf, Pe,Ps	YES- spp	T,M,Lr	Np	--	--	0
88	Melamprosops	phaeosoma	(Po'ouli)	Maui	≤50	1	D	AA-2	C	D,G,Pe,Sh, Lm	YES	T,S	Np	--	--	0

Table 9. Endangered Hawai'ian forest bird taxa.

	TAXON			WILD POPULATION								CAPTIVE PROGRAMS				
				SCIENTIFIC NAME	RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF
3	Branta	sandvicensis	(Nene)	Maui,Hawai'i,Kaua'i	<500	4			E				Oi	N	1	>1,000
12	Asio	flammeus		Maui	<u>±</u> 100	1	D	AA-1	E?	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0
14	Asio	flammeus		Moloka'i	<u>±</u> 100	0	D	AA-2	E?	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0
31	Acrocephalus	familiaris	kingi (Nihoa millerbird)	Nihoa	200-300(?)	1	S	AA-3	E	Sh,D, Sf,Pe,Ice,Lm	NO?	M	Np	--	--	0
43	Telespyza	ultima	(Nihoa finch)	Nihoa	1,000-3,000	1	S	AA-3	E	D,Ice,L,Sh,M	YES	M	N	--	--	0
46	Loxioides	bailleui	(Palila)	Hawai'i	1,317-6,400	1	D	AA-1	E	C,D,I,Sf,Sh, Pe,Ice,Lm	YES	M,Lr,Lm, Lh,TI	I-1	S,N	1(F)	0
47	Pseudonestor	xanthophrys	(Maui parrotbill)	Maui	<500	1	D	AA-2	E	D,G,Ice,Lm, Pe,Sh	YES	M,Lh,Lr	I-1	E	3(I)	0
61	Hemignathus	munroi	(Akiapola'au)	Hawai'i	<1,500	3	D	AA-1	E	D,Ice,Lm,L, Pe	YES	M,Lr,Lh	I-1	E	3(I)	0
62	Oreomystis	bairdi	(Kaua'i creeper)	Kaua'i	800-1,000	1	D	AA-2	E	D,Pe,Sh,Ice, Lm	NO	M,Lr,Lh	I-2	N,S	3(I)	0
63	Oreomystis	mana	(Hawai'i creeper)	Hawai'i	12,500	4	S?	AA-1	E	D,Ice,Lm,Pe	YES	Ti,M,Lh,Lr	N	--	--	0
69	Loxops	coccineus	coccineus (Hawai'ian Akepa)	Hawai'i	14,000	4	D?	AA-1	E	D,Ice,Lm,Pe	YES	M,Lh,Lr	N	--	--	0
72	Loxops	caeruleirostris	(Kaua'i Akepa)	Kaua'i	3,000-5,000	1	D?	AA-2	E	D,Pe,Lm	NO	M,Lr	I-2	S,N	3(I)	0
80	Palmeria	dolei	(Crested honeycreeper)	Maui	<u>±</u> 3,800	1	D?	AA-2	E	D,Ice,Pe,Lm	YES	S,Lh,Lr	I-1	S,N	2(N)	0

Table 10. Vulnerable Hawai'ian forest bird taxa.

	TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
				SCIENTIFIC NAME	RANGE	EST#	SUB POP	TRND	AREA	ML STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF
9	Buteo	solitarius	(I'o or Hawai'ian hawk)	Hawai'i	1,400-2,500?	1	S	AAA	V	I,Ps	NO	M	N	--	--	0
11	Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui,Kaua'i, Moloka'i,Lana'i, O'ahu,Hawai'i, Kaho'olawe					V				N	--	--	2-5 rehab
13	Asio	flammeus		Kaua'i	+2,000	0	D	AA	V	D,Ps,I	PEND SURV	M,Lr	N	--	--	0
19	Asio	flammeus		Hawai'i	UNK, but common, 1000s?	1	D	AAA	V	D,Ps,Pe,I	NO	M,Lh,Lm,Lr	N	--	--	0
24	Myadestes	obscurus	(Oma'o)	Hawai'i - windward	>172,000	1	D?	AAA	V	Pe,Lm,Ice,D	NO	M,Lr	Oi,I-1	S,N	1(F)	6
34	Chasiempis	sandwichensis	sandwichensis ridgewayi bryani (Hawai'i Elepaio)	Hawai'i	>205,000	3 subssp, may be further subdivided	D?	AA	V	D,Lm,Pe,Ice	NO	T,Lh,M,Lr	I-2 Np Np	S	3(I)	0
35	Chasiempis	sandwichensis	sclateri (Kaua'i 'Elepaio)	Kaua'i	20,000-30,000	1	D?	AA-2	V	D,Pe,Ice, Lm	NO	M,Lr	Np	--	--	0
42	Telespyza	cantans	(Laysan finch)	Laysan	10,000	2	S	AA-3	V	D,Lm, Sh,St,C	YES	M	N	--	--	6
49	Hemignathus	virens	('Amakihi)	Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i & other smaller isls					V		?					
50	Hemignathus	virens	virens (Hawai'ian 'Amakihi)	Hawai'i	870,000	2?	S?	AA	V	D	NO	T,M,Lh,Lr	Oi	S	2(I)	20-40
51	Hemignathus	virens	stejnegeri (Kaua'i 'Amakihi)	Kaua'i	15,000-20,000	1	I?	AA-2	V	D	NO?	M	N	--	--	0
52	Hemignathus	virens	chloris (O'ahu 'Amakihi)	O'ahu	20,000-60,000	2?	S?	AA-1	V	D	NO	M,Lr	N	--	--	0

	TAXON			WILD POPULATION								CAPTIVE PROGRAMS				
				SCIENTIFIC NAME	RANGE	EST#	SUB POP	TRND	AREA	ML STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF
53	Hemignathus	virens	wilsoni (Maui 'Amakihi)	Maui	47,000	≤3	S	AA-1	V	D	YES?	M	N	--	--	0
55	Hemignathus	virens		Moloka'i	1,800	1	S?	AA-2	V?	D,Lm, Pe,Ice	YES?	T,M	N	--	--	0
56	Hemignathus	parvus	('Anianiau)	Kaua'i	15,000- 25,000	1	S?	AA-1	V	D,Pe,Ice	NO	M	N	--	--	0
65	Paroreomyza	montana	newtoni (Maui creeper)	Maui	35,000	2	S	AA-1	V	D,Ice,Lm	NO	M,Lh	I-1	S	3(I)	0
74	Vestiaria	coccinea	(Hawai'i 'Iiwi)	Hawai'i	<340,000	1	D	AA	V	D	YES	M,Lr,Lh	Oi	S	2(N)	25
75	Vestiaria	coccinea	(Kaua'i 'Iiwi)	Kaua'i	10,000- 20,000	1	S?	AA-1	V	D	YES- spp	M	N	--	--	0
76	Vestiaria	coccinea	(Maui 'Iiwi)	Maui	±19,180	1	S	AA-1	V	D	YES- spp	M	I-2	S	2(N)	0
81	Himatione	sanguinea	sanguinea (Hawai'i 'Apapane)	Hawai'i	1,000,000	1	S	AA	V	D	NO	M,Lh	Oi	S	2(N)	30
82	Himatione	sanguinea	(Kaua'i 'Apapane)	Kaua'i	100,000	1	D?	AA-1	V	D	NO	M	N	--	--	0
84	Himatione	sanguinea	(Maui 'Apapane)	Maui	94,000	1	S	AA-1	V	D	YES- spp	M	I-1	S	2(N)	0
85	Himatione	sanguinea		W. Maui	1,600	1	D	AA-2	V	D	YES- spp	M,Lr	N	--	--	0
86	Himatione	sanguinea	(Moloka'i 'Apapane)	Moloka'i	±39,000	1	S	AA-2	V	D,I	YES- spp	T,M	N	--	--	0
87	Himatione	sanguinea	(O'ahu 'Apapane)	O'ahu	20,000- 50,000	1	S?	AA-1	V	D	NO	M,Lr	N	--	--	0

Table 11. Hawai'ian forest birds with unknown numbers or with populations of ten or fewer individuals.

TAXON			SIGHTING DATA				
SCIENTIFIC NAME			RANGE	DATE	OBSERVER	WRITTEN DOCUMENTATION	SOURCE/COMMENTS
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Kaho'olawe				
			Ni'ihau				
Myadestes	lanaiensis	rutha (Oloma'o)	Moloka'i	1988	A. ENGILIS	SOME	ARCHIVE (DOFAW REPORT); 1 BIRD SIGHTED
Myadestes	myadestinus	(Kama'o)	Kaua'i (Alaka'i Swamp)	mid-1980s 1981	VARIOUS FWS SURVEY	SOME SOME	ARCHIVE-SEVERAL REPORTED DETECTIONS IN PIHEA/Alaka'i TRAIL JCT AREA SCOTT ET AL. 1985
Moho	braccatus	(Kaua'i 'O'o)	Kaua'i (Alaka'i Swamp)	1987	J & C KRAKOWSKI	YES	AUDIO ONLY; 2 CONSECUTIVE DAYS, SAME LOCATION
				1985	FWS SURVEY		ARCHIVE; 1 VISUAL DETECTION
				1983	D. BOYNTON	YES	HAW. CONSERVER 43:1, 1992. SAW 1 BIRD AT NEST
Moho	bishopi	(Bishop's/Maui 'O'o)	Maui	mid-1980s	VARIOUS		'O'O'A'A-LIKE VOCALIZATIONS HEARD BY SEVERAL SURVEY PEOPLE (PER MOUNTAINSPRING)
				1985	FWS SURVEY	YES	'ELEPAIO 42:69; REDISCOVERY
				1981	MOUNTAINSPRING		FEW ISOLATED DETECTIONS, NONE WITH CONFIDENCE
Psittirostra	psittacea	(Hawai'i 'O'u)	Hawai'i	1986	R. CAMARA?	UNKNOWN	CHECK WITH USFWS STAFF AT Hawai'i VOLCANOES
	psittacea	(Kaua'i 'O'u)	Kaua'i	1989	DOFAW SURVEY	SOME	DOFAW REPORT; 2 BIRDS REPORTED SEEN
Hemignathus	virens	wilsoni (Lana'i 'Amakihii)	Lana'i	1976	L. HIRAI	YES	WESTERN BIRDS 9: 71.
Hemignathus	procerus	(Kaua'i 'Akialoa)	Kaua'i	1960	RICHARDSON	EXCELLENT	RICHARDSON & BOWLES - SPECIMEN
				1969	P. BRUNER	SOME	ARCHIVE - 1 BIRD - LAST KNOWN SIGHTING
Hemignathus	lucidus	hanepepe (Kaua'i Nuku-pu'u)	Kaua'i (Alaka'i Swamp)	1987	TELFER ET AL.	SOME	ARCHIVE; 1 BIRD, SAME AREA, 2 DAYS APART
	lucidus	affinus (Maui Nuku-pu'u)	Maui	1990	R.C. FLEISCHER	SOME	ARCHIVE
				1985-86	SEVERAL	SOME	ARCHIVE; SEVERAL REPORTED SIGHTINGS IN HANAWI OVER 6-MONTH PERIOD BY SKILLED SURVEY PERSONNEL

TAXON			SIGHTING DATA				
SCIENTIFIC NAME			RANGE	DATE	OBSERVER	WRITTEN DOCUMENTATION	SOURCE/COMMENTS
Paroreomyza	flammea	(Moloka'i creeper)	Moloka'i	1963	N. PEKELO	UNKNOWN	'Elepaio 23:64; 24:46.
Paroreomyza	maculata	(O'ahu creeper)	O'ahu	1985	A. ENGILIS ET AL.	EXCELLENT	ARCHIVE. OTHER REPORTED DETECTIONS DURING 1980'S BUT NONE CONFIDENT
Loxops	coccineus	ochraceus (Maui Akepa)	Maui	1988	A. ENGILIS	EXCELLENT	ARCHIVE - DOFAW SURVEY - 1 BIRD SCOTT ET AL., 1985 REPORTED 8 DETECTIONS; 6 AUDIO, 2 VISUAL
				1980	FWS SURVEY	UNKNOWN	
Vestiaria	coccinea	(Maui 'I'iwi)	West Maui	1980	FWS SURVEY	EXCELLENT	SCOTT ET AL, 1985; 9 DETECTIONS
				1980	R.L. PYLE	EXCELLENT	1 BIRD SEEN WELL, 1 AUDIO
			Moloka'i	1988	DOFAW SURVEY	EXCELLENT	10 DETECTIONS
Melamprosops	phaesoma	(Po'ouli)	Maui	1992	R. CANN	NONE	1 UNSUBSTANTIATED SIGHTING
				1986	FWS SURVEY	EXCELLENT	2 NESTINGS STUDIED

**HAWAI'IAN FOREST BIRDS
CONSERVATION ASSESSMENT
AND MANAGEMENT PLAN**

Final Report

Compiled and Edited by

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**Produced by Participants of the
Hawai'ian Forest Birds
Conservation Assessment and Management Plan Workshop
held 7-12 December 1992
Hilo, Hawaii**

SECTION 3

**ISLAND-BY-ISLAND SUMMARIES
AND TAXON REPORTS BY WORKING GROUPS**

3.1 ISLAND-BY-ISLAND SUMMARIES BY WORKING GROUPS.

Using the criteria and background information detailed in Sections 2 and 3, participants formed small working groups, divided by islands, to: 1) determine best estimates of the status of all Hawai'ian forest birds; 2) assign each taxon to a Mace-Lande category of threat; and 3) identify areas of action and information needed for conservation and management purposes.

Since many taxa were found in several geographic locations, each taxon was examined by island subpopulation; the assessments and recommendations of each of the working groups for each subpopulation were circulated to and discussed by the entire group prior to final consensus by all participants, as represented in this document. Summary recommendations concerning research management, assignment of all taxa to threatened status, and captive breeding were supported by the workshop participants. Following, in Sections 8 - 16 are summaries from each island working group. Taxa determined to be Extinct are not included.

3.2 HAWAI'I WORKING GROUP.

I. Critical

Branta sandvicensis (Nene)
Corvus hawaiiensis ('Alala)
Psittirostra psittacea (Hawai'i 'O'u)

II. Endangered

Loxiodes bailleui (Palila)
Hemignathus munroi (Akiapola'au)
Hemignathus mana (Hawai'i Creeper)
Loxops coccineus (Hawai'i Akepa)

III. Vulnerable

Buteo solitarius ('Io)
Asio flammeus sandwichensis (Pueo)
Myadestes obscurus (O'mao)
Chasiempsis sandwichensis sandwichensis (Hawai'i 'Elepaio)
Hemignathus virens virens (Hawai'ian 'Amakihi)
Vestiaria coccinea (Hawai'i 'I'iwi)
Himatione sanguinea sanguinea (Hawai'i Apapane)

Table 12. Threats to the forest birds of the island of Hawai'i by Mace-Lande threat category.

MACE-LANDE	Habitat loss	Disease	Predat'n exotics (native)	Interspec compet exotics	Human interfer	Hurr	Genetic probs	Pesticide	Fire	Hunt	Tsun	Clim
Critical	3	3	3 (2)	1	2	2	3	1	1	0	1	0
Endangered	4	4	4	3	1	1	0	2	1	0	0	1
Vulnerable	6	6	5	4	2	0	0	0	0	2	0	0
TOTAL	13	13	12 (2)	8	5	4	3	3	2	2	1	1

Table 13. Research management recommendations by Mace-Lande threat category for forest birds of the island of Hawai'i.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history	More Habitat mgmt
Critical	1	2	2	0	2	2	1	1
Endangered	0	4	2	0	1	4	4	0
Vulnerable	0	6	1	1	0	3	4	0
TOTAL	1	12	5	1	3	9	9	1

Table 14. Hawai'ian forest birds - Hawai'i

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Branta	sandvicensis	(Nene)	Maui,Hawai'i,Kaua'i	<500	3			E				Oi	N	1	>1,000
			Hawai'i	<339	1	D	AAA	C	Pe,Ps,L,I,D,G	YES	Ti,Lr,M,Lm				
Buteo	solitarius	('Io or Hawai'ian hawk)	Hawai'i	1400-2500?	1	S	AAA	V	I,Ps,H,L,Pe	NO	M	N	--	--	0
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui,Kaua'i, Moloka'i,Lana'i, O'ahu,Hawai'i, Keho'olawe									N	--	--	5 rehab
			Hawai'i	UNK, but common, 1000s?	1	D	AAA	V	D,Ps,Pe,I,H,L	NO	M	N	--	--	0
Corvus	hawaiiensis	('Alala)	Hawai'i	13	2	D	AA-1	C	P,Pe,D,G,I,L,Sf,Sh,St,Ice	YES	Hm,M,Lm,Lr,Lh,Ti	Oi	E	1(0)	11
Myadestes	obscurus	(O'mao)	Hawai'i - windward	>172,000	1	D?	AAA	V	Pe,Ice,D,L	NO	M,Lr,Lh,Ti	Oi,I-1	S,N	1(F)	6
Chasiempis	sandwichensis	(Elepaio)													
	sandwichensis	sandwichensis ridgewayi bryani (Hawai'i Elapaio)	Hawai'i	>205,000	3 subsp p, maybe further subdivided	D?	AA	V	D,Pe,Ice,Lm	NO	Ti,Lh,M,Lr	I2 Np Np	S	3(I)	0
Psittirostra	psittacea	(Hawai'i 'O'u)	Hawai'i	UNK	--	D	UNK	C	D,L,Sh,Pe	NO	S	Np	--	--	0
Loxioides	baillieui	(Palila)	Hawai'i	1,317-6,400	1	D	AA-1	E	C,D,P,Sf,Sh,Pe,L	YES	M,Lr,Lm,Lh,Ti	I-1	S,N	1(F)	0

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRSTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Hemignathus	virens	(Amakihi)	Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i & other smaller islands					V		?					
	virens	virens (Hawai'ian Amakihi)	Hawai'i	870,000	2?	S?	AA	V	D,Pe,Ice,Lm	NO?	T,M,Lh,Lr	Oi	S	2(I)	20-40
	munroi	(Akiapola'au)	Hawai'i	<1,500	3	D	AA-1	E	D,Ice,L,Pe,Sh,G,I	YES	M,Lr,Lh	I-1	E	3(I)	0
	mana	(Hawai'i creeper)	Hawai'i	12,500	4	S?	AA-1	E	D,Ice,L,Pe	YES	Tl,M,Lh,Lr	N	--	--	0
Loxops	coccineus	(Akepa)													
	coccineus	coccineus (Hawai'ian Akepa)	Hawai'i	14,000	4	D?	AA-1	E	D,Ice,LM,Pe	YES	M,Lh,Lr	N	--	3	0
Vestiaria	coccinea	(Hawai'i 'Iiwi)	Hawai'i	<340,000	1	D	AA	V	D	YES	M,Lr,Lh	Oi	S	2(N)	25
Himatione	sanguinea	sanguinea (Hawai'i Apapane)	Hawai'i	1,000,000	1	S	AA	V	D,Pe,Ice,Lm	NO	M,Lh	Oi	S	2(N)	30

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Branta sandvicensis* - Nene (Big Island population)

STATUS:

Mace-Lande: Critical

USFWS: Endangered

CITES: Appendix I

State of Hawai'i: Endangered

Other: IUCN/CBSG Waterfowl CAMP - Endangered

Taxonomic status: Species population on Hawai'i

Distribution: widely distributed on Hawai'i

Elevation: Sea level to 8,000 ft.

Wild Population: <339 on Hawai'i (Black et al., 1991), maintained by releases of captive birds.

Field Studies: Black-recovery plan (WWT); Stone-predator control; Duvall-State studbook and breeding program; Hoshide-monitoring program, Maui; Medeiros-monitoring program, Maui; Natividad-Hodges-monitoring program, Maui; Santos-monitoring program, Hawai'i; Fleischer-DNA fingerprinting investigation; Telfer-monitoring program, Kaua'i; Banko-Ph.D. thesis.

Threats: Predation by mongoose (*Herpestes punctatus*) and introduced species (cats, pigs, dogs, and rats), habitat loss due to human encroachment, human interference (road kills), genetics (inbreeding), disease from introduced game birds, parasites, and potential hunting. Some birds have died from poisoning when feeding at golf courses (fertilizer/pesticides).

Comments: Despite releases of more than 2,000 Nene since 1960, the population has not become self-sustaining and is currently quite vulnerable (Kear & Berger, 1980; Black, 1990). Species needs continual restocking from captive stock to maintain numbers in marginal habitats, according to preliminary PHVA modelling. Predator control is intensive at Haleakala (Maui); sporadic on Big Is.; not necessary on Kaua'i; food is supplemented in two areas on Hawai'i; water is supplemented in five places on the Big Island.

Recommendations:

Research Management: Translocation; Limiting factor research; Limiting factor management; Monitoring of existing populations and released captive-bred birds.

Ongoing: husbandry (genetics), monitoring.

PHVA: Yes

Captive Population: 289,140,46 (.3 % wild-caught) in mainland U.S. and Europe. Genetic diversity in captive flock outside of Hawai'i is very low (even relative to wild). Captive population outside of mainland U.S. very unlikely to be used for releases because of avian TB (Slimbridge). On islands, 10 pairs at Olinda; about 10 pairs in open-top pens for release. There are on the order of 40-50 released per year.

Captive Programs: Increase ongoing program; Nucleus level management continued and intensified.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Buteo solitarius* 'Io

STATUS:

Mace-Lande: Vulnerable

USFWS: Endangered, proposed for downlisting to Threatened

CITES: Not listed

State of Hawai'i: Endangered

IUCN: Rare

Taxonomic status: Species

Distribution: Hawai'i; island wide

Elevation: Sea level to 9500 ft.

Wild Population: 1,400-2,500 (Scott et al., 1986); population is presumed to be stable

Field Studies: Griffin (1984) Ph.D. thesis; Baldwin's 1938-49 surveys; some current work by Susan Brown (University of Hawai'i, Hilo) and Lloyd Yoshino (Panaewa Zoo).

Threats: Shooting, nest-site harassment, secondary poisoning, breeding habitat loss, predation (rats), and possibly aircraft.

Comments: Moderately low numbers (perhaps always low), but use modified habitats down to sea level. Had been more commonly reported ten years ago; now seldom seen in lower Kailua-Kona (M. Morin, pers. comm.)

Recommendations:

Research Management: Monitoring of population; periodic screening for potential poisoning.

PHVA: No

Other: Anti-poaching education program

Captive Population: 2 at Panaewa Zoo; possibly up to 3 others (all rehabilitated birds)

Captive Programs: Not currently recommended

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* Hawai'i Pueo or Hawai'i short-eared owl

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed on Big Island

CITES: Not listed

State of Hawai'i: Not listed on the Big Island

IUCN: Not listed

Taxonomic status: island population of statewide subspecies

Distribution: Hawai'i - island-wide

Elevation: Sea level to 9500 ft.

Wild Population: unknown, 1,000's (guesstimate 500-2,000), common;
unexplained periodic die-offs, perceived to be declining.

Field Studies: some disease work by NWHRC, food habits study by
USFWS, no population studies.

Threats: Disease, pesticides, predation by exotics (rats, cats, mongoose, and possibly
pigs), predation ('Io), human interference (shooting)

Recommendations:

Research Management: Monitoring

PHVA: No

Captive Population: Approximately 5 (rehabilitation birds)

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Corvus hawaiiensis* - 'Alala

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Endangered

Taxonomic status: Species

Distribution: Hawai'i, central Kona Coast on McCandless Ranch;
range less than 200 km²; possibly Hualala'i; occasional unconfirmed reports in Kau
and Kapapala forests.

Elevation: 1,000-8,000 ft. historically; 3,500-5,500 ft. presently

Wild Population: 12 in one population (Mauna Loa), 1 in another
(Hualalai)

Field Studies: see PHVA

Threats: Predation ('Io, Pueo), and predation by exotics (mongoose, rats, cats), disease,
catastrophes (fire, hurricanes, tsunami), genetics, human interference (shooting), loss of
habitat, catastrophes, (possibly interspecific competition for food from gamebirds and
introduced passerines).

Comments: The Hawai'ian crow is at such low numbers that any threat or loss of adults or
chicks would result in a significant population decline. Six chicks hatched via
artificial incubation eggs collected during 1993 season.

Recommendations:

Research Management: Monitoring; Limiting factors research; Limiting factors
management; Life history studies; Habitat management
PHVA: Yes; December 1992

Captive Population: 11 (plus 6 chicks hatched via artificial incubation during the 1993
season).

Captive Programs: Ongoing program should be increased; Emergency program should be
implemented for 90/100 level of management immediately (within 0-3 years).

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Myadestes obscurus* - Oma'o or Hawai'i Thrush

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species

Distribution: Hawai'i, windward half; range 1755 km²
Elevation: 900 - 6500 ft.

Wild Population: 172,000 (Scott et al., 1986); fluctuating and thought to be declining.

Field Studies: H.D. Pratt-taxonomy; Berger-nesting; T. Pratt-food habits; C.J. Ralph-ecology

Threats: Disease, predation by exotics (rats), loss of habitat, competition from exotics

Comments: Still widespread and numerous, and found at lower elevations in areas with malaria, but subject to threats that could drive it extinct. Absent from large areas of island previously inhabited (e.g., Kohala, montane Kona and Hualalai).

Recommendations:

Research Management: Monitoring; Translocation; Limiting factors research; Life history research
PHVA: Not immediately
Other: Husbandry research (as a surrogate); Disease research

Captive Population: 6

Captive Programs: Ongoing program should be developed into a nucleus-type program immediately (within 0-3 years).

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Chasiempis sandwichensis* - Hawai'i 'Elepaio

Note: 3 subsp. on Big Island: *sandwichensis*, *bryani*, *ridgewayi*

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed

CITES: Not listed

State of Hawai'i: Not listed

IUCN: Not listed

Taxonomic status: 3 Subspecies on Hawai'i

Distribution: Hawai'i, various habitats; range 2749 km²

Elevation: 900-9,500 ft.

Wild Population: > 207,000 (Scott et al., 1986), fluctuating and possibly declining? Three subspecies, but fairly contiguous distribution and observed hybrids; perhaps further subdivision

Field Studies: Eric VanderWerf - Foraging Behavior; Sheila Conant - Breeding Biology of 'Elepaio; Havo Research 'Elepaio study-breeding ecology; Ph.D. Pratt (1980) - taxonomy; C.J.Ralph - unpubl. on ecology

Threats: disease, loss (modification) of habitat, predation by exotics (rats), interspecific competition, catastrophes could impact individual subspecies.

Comments: Low numbers, but widespread, even in disturbed lowlands where other species have disappeared.

Recommendations:

Research Management: Monitoring; Life history; Limiting factors research;

Translocation

PHVA: No

Other: Husbandry (as a surrogate)

Captive Population: 0

Captive Programs: Program should be developed within the next three years, possibly at the Honolulu Zoo; Nucleus level of management; surrogate for O'ahu population.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Psittirostra psittacea* - Hawai'i 'O'u

STATUS:

Mace-Lande: Critical, possibly extinct

USFWS: Endangered

CITES: Not listed

State of Hawai'i: Endangered

IUCN: Endangered

Taxonomic status: Species population

Distribution: Hawai'i; once common in the forest from 2500'-4000'
elev. in windward forests

Wild Population: Last sighted in 1986 by R. Camara; none seen in intensive
local survey in 1987; possibly heard in 1988; possibly extinct.

Field Studies: Surveys planned for 1993

Threats: Thought to be disease, predation by exotics, habitat loss, interspecific competition

Comments: Taxonomic uniqueness and widespread historic range of importance in
considering contingency plan for immediate field management or captive population if
the species is re-discovered.

Recommendations:

Research Management: Survey

PHVA: No

Captive Population: 0

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Loxoides bailleui* - Palila

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Rare

Taxonomic status: Species

Distribution: Hawai'i, Mamane forest on Mauna Kea; range 139 km²;
elev: 6478'-9360'

Wild Population: 1317-6400 (over last 12 years), 1 pop., large
fluctuations

Field Studies: Well studied: Ph.D. study by van Riper (1978); 5 year intensive study by
USFWS; annual censuses; see Palila PHVA Report

Threats: Large population fluctuations, climate (drought),
catastrophes (fire, hurricanes), disease, loss of habitat (grazing, development),
predation (pueo, rats, cats).

Recommendations:

Research Management: Monitoring; Limiting factors research; Limiting factors
management; Life history; Translocation
PHVA: Yes, December 1992
Other: Need to acquire and rehabilitate additional habitat; determine how to reduce
fire threat

Captive Population: 0

Captive Programs: Program at Nucleus level of management should be implemented
immediately (0-3 years); surrogate research. Nucleus program should include an active
research component (see above).

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens virens* - Hawai'i 'Amakihi

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Subspecies

Distribution: Hawai'i; range 3091 km²

Elevation: 500 - 9,500 ft.

Wild Population: 870,000 (Scott et al., 1986); thought to be two populations; presumed to be stable.

Field Studies: vanRiper Ph.D. thesis; A. Kamil - feeding behavior; Eddinger - life history; Baldwin 1953; Amadon 1950; Carpenter and MacMillen - energetics; USFWS unpubl. studies; A.J.Berger - nests

Threats: disease, possible competition with exotics, habitat loss, and predation by exotics

Recommendations:

Research Management: Monitoring, Taxonomy; Life history; Limiting factors research
PHVA: no
Other: determine if Mauna Loa population is different from the Mauna Kea population (e.g., number of true populations).

Captive Population: about 30

Captive Programs: Ongoing surrogate program should be intensified; Nucleus-level management.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus munroi* - Akiapola'au

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Vulnerable

Taxonomic status: Species

Distribution: Hawai'i; range 518 km²
Elevation: 4,500 - 9,000 ft.

Wild Population: less than 1,500 (Scott et al., 1986); subpops. in windward Koa forests, Kau, leeward Kona may be gone; Pu'u La'au population is males only; windward Mauna Kea population is declining; total population size is likely an overestimate, may be much lower.

Field Studies: Pratt et al. (1989); Banko and Williams (unpublished) - nesting; Amadon (1950) - mouth morphology, feeding; Recovery Plan

Threats: Disease, habitat loss/modification, competition from exotics, predation from exotics (rats, cats), possibly catastrophe/hurricanes, genetics, and human disturbance

Comments: Likely difficult to propagate because of specialized feeding habits, with long-term parental training.

Recommendations:

Research Management: Monitoring, Life history; Limiting factors research; effective Population size; Translocations
PHVA: Yes, high priority
Other: Habitat improvement, corridors

Captive Population: 0

Captive Programs: Program should be implemented for management at the 90/100 level immediately (within 0-3 years).

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Oreomystis mana* - Hawai'i Creeper

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Not listed

Taxonomic status: Species

Distribution: Hawai'i; range 730 km²
Elevation: 4,000 -6,500 ft.

Wild Population: 12,500 (Scott et al., 1986); 4 subpops in windward forest,
Kau, south Kona, Hualalai; populations are presumed to be stable.

Field Studies: Recovery Plan; H. Sakai - nesting, life history; Scott, Conant, and Pratt
(1979)- field identification; unpublished ongoing studies by L. Freed; J. Lepson; R.
Cann; C.J. Ralph -natural history

Threats: Disease, predation by exotics (rats), habitat loss, competition from exotics

Recommendations:

Research Management: Monitoring; Life history; Limiting factors research;
Translocation
PHVA: Yes
Other: Increased management -- removal of exotics, forest restoration, translocation,
nest site work.

Captive Population: 0

Captive Programs: Not currently recommended; Maui creeper should be used for surrogate.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Loxops coccineus coccineus* - Hawai'i Akepa

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Rare

Taxonomic status: Subspecies, perhaps deserves species status

Distribution: Hawai'i; 4 sites - windward forests, Kau, Hualalai,
south Kona; range 480 km²

Elevation: 4,000 - 6,500 ft.

Wild Population: 14,000 (Scott et al, 1986); 4 subpops.; thought to be declining

Field Studies: Recovery Plan; T. Pratt 1989 observations; Sincock and Scott (1980) - nesting;
M. Collins - nest observation; unpublished ongoing studies by L. Freed; J. Lepson; R.
Cann; C.J. Ralph - natural history.

Threats: Disease, competition with exotics, predation by exotics, habitat loss (modification);
inbreeding may be a threat in smaller subpopulations.

Comments: Endangered due to threats, found now only at high elevations.

Recommendations:

Research Management: Monitoring; Life history; Limiting factors research; possibly
Translocation
PHVA: Yes
Other: Nest box studies

Captive Population: 0

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Vestiaria coccinea* - Hawai'i 'I'iwi

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Hawai'i; range min. 2158 km²
Elevation: 4,000 ft (previously 3,000) - 9500 ft.

Wild Population: less than 340,000 (Scott et al., 1986); population is declining; not subdivided, disperse widely.

Field Studies: Amadon, 1950; Baldwin, 1953; E. Pung - feeding behavior; Fancy et al. 1993 - sexing and aging; Berger; Carpenter and McMillen - movement patterns; unpublished studies by Lepson et al., and by C.J. Ralph; Eddinger, 1970

Threats: Disease; and possibly competition with exotics, habitat loss, and predation by exotics

Comments: Indicator species, move up and down elevation gradient so they are vulnerable to many threats. Species' range is declining.

Recommendations:

Research Management: Monitoring; Life history; Limiting factors research
PHVA: Yes, as declining indicator species
Other: Between-island taxonomy

Captive Population: about 25

Captive Programs: Ongoing surrogate program should be intensified; research component intensified

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himatione sanguinea* - Hawai'i 'Apapane

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Hawai'i; scattered in around island, in forest; range 3203 km²
Elevation: 500 - 9,500 ft.

Wild Population: 1,000,000 (Scott et al., 1986); population appears to be stable

Field Studies: Amadon, 1950; Baldwin, 1953; Fancy et al. 1993 - sexing and aging; Berger; Carpenter and McMillen - movements patterns; unpublished studies by Lepson et al., and by C.J. Ralph; Eddinger, 1970s.

Threats: Disease, predation by exotics, competition, habitat loss (modification)

Comments: widespread, abundant, subject to standard threats, but living in areas with malaria

Recommendations:

Research Management: Monitoring; Life history
PHVA: No

Captive Population: about 30

Captive Programs: Ongoing surrogate program should be intensified; nucleus level of management

3.3 KAUA'I WORKING GROUP.

I. Critical

Branta sandvicensis (Nene)
Myadestes myadestinus (Kama'o)
Myadestes palmeri (Puaiohi)
Moho braccatus (Kaua'i 'O'o)
Psittirostra psittacea (Kaua'i 'O'u)
Hemignathus procerus (Kaua'i 'Akialoa)
Hemignathus lucidus hanapepe (Kaua'i Nuku-pu'u)

II. Endangered

Oreomystis bairdi (Kaua'i Creeper)

III. Vulnerable

Asio flammeus sandwichensis (Pueo)
Chasiempis sandwichensis sclateri (Kaua'i 'Elepaio)
Hemignathus virens stejnegeri (Kaua'i 'Amakihi)
Hemignathus parvus ('Anianiau)
Loxops caeruleirostris (Kaua'i Akepa)
Vestiaria coccinea (Kaua'i 'Iwi)
Himatione sanguinea sanguinea (Kaua'i Apapane)

Table 15. Threats to the forest birds of the island of Kaua'i by Mace-Lande threat category.

MACE-LANDE	Disease	Predat'n exotics	Interspec compet exotics	Hurricane	Habitat loss	Genetic probs	Aircraft	Pesticides
Critical	7	6	6	7	2	7	4	0
Endangered	1	1	1	1	1	0	0	0
Vulnerable	7	6	4	3	5	0	1	1
TOTAL	15	13	11	11	8	7	5	1

Table 16. Research management recommendations by Mace-Lande threat category for forest birds of the island of Kaua'i.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical	5	2	1	0	0	1	1
Endangered	0	1	0	0	0	1	1
Vulnerable	0	7	0	1	0	3	0
TOTAL	5	10	1	1	0	5	2

Table 17. Hawai'ian forest birds - Kaua'i

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRSTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Branta	sandvicensis	(Nene)	Maui,Hawai'i,Kaua'i	<500	3			E				Oi	N	1	>1,000
			Kaua'i	100	2	I	AA-1	C	Pe,D,G,Sh	YES	M,TI				
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui,Kaua'i, Moloka'i,Lana'i, O'ahu,Hawai'i, Keho'olawe									N	--	--	5 rehab
			Kaua'i	±2,000	0	D	AA	V	D,Ps,ice	PEND SURV	M,Lr				0
Myadestes	myadestinus	(Kama'o)	Kaua'i (Alaka'i Swamp)	0-10	1	D	AA-1	C	D,Pe,Sh, Ice,G	NO	S	Np	--	--	0
	palmeri	(Puaiohi)	Kaua'i (Alaka'i Swamp)	20-50	1	D-UNK	AA-1	C	D,Pe,Sh, Ice,G	NO	M,Lh,Lr	I-1	E	1(F)	0
Chasiempis	sandwichensis	('Elepaio)													
	sandwichensis	sclateri (Kaua'i 'Elepaio)	Kaua'i	20,000- 30,000	1	D?	AA-2	V	D,Pe,ice, L	NO	M,Lr	Np	--	--	0
Moho	braccatus	(Kaua'i 'O'o)	Kaua'i (Alaka'i Swamp)	EXT?	1	D	AA-3	C	D,Pe,Sh,ice, G,A	NO	S	Np	--	--	0
Psittirostra	psittacea	(Kaua'i 'O'u)	Kaua'i	0-1	1	D	AA-1	C/ Ext ?	D,G,Pe,A,Sh Ice,L	NO	S	Np	--	--	0
Hemignathus	virens	('Amakihi)	Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i & other smaller isls					V		?					

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
	virens	stejnegeri (Kaua'i 'Amakihī)	Kaua'i	15,000-20,000	1	I?	AA-2	V	D,Sh,Pe,Lm	NO?	M,T	N	--	--	0
	parvus	('Anianiau)	Kaua'i	15,000-25,000	1	S?	AA-1	V	D,Pe,Ice	NO	M	N	--	--	0
	procerus	(Kaua'i 'Akialoa)	Kaua'i	EXT?	--	--	--	C/ Ext ?	D,Ice, G,A,Sh	--	S	N	--	--	--
	lucidus	(Nuku-pu'u)										Np	--	--	
	lucidus	hanepepe (Kaua'i Nuku-pu'u)	Kaua'i (Alaka'i Swamp)	0-10	1	D	--	C	D,Pe,Sh,Ice L,G,A	NO	S	Np	--	--	0
Oreomystis	bairdi	(Kaua'i creeper)	Kaua'i	800-1,000	1	D	AA-2	E	D,Pe,Sh,Ice, L	NO	M,Lr,Lh	I2	S,N	3(I)	0
Loxops	caeruleirostris	(Kaua'i Akepa)	Kaua'i	3,000-5,000	1	D?	AA-2	V	D,Pe,L	NO	M,Lr	I2	S,N	3(I)	0
Vestiaria	coccinea	(Kaua'i 'I'iwi)	Kaua'i	10,000-20,000	1	S?	AA-1	V	D,Pe,Lm,A, Ice,Sh	YES- spp	M	N	--	--	0
Himatione	sanguinea	sanguinea (Kaua'i 'Apapane)	Kaua'i	100,000	1	D?	AA-1	V	D,Lm,P,Sh	NO	M	N	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Branta sandvicensis* - Nene (Kaua'i population)

STATUS:

Mace-Lande: Critical

USFWS: Endangered

CITES: Appendix I

State of Hawaii: Endangered

Other: IUCN/CBSG Waterfowl CAMP - Endangered

Taxonomic status: Population of species

Distribution: Kaua'i. Two subpopulations: Kipu Kai is the base population established accidentally from a captive flock. Kilauea was established through introduction in 1991. No mixing of subpopulations to date.

Elevation: ??

Wild Population: 100

Field Studies: Telfer - 1992 DOFAW Progress Reports; monitoring program, Kaua'i - Telfer.

Threats: Only known mortalities are due to road kills and accidents.

Comments: Experimental population is expanding rapidly. This is attributed to absence of mongoose and abundance of lowland habitat free from predators. From a very small founding population (exact number unknown, private breeder deceased, probably 6 or less), and one release of 12 captive-reared birds, the Kaua'i Nene population has increased to ± 100 birds in 7 years.

Recommendations:

Research Management: Monitoring; Translocation

PHVA: Yes. Species level.

Other: Continue studies on nesting success, habitat preferences, and distribution surveys. Continue plans to construct open-top breeding pens to release additional birds and improve genetics.

Captive Population: Currently one breeding pair kept on Kaua'i by a cooperator. There are plans to obtain a captive population of 5-6 pairs to use in open top breeding pens. Pairs will be double-clutched. First clutch will be hand-reared and released. Second clutch will be parent-reared and fledged from release pens.

Captive Programs: Ongoing program should be intensified; managed at Nucleus level.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - Kaua'i Pueo

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed

CITES: Not listed

State of Hawaii: Not listed

IUCN: Not listed

Taxonomic status: Population of subspecies

Distribution: Island-wide on Kaua'i. 555 sq. mi.

Elevation: Sea level to 5,000 ft.

Wild Population: estimated 2,000

Field Studies: Surveys of causes and distribution of mortality by DOFAW in progress.
Nakamura is conducting pathological studies on retrieved carcasses.

Threats: Unidentified disease or mortality agent, possibly starvation, and interspecific competition by introduced barn owl and possibly cattle egrets.

Comments: Has declined on O'ahu and is having similar mortality problems along with the Barn Owl on Kaua'i. Approximately 15-20 owl carcasses and 6 rehabilitatable birds per year. One out of every three owls seen or carcasses retrieved are Pueo.

Recommendations:

Research Management: Monitor; Limiting factors research

PHVA: Pending. Too little data at present.

Other: Continue disease and mortality surveys.

Captive Population: A few rehabilitated, non-releasable birds are in captivity. Not in a managed program.

Captive Programs: Not currently recommended

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Myadestes myadestinus* - Kama'o

STATUS:

Mace-Lande: Critical
 USFWS: Endangered
 CITES: Not listed
 State of Hawaii: Endangered
 IUCN: Endangered

Taxonomic status: Species

Distribution: Kaua'i, Alaka'i Swamp. Area: 10 sq. km.

Elevation: 3,500-5,000 ft.

Wild Population: estimated 0-10; possibly extinct.

Sincock 1968-83: 373 \pm 242, Alaka'i Swamp 173 \pm 116

Scott et al., (1981): 24 \pm 20

DOFAW 1989: 0, some possible sightings

Last documented sighting 1981 USFWS Survey. In mid-1980's there were several reported detections in Pihea/Alaka'i Trail area.

Field Studies: Surveys - see section above. Anecdotal observations by Munro (1944), Sincock et al., (1984). See also the Kaua'i Forest Bird Recovery Plan (Sincock et al., 1984).

Threats: Disease, predation by rats, catastrophes/hurricanes (last time observed in large numbers was prior to the Iwa hurricane in 1982), modification of habitat due introduced plants and pigs (although pigs were here before decline), genetic factors, and competition from introduced birds (northern cardinal, Hwamei laughing thrush, and possibly Japanese bush warbler). Thrushes generally more likely to be adaptable to habitat alterations, feed mostly on fruit and insects. The above items are theoretical, there is no clear documentation of causes for decline. Habitat modification does not seem to be a major factor since the Oma'o, a closely-related species, occurs in areas with similar modifications. Helicopter disturbance may also be a threat (Jeffrey cited 3-4 flyovers per 8 minute survey in part of Alaka'i).

Recommendations:

Research Management: Surveys need to be carried out to determine if this species still exists. Conduct as part of multispecies transect of Alaka'i Swamp with possible addition of a few techniques targeting Kama'o.

PHVA: Not unless rediscovered.

Other: Disease and parasites. Focus on same techniques which benefit other species (i.e. - control of feral ungulates and noxious plant invasion), predator control.

Captive Population: None.

Captive Programs: Not currently recommended - pending

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Myadestes palmeri* - Puaiohi

STATUS:

Mace-Lande: Critical

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: Endangered

Taxonomic status: Species

Distribution: Kaua'i, Alaka'i Swamp. Area = 25 sq. km.

Elevation: 4,000-5,000 ft.

Wild Population: 20-50 (individual birds and young were seen in 1992)

Sincock 1968-73: 176 \pm 192, Alaka'i Swamp 97 \pm 129; Scott et al. 1986: 20 \pm 34 (1981 sightings); DOFAW 1989: 8 birds detected

Field Studies: Surveys listed under wild population above. Kepler studied (dates?).

Threats: Disease, predation by rats, catastrophes/hurricanes (last time seen in large numbers was prior to the Iwa hurricane in 1982), modification of habitat due introduced plants and pigs (although pigs were here before decline), genetic factors, and competition from introduced birds (northern cardinal, Hwamei laughing thrush, and possibly Japanese bush warbler). Thrushes generally more likely to be adaptable to habitat alterations, feed mostly on fruit and insects. The above items are theoretical, there is no clear documentation of causes for decline. Habitat modification does not seem to be a major factor since the Oma'o, a closely-related species, occurs in areas with similar modifications. Helicopter disturbance may also be a threat (Jeffrey cited 3-4 flyovers per 8 minute survey in part of Alaka'i).

Comments: Difficult to survey because they often occur in deep, inaccessible gulches. Observed in open forest (plateaus). They are often quiet. Did not respond to playback in February 1989 (presumed nesting period).

Recommendations:

Research Management: Monitor; Life history; Limiting factors research

PHVA: Not at present. Too little information.

Other: Disease and parasites. Focus on same techniques which benefit other species (i.e.- control of feral ungulates and noxious plant invasion), predator control.

Captive Population: None now. Nesting age birds have been reared and survived at Honolulu Zoo.

Captive Programs: Immediate (within 0-3 years) emergency program with management at the 90/100 level is recommended.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Chasiempis sandwichensis sclateri* - Kaua'i 'Elepaio

STATUS:

Mace-Lande: Vulnerable
 USFWS: Not listed
 CITES: Not listed
 State of Hawaii: Not listed
 IUCN: Not listed

Taxonomic status: Subspecies

Distribution: Kaua'i. Island wide.

Elevation: Above 3,000 ft.

Wild Population: 20,000-30,000; possibly declining.

Sincock 1968-73: 40,000 island-wide.

DOFAW 1989 survey indicated a decrease on the same transects, as in 1981 (Scott et al., 1986 - data are presented below). However, the survey does not represent the entire range of the species.

	<u>1981</u>	<u>1989</u>
Total Birds	204	123
# Stations Occupied	104	69
Freq. Occurrence	97	64

Field Studies: Sincock surveys 1968-73.

Threats: Disease, predation by rats, interspecific competition from exotics, and habitat modifications especially noxious weed invasion (banana poka, *Tiboushina*, Japanese honeysuckle).
 Helicopter overflights.

Recommendations:

Research Management: Monitor; Limiting factors research.

PHVA: No

Other: Inter-island comparisons

Captive Population: None

Captive Programs: Not currently recommended - pending. Potential surrogate for O'ahu 'Elepaio. Hawai'i population as surrogate.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Moho braccatus* - Kaua'i 'O'o

STATUS:

Mace-Lande: Critical/Extinct?

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: Endangered

Taxonomic status: Species

Distribution: Kaua'i. Above 3,000 ft.

Wild Population: Possibly extinct. Scott et al. (1986) reported a population of 2 ± 1 from 1981 survey. Last documented observation was Alaka'i Swamp when calls over 2 consecutive days were reported in 1985 (Krakowski).

Field Studies: Sincock described some life history (unpublished). Last surveyed in 1989, but not seen or heard. Cursory surveys annually. See Kaua'i Forest Bird Recovery Plan.

Threats: Disease, predation, catastrophe/hurricane, competition from exotics, inbreeding, aircraft disturbance.

Recommendations:

Research Management: Survey to determine existence

PHVA: Not presently recommended

Captive Population: None.

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Psittirostra psittacea* - Kaua'i 'O'u

STATUS:

Mace-Lande: Critical/Extinct?

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: Endangered

Taxonomic status: Population of a species

Distribution: Kaua'i. Last seen in eastern Alaka'i Swamp.

Wild Population: Possibly extinct. One seen in 1981 (Scott et al., 1986) - 3 birds reported; one detection. 2 last seen in 1989 (DOFAW Survey). Seen fairly commonly in late 1960's. Declined quickly.

Field Studies: Sincock (1967-1973 unpublished USFWS Reports).

Threats: Disease, predation from rats, catastrophe/hurricane, competition from exotics, loss of habitat due to exotics, aircraft, possible inbreeding.

Recommendations:

Research Management: Surveys to determine existence.

PHVA: Not unless rediscovered.

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens stejnegeri* - Kaua'i 'Amakihi

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed

CITES: Not listed

State of Hawaii: Not listed

IUCN: Not listed

Taxonomic status: Subspecies

Distribution: Kaua'i

Elevation: 2,000-5,000 ft., may range as low as 1,000.

Wild Population: 15,000-20,000

Sincock 1968: entire island 11,0000 \pm 2,000

Alaka'i 600 \pm 250

Scott et al. 1986: 2,300 \pm 400 (1981 survey - Alaka'i)

DOFAW 1989: population increase in Alaka'i reported two times over Scott 1981 survey

Field Studies: Genetic screening - Tarr and Fleischer (in press). Taxonomic studies - Pratt (1989).

Threats: Disease, habitat modification due to non-native plants and animals, predation such as rats, and catastrophic events/hurricanes.

Comments: Population increasing. Some discussion as to whether the Kaua'i 'Amakihi may be a separate species, *Hemignathus kauaiensis*.

Recommendations:

Research Management: Monitoring; Taxonomy

PHVA: No

Other: Stabilize habitat from further degradation due to non-native plants and animals.

Determine limiting factors. Possibly disease screening.

Captive Population: Surrogate program exists for 'Amakihi species. All individuals collected on the Big Island.

Captive Programs: Not currently recommended. Recommendation should be re-examined if taxonomic research suggests that it is a separate species.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus parvus* - Lesser 'Amakihi or 'Anianiau

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawaii: Not listed
IUCN: Not listed

Taxonomic status: Species

Distribution: Kaua'i. Area = 50 sq. mi.

Elevation: 2,500-5,000 ft.

Wild Population: 15,000-25,000

Sincock 1968-75: entire island 24,000 \pm 3,000

Alaka'i 5,500 \pm 900

Scott et al. 1986: 6,100 \pm 600 (1981 surveys)

DOFAW 1989: Numbers comparable to 1981 surveys by Scott et al.

Field Studies: Surveys listed under wild population above, genetics (Tarr and Fleischer, in press), breeding biology (Eddinger, 1970).

Threats: Diseases, predation by rats; possibly aircraft disturbance at Kokee; modification of habitat by introduced plants, pigs, and insects; interspecific competition by introduced exotics (ie. competition for nectar with Japanese White Eyes), catastrophic events/hurricanes.

Comments: Range could be contracting without being detected.

Recommendations:

Research Management: Monitor

PHVA: No

Other: Pig control. Monitor and control introduction of non-native exotic plants. Population ecology and limiting factors.

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus procerus* - Kaua'i 'Akialoa

STATUS:

Mace-Lande: Critical/Extinct?

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: not listed

Taxonomic status: Species

Distribution: Central Alaka'i Swamp on Kaua'i

Wild Population: Extinct. Last documented sighting was in 1969 by P. Bruner (archive). Also Richardson and Bowles, 1960 (specimen).

Field Studies: Surveys conducted by Sincock (1967-1973); not found

Threats: Possibly inbreeding, aircraft, catastrophe/hurricane; possibly disease, and interspecific competition.

Comments: Presumed extinct. Not demonstrably extinct as are the species last recorded around the turn of the century.

Recommendations:

Research Management: Surveys to find along with other species in Alaka'i.

PHVA: Not unless rediscovered.

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus lucidus hanepepe* - Kaua'i Nuku-pu'u

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawaii: Endangered
IUCN: Endangered

Taxonomic status: Subspecies

Distribution: Kaua'i. Halekua Drainage (Gay and Robinson land)

Wild Population: 0-10 or possibly extinct

Last seen in 1987 by Tom Telfer and others - one bird, same area for two consecutive days.
A few later sightings reported; some documented. None repeated and accuracy is undeterminable.

Field Studies: Sincock surveys (1967-1973); found by Sincock in 1975.

Scott et al. (1986) reported no observations from 1981 surveys.

Threats: Disease, predation by rats, catastrophes/hurricanes, competition by introduced exotics, habitat loss, genetic problems, and possibly aircraft.

Recommendations:

Research Management: Surveys to determine existence.

PHVA: Not currently recommended

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Oreomystis bairdi* - 'Akeke'e or Kaua'i Creeper

STATUS:

Mace-Lande: Endangered
 USFWS: Not listed
 CITES: Not listed
 State of Hawaii: Not listed
 IUCN: Rare

Taxonomic status: Species

Distribution: Kaua'i - 55 sq. mi. (92 sq. km.)

Elevation: Above 3,500 ft elevation (Alaka'i),

Wild Population: 800 - 1,000

Sincock 1984: 6,800 \pm 1,900

Scott et al. 1986: 1,650 (1981 surveys)

DOFAW counts in 1989: 800-1,000

	<u>1981</u>	<u>1989</u>	
Total Birds		30	19
# Stations Occurring		24	12
Frequency of Occurrence		22	11
	(in stations in		
	transect)		

Field Studies: Surveys listed under wild population above. Eddinger (1970) studied breeding biology. Fleischer conducting studies to examine genetic variation between islands. Pimm conducting demographic surveys by mark and recapture.

Threats: Disease, predation by rats, catastrophe/hurricanes, interspecific competition from exotics, degradation of habitat by exotic weeds.

Comments: Appears to have declined in recent years. Reasons uncertain.

Recommendations:

Research Management: Monitor; Limiting factor research; Life history

PHVA: Not presently recommended. Too little information.

Other: Pig control. Monitor and control introduction of non-native exotic plants.

Captive Population: None

Captive Programs: Intensive captive program with management at the Nucleus level should be implemented within the future (more than 3 years).

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Loxops caeruleirostris* - 'Akeke'e or Kaua'i Akepa

STATUS:

Mace-Lande: Vulnerable
 USFWS: Not listed
 CITES: Not listed
 State of Hawaii: Not listed
 IUCN: *L. coccineus* listed as Rare

Taxonomic status: Species

Distribution: Kaua'i in Alaka'i and Kokee. 55 sq. km.

Elevation: Above 3,500 ft.

Wild Population:

Sincock 1984: whole island 5,100 \pm 1,700
 Scott et al. 1986: Alaka'i 1,700 \pm 300, \pm 3,000 whole island (1981 surveys)
 DOFAW 1989: 3,000-5,000 whole island, stable or increasing

	<u>1981</u>	<u>1989</u>
Total Birds	48	78
# Station Occurring	47	44
Frequency Occurrence	44	41

Field Studies: Breeding biology (Eddinger 1970), nest discovery (Eddinger 1972).

Threats: Disease, predation by rats, habitat degradation by exotic plants.

Comments: Population density is low, but numbers appear to be stable or increasing.

Recommendations:

Research Management: Monitor; Limiting factors research
 PHVA: No
 Other: Pig control. Monitor and control non-native exotic plants.

Captive Population: None

Captive Programs: Initiate future (3+ years) program with management at the Nucleus level.
 Surrogate species.

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Vestiaria coccinea* - Kaua'i I'iwi

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawaii: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Kaua'i. 50 sq. mi.

Elevation: 3,000-5,000 ft. (900-1,500 m). Occasionally utilize exotic flowers down to 2,000 feet.

Wild Population: 10,000-20,000

Sincock 1968-73: 26,000 \pm 6,000

7,800 \pm 2,300 for Alaka'i Swamp

Scott et al. 1986: 5,400 \pm 500 for Alaka'i Swamp (1981 surveys)

DOFAW 1989: no change in densities compared to 1981 surveys

Trend unknown. Population and range could be contracting without being detected.

Field Studies: Surveys - see section above. Study of nesting biology by Eddinger in 1970.

Threats: Diseases, predation by rats, aircraft disturbance at Kokee, modification of habitat by introduced plants, pigs, and insects, interspecific competition by introduced exotics, catastrophic events/hurricanes.

Comments: Status of species on Kaua'i could be changing and not be detected at this time. Surveys were conducted at Alaka'i which is the best part of it's range.

Recommendations:

Research Management: Monitor

PHVA: Yes (in context of species recovery statewide).

Other: Candidate for translocation to O'ahu. Pig control. Monitor and control introduction of non-native exotic plants. Basic research on population ecology and limiting factors.

Captive Population: None

Captive Programs: No program currently recommended.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himatione sanguinea* - Kaua'i 'Apapane

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed

CITES: Not listed

State of Hawaii: Not listed

IUCN: Not listed

Taxonomic status: Species population

Distribution: Kaua'i. 185 sq. mi.

Elevation: Above 1,000 ft.

Wild Population: 100,000

Sincock 1967-73: Alaka'i 43,000 \pm 9,000

Scott et al. 1986: Alaka'i 30,327 \pm 716 (1981 surveys)

DOFAW 1989: looks about the same as 1981 survey, so estimate is about 30,000 \pm 23,000

Field Studies: Breeding biology (Eddinger, 1970), feeding (Carpenter and Machillen, 1976 - Hawai'i).

Threats: Disease, habitat modifications due to non-native plants and animals, predation, catastrophe/hurricanes.

Comments: Population possibly declining. 'Apapane on all islands considered conspecific, but populations have different risk levels on different islands.

Recommendations:

Research Management: Monitor

PHVA: Yes, for species.

Other: Stabilize habitat from further degradation due to non-native plants and animals.

Research should look at ability to utilize and survive in non-native forests.

Captive Population: None

Captive Programs: Not currently recommended

3.4 MAUI WORKING GROUP.

I. Critical

Branta sandvicensis (Nene)
Moho bishopi (Bishop's 'O'o)
Hemignathus lucidus affinus (Maui Nuku-pu'u)
Loxops coccineus ochraceus (Maui Akepa)
Vestiaria coccinea (West Maui 'I'iwi)
Melamprosops phaeosoma (Po'ouli)

II. Endangered

Asio flammeus sandwichensis (Pueo)
Pseudonestor xanthophrys (Maui Parrotbill)
Palmeria dolei (Crested Honeycreeper)

III. Vulnerable

Hemignathus virens wilsoni (Maui 'Amakihi)
Paroreomyza montana newtoni (Maui Creeper)
Vestiaria coccinea (East Maui 'I'iwi)
Himatione sanguinea sanguinea (East Maui Apapane)
Himatione sanguinea sanguinea (West Maui Apapane)

Table 18. Threats to the forest birds of the island of Maui by Mace-Lande threat category.

MACE-LANDE	Disease	Predat'n exotics	Habitat loss	Hurricane	Interspec compet exotics	Genetic probs	Pesticides	Human interfer	Fire
Critical	6	6	6	6	4	6	1	1	1
Endangered	3	3	2	2	2	1	1	1	0
Vulnerable	5	0	1	0	1	0	0	0	0
TOTAL	14	9	9	8	7	7	2	2	1

Table 19. Research management recommendations by Mace-Lande threat category for forest birds of the island of Maui.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical	5	2	0	0	1	1	0
Endangered	1	2	0	0	2	3	2
Vulnerable	0	5	0	0	0	1	1
TOTAL	6	9	0	0	3	5	3

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
	montana	newtoni (Maui creeper)	Maui	35,000	2	S	AA-1	V	D,Ice,Lm	NO	M,Lh	I-1	S	3(I)	0
Loxops	coccineus	(Akepa)													
	coccineus	ochraceus (Maui Akepa)	Maui	0-10	1	D	AA-2	C	D,G,Lm,Ice, Sh,Pe	NO	S	Np	--	--	0
Vestiaria	coccinea	(Maui 'Iiwi)	East Maui	<u>±</u> 19,180	1	S	AA-1	V	D	YES- spp	M	I2	N	2(N)	0
			West Maui	UNK	1	D	AA-3	C	D,Lm,Ice, Pe,G,Sh,	YES- spp	S,M	Np	--	--	0
Palmeria	dolei	(Crested honeycreeper)	Maui	<u>±</u> 3,800	1	D?	AA-2	E	D,Ice,Pe,Lm Sh	YES	S,Lh,Lr,Lm	I-1	S,N	2(N)	0
Himatione	sanguinea	(Maui 'Apapane)	East Maui	94,000	1	S	AA-1	V	D	YES- spp	M	I-1	S	2(N)	0
			West Maui	1,600	1	D	AA-2	V	D	YES- spp	M,Lr	N	--	--	0
Melamprosops	phaeosoma	(Po'ouli)	Maui	<u><</u> 50	1	D	AA-2	C	D,G,Pe,Sh, Lm	YES	S	Np	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Branta sandvicensis* - Nene (Maui subpopulation)

STATUS:

Mace-Lande: Critical

USFWS: Endangered

CITES: Appendix I

State of Hawaii: Endangered

Other: IUCN/Waterfowl CAMP-Endangered

Taxonomic status: Subpopulation of species

Distribution: Maui

Elevation: 3,000 - 7,500 ft

Wild Population: <200 (possible 200-260? Maui no subpopulations, stable? AA-2.

Field Studies: Black-recovery plan (WWT); Stone-predator control; Duvall-State studbook and breeding program; Hoshide-monitoring program, Hawai'i Volcanoes National Park, Hawai'i; Medeiros-monitoring program, Maui; Natividad-Hodges-monitoring program, Maui; Santos-monitoring program, Hawaii; Fleischer-DNA fingerprinting investigation; Telfer-monitoring program, Kaua'i.

Threats: Predation by mongoose (*Herpestes punctatus*) and introduced species (cats, pigs, dogs, and rats) and habitat loss due to human encroachment. Disease, genetic factors, human interference, hunting, habitat loss/modification, pesticides, catastrophe/hurricanes and fire. Poor nutrition results in a low number of females breeding and contributes to low rate of gosling survival.

Comments: Despite releases of more than 2,000 Nene since 1960, the population has not become self-sustaining and is currently quite vulnerable (Kear & Berger, 1980; Black, 1990). Species needs continual restocking from captive stock to maintain numbers in marginal habitat, according to preliminary PHVA modelling. Predator control is not practiced throughout most of the current range of the species; food and water are supplemented on Hawai'i. A Nene Research and Management Initiative was recently written (Black, 1990; The Wildfowl & Wetlands Trust), and the Federal Recovery Plan is being revised.

Recommendations: Wild management

Research Management: (Ongoing)-Monitor; Limiting factors management; Limiting factors research

PHVA: Yes

Other: Monitor survival and success of released captive-bred birds

Captive Population: Species 289.140.46 (.3 % wild-caught)

Captive Programs: At species level, the ongoing program should be increased; continue management at a Nucleus level.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - Maui short-eared owl
or Maui Pueo

STATUS:

Mace-Lande: Endangered?
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed; O'ahu population is listed as Endangered
IUCN: Not listed

Taxonomic status: Subspecies

Distribution: Maui - Area - AA-1

Wild Population: ± 100 (guesstimate); there has never been a survey. Population is suspected to be declining. No subpopulations.

Field Studies: Unaware of specific efforts

Threats: Disease, human interference, pesticides (insecticides and rodenticides), predation by exotics.

Comments: There is very little known about this species. Ground nester.

Recommendations:

Research Management: Monitor; Life history research
PHVA: Yes, pending survey/monitoring data
Other: Disease, life history studies, pesticide research, husbandry.

Captive Population: None

Captive Programs: No current recommendation

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Moho bishopi* - Bishop's 'O'o

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Endangered

Taxonomic status: Species

Distribution: Maui - Northeast slope of Haleakala, Hanawi watershed. Area - AA-2.
Elevation: 1,600-2,000 m.

Wild Population: Unknown.

In 1985 several 'O'o-like calls heard by several people on USFWS survey
(Mountainspring, archive)
Last seen in 1980 (Mountainspring).
Various sightings during the 1980's, unconfirmed.
See Scott et al. (1986) reports from old ranchers about black birds which may have been
'O'o. There have been several unconfirmed sightings and unconfirmed calls heard.

Field Studies: Unaware of specific recent efforts aside from DOFAW surveys carried out
periodically (approximately 5-year intervals)

Threats: Disease, genetic factors, interspecific competition with exotics, habitat
loss/fragmentation because of exotic plants and animals, predation by exotics,
catastrophes/hurricanes.

Comments: 'O'o's have a distinctive call. Most of the survey work will have to be on the basis
of audition. Several melaphagids have bred in captivity. There continues to be question
whether 'O'o ever existed on Maui, despite reported sightings.

Recommendations:

Research Management: Survey confirm existence
PHVA: No
Other: Immediate non-interventive search for extant populations.

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Pseudonestor xanthophrys* - Maui Parrotbill

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Vulnerable

Taxonomic status: Species

Distribution: Northwest slope of Haleakala, from Waikamoi to Kuiki to Planeeze. Area - AA-2
Elevation: 4,500 ft. - 6,600 ft.

Wild Population: < 500 - 6% of stations 1980 to 3% in 1992 (stations occupied). Both the frequency and the distribution (transect survey) show a decrease in the population. 11% of the stations had detections = < 500 \pm 230, however, the trend is a declining population.

Field Studies: Area was re-surveyed in 1992 (DOFAW) and a more current population estimate will be forthcoming in January 1993. There is a on-going field study (banding, feeding observations, nest detections, capture-recapture work and periodic surveys).

Threats: Disease, genetic factors, interspecific competition with exotics, habitat loss/modification because of exotic plants and animals, habitat loss (fragmentation), predation by exotics, catastrophes/hurricanes, and possibly genetic factors.

Comments: Based on the 1980 survey and 1992 survey, there is question whether or not there are one or two populations. Habitat degradation and competition with Japanese bush warbler may impact population in near future. Japanese bush warbler population went up from one detection in 1980 to being found at 66 of the stations in 1992.

Recommendations:

Research Management: Monitor; Life history; Limiting factors research; Limiting factors management
PHVA: Yes
Other: Determine if population is contiguous or not. Examine competition with Japanese bush warbler and the red-billed *Leothrix*. Pig and ungulate management is needed wherever the birds occur.

Captive Population: None

Captive Programs: Immediate (within 0-3 years) captive program with 90/100 level of management should be established.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens wilsoni* - Maui Amakihi (Maui)

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Subspecies subpopulation

Distribution: Maui - 2 subpopulations West Maui, Haleakala,
Fleisher has preliminary data which may indicate there are 3 genetically-distinct
populations (verify). Poli Poli may show a third subpopulation. Area - AA-1.
Elevation: < 2000 ft. 7200-7500 ft.

Wild Population: 47,000
Increase in station occupancy from 77% (1980) to 85% (1992).

Field Studies: Unaware of recent specific efforts

Threats: Disease, and possibly interspecific competition with exotics, habitat loss due to exotic
plants and animals, habitat loss (fragmentation), predation by exotics.

Recommendations:

Research management: Monitor
PHVA: Yes?
Other: Alien species control. Interspecific competition research would be valuable
especially in terms of food resources. Need continued monitoring. Compare captive
population behavior with wild population husbandry, disease, predation. It would be
useful to determine if genetic differences are verifiable between the three subpopulations.

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus lucidus affinus* - Maui Nuku-pu'u

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Endangered

Taxonomic status: Subspecies

Distribution: Maui - Manawainui valley, Hanawi.

Elevation: 1600 m

Wild Population: <10 -

An optimistic estimate might be 28 \pm 56.

No sub-populations. Area - AA-2.

Population is thought to be declining.

Last sighted in 1989 (Fleischer).

Betsy Gagne' and others reported sightings in 1985-86.

Field Studies: Unaware of specific recent efforts

Threats: Disease, genetic factors, interspecific competition with exotics, habitat fragmentation/loss because of exotic plants and animals, habitat loss (fragmentation), predation by exotics, catastrophe/hurricane.

Recommendations

Research Management: Survey to confirm existence.

PHVA: Yes

Other: Intensive alien species control and monitoring.

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Paroreomyza montana newtoni* - Maui Creeper

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Subspecies

Distribution: 900-2500m Northeast and western slopes of Haleakala. Area - AA-1.

Elevation: 3,000 - 7,000 ft

Wild Population: 35,000

From 1980 to 1992 there was no change in the distribution. Frequency of visitation occurrence at stations is basically the same, leading to rough estimate of population at 35,000 \pm 5,000 (Scott et al., 1986). Two subpopulations. Thought to no longer be present on west Maui; loss from west Maui is unexplained, but preceded appearance of the Japanese bush warbler (*Cettia diphonea*). Population is presumed to be stable.

Field Studies: Current Pimm and Conant short-term field study (banding, reproductive history). 1992 Forest Bird Survey data is not yet published.

Threats: Disease, interspecific competition with exotics, habitat loss due to exotic plants and animals, and possibly predation by exotics, catastrophes/hurricanes.

Recommendations:

Research Management: Monitor; life history research

PHVA: No

Other: Alien species control. Need research on interspecific competition (e.g., food competition from Japanese bush warbler). Might be a surrogate for the Hawai'i, O'ahu, and Moloka'i creeper.

Captive Population: None

Captive Programs: Immediate (within 0-3 years) captive surrogate program with management at the Nucleus level

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Loxops coccineus ochraceus* - Maui Akepa

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: *L. coccineus* listed as Rare

Taxonomic status: Subspecies

Distribution: East Maui, Waianapanapa. Area - AA-2.

Elevation: 6700 ft.

Wild Population: 230 (+290 based on 1 acoustic detection in 1980 survey).

Last sighted by A. Engilis (DOFAW survey) - one bird

1980 USFWS survey reported 2 visual sightings and 6 audio detections.

The wild population trend is unknown.

Field Studies: Unaware of specific recent efforts

Threats: Disease, genetic factors, interspecific competition with exotics, habitat loss due to exotic plants and animals, habitat loss (modification), catastrophe/hurricane, predation by exotics.

Comments: There is some question that parrotbill calls may have been mistaken for 'akepas, and that this species may actually be extinct. Inhabits same habitat as crested honeycreeper, parrotbill, and Nuku'pu'u.

Recommendations:

Research management: Survey to determine existence

PHVA: No, but recommendation should be re-visited pending rediscovery

Other: Continued land management for habitat maintenance and alien species control.

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Vestiaria coccinea* - Maui 'Iwi (East Maui and West Maui populations)

STATUS:

Mace-Lande: Vulnerable; Critical for west Maui population

USFWS: Not listed

CITES: Not listed

State of Hawai'i: Not listed

IUCN: Not listed

Taxonomic status: Species population

Distribution: Maui - east and west Maui. Area - AA-3 for west Maui population, AA-1 for large population.

Elevation: 3,000-7,200 ft. East Maui sharp drop off below 1,100 m.

Wild Population:

East Maui:

± 19,180 Maui

1988 & 1992 DOFAW surveys showed no appreciable change in the East Maui population.

Presumed to be stable. Two subpopulations.

West Maui:

Has not been found since 1980. Scott et al. (1986) reported 9 detections during 1980 survey) may be relic (Kaulalewelewe). West Maui population is closer geographically to Moloka'i than East Maui.

Field Studies: Unaware of specific recent efforts

Threats: Disease, genetic factors (for west Maui population - the 2 populations are not known to intermingle), interspecific competition with exotics, predation by exotics, habitat loss because of exotic plants, habitat loss because of fragmentation (for west Maui population), catastrophes/hurricanes (west Maui population).

Comments: The 'Iwi has all but disappeared from large areas of O'ahu and is declining on Moloka'i. This species is thought to be an indicator of changes in Hawai'ian birdlife. There has not been a serious survey recently in the west Maui region; this area was not surveyed in 1992 because of insufficient staffing and logistics.

Recommendations:

Research Management: Monitoring (both subpopulations); Survey (west Maui)

PHVA: Yes, for species

Other: Continued alien species control

Captive Population: None.

Note: 15 Hawai'ian 'Iwi are currently being maintained for future breeding effort in mainland zoos

Captive Programs: For East Maui - captive population should be established soon (more than 3 years), managed at the Nucleus level. For West Maui - Not currently recommended - pending.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Palmeria dolei* - Crested Honeycreeper

STATUS:

Mace-Lande: Endangered
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Rare

Taxonomic status: Species

Distribution: Northeast slope of Haleakala, Makawao forest reserve to Kaupo. Area - AA-2.
Elevation: 4,000 - >7,000 ft.

Wild Population: \pm 3,800

Population estimated based on Scott et al. (1986) report on 1981 survey.
1992: pending 1993 report however - there is a decline both in distribution and frequency of the species. No subpopulations.

Field Studies: Nesting biology and life biology studies (foraging) beginning in 1991 by Ellen VanGelder and Tom Smith.

Threats: Disease, interspecific competition with exotics, predation by exotics, habitat loss because of exotic plants and animals, catastrophes/hurricanes.

Comments: This species was formerly found on Moloka'i and west Maui. They can fly extremely high and have aerial displays. May be colonial nesters.

Recommendations:

Research Management: Surveys; Life history; Limiting factors research; Limiting factor management
PHVA: Conducted December 1992.
Other: More intensive wild management for alien species control. Interspecific competition, disease, predation research.

Captive Population: None

Captive Programs: Immediate (within 0-3 years) captive program with management at the 90/100 level

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himatione sanguinea* - Maui 'Apapane

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Maui - Haleakala - large population;
west Maui mountains - small population. Area - AA-1 east, AA-2 west.
Elevation: < 2,000 ft. - > 8,000 ft. east Maui;
2,000 ft. - > 6,000 ft.

Wild Population: 94,000 (east Maui); 1,800 (west Maui). Total population - 110,000,
95% station occurrence in 1980 (Scott et al., 1986)
96% station occurrence in 1992 (DOFAW Forest Bird Survey) - no difference.
Possibly 2 subpopulations.
Trend is presumed to be stable for the east Maui population; declining for the west Maui
population.

Field Studies: Unaware of specific recent efforts

Threats: Disease, and possibly interspecific competition with exotics, habitat loss because of
exotic plants and animals, predation by exotics.

Recommendations:

Research Management: Monitor (both east and west Maui); Limiting factors research
(west Maui)
PHVA: Yes, for species
Other: Because it is so successful, this is a good species to use as a research model to
answer questions related to why it is dealing with the threats in the Hawai'ian islands
better than other birds?

Captive Population: None

Note: 17 Hawai'ian 'Apapane in captivity in mainland zoos

Captive Programs: For east Maui - Immediate (within 0-3 years) captive program for surrogate
program.

For west Maui - Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Melamprosops phaeosoma* - Po'ouli

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Rare

Taxonomic status: Species

Distribution: 1400-2500 m Northeast slope of Haleakala from 5,000-6,900 ft. in wet Ohia forest with dense understory. Area - AA-2.

Wild Population: ≤ 50

In the 1992 DOFAW Forest Bird Survey the birds were not found.
Unsubstantiated sighting in 1992 (R. Cann) - one bird.
In the 1986 DOFAW Forest Bird Survey, 2 nestings were studied.
In 1980, 2 birds on 1 station = 141 birds.
Trend declining. No subpopulations. Area - AA-2.

Field Studies: Stuart Pimm and Sheila Conant are conducting a reproductive, banding, distribution, and life biology study. Started in July 1992 and will run at least 3 years. Two nests were discovered in 1986 (DOFAW) and monitored; results still unpublished.

Threats: Disease, genetic factors, habitat loss because of exotic plants and animals, predation by exotics, catastrophes/hurricanes.

Recommendations:

Research Management: Surveys
PHVA: Yes
Other: Life history studies. Continued and more intensive habitat restoration. Alien species control. Taxonomic research to answer phylogenetic questions and for comparative work with paleontology (important for fossil records); to be checked with Monograph (Moloka'i Ulupalakua). Husbandry research (these birds eat snails). Disease, predation studies.

Captive Population: None

Captive Programs: Not currently recommended - pending

3.5 O'AHU WORKING GROUP.

I. Critical

Asio flammeus sandwichensis (Pueo)

Chasiempsis sandwichensis gayi (O'ahu 'Elepaio)

Paroreomyza maculata (O'ahu Creeper)

Vestiaria coccinea (O'ahu 'I'iwi)

II. Vulnerable

Hemignathus virens chloris (O'ahu 'Amakihi)

Himatione sanguinea sanguinea (O'ahu Apapane)

Table 21. Threats to the forest birds of the island of O'ahu by Mace-Lande threat category.

MACE-LANDE	Disease	Predat'n exotics	Interspec compet exotics	Habitat modif	Genetic probs	Hurricanes	Human interfer	Habitat loss	Pesticides
Critical	4	4	3	3	2	2	1	1	1
Endangered	0	0	0	0	0	0	0	0	0
Vulnerable	2	0	0	0	0	0	0	0	0
TOTAL	6	4	3	3	2	2	1	1	1

Table 22. Research management recommendations by Mace-Lande threat category for forest birds of the island of O'ahu.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical	2	3	1	0	1	3	0
Endangered	0	0	0	0	0	0	0
Vulnerable	0	2	0	0	0	2	0
TOTAL	2	5	1	0	1	5	0

Table 23. Hawai'ian forest birds - O'ahu.

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui, Kaua'i, Moloka'i, Lana'i, O'ahu, Hawai'i, Kaho'olawe									N	--	--	5 rehab
			O'ahu	+200	0	D	AA	C	D,Ps,Pe,I	PEND SURV	M,Lr	N	--	--	2 rehab
Chasiempis	sandwichensis	(Elepaio)													
	sandwichensis	gayi (O'ahu 'Elepaio)	O'ahu	200-500	2	D	AA-1	C	D,Pe,Ice,Lm	NO	M,Lr,Lm	12	N	--	0
Hemignathus	virens	('Amakahi)	Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i & other smaller isls					V		?					
	virens	chloris (O'ahu 'Amakahi)	O'ahu	20,000-60,000	2	I?	AA-2	V	D	NO?	M,Lr	N	--	--	0
Pareomyza	maculata	(O'ahu creeper)	O'ahu	0-10	1	D	AA-1	C	D,Pe,L,Lm, G,Ice,Sh	NO	S	Np	--	--	0
Vestiaria	coccinea	(O'ahu 'Iwi)	O'ahu	<50	2	D	AA-1	C	D,G,Sh,Pe, Lm,Ice	NO	S,M,Lr,TI	Np	--	--	0
Himatione	sanguinea	(O'ahu 'Apapane)	O'ahu	20,000-50,000	1	S?	AA-1	V	D	NO	M,Lr	N	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Chasiempis sandwichensis gayi* - O'ahu 'Elepaio

STATUS:

Mace-Lande: Critical
USFWS: Not listed
CITES: Not listed
State of Hawaii: Not listed
IUCN: Not listed

Taxonomic status: Subspecies

Distribution: O'ahu. Fragmented, probably 2 subpopulations in Wainae (20%) and Koolau (80%) Mountains.

Wild Population: 200-500

Shallenberger 1970's

DOFAW 1991: counted 12, recorded at 12 of 258 stations, Paul Conry has more data (transects on ridges, not best habitat)

Field Studies: Shallenberger (1978) conducted surveys. Conant (1977) studied breeding biology. Fifty year record for Honolulu Christmas counts show strong downward trend in past 10-20 years in Honolulu area.

Threats: Presumably disease and predation by exotics (rats, cats), habitat modification (highway constructed), interspecific competition with Japanese bush warbler.

Comments: Can use fairly heavily modified habitat. Therefore, habitat doesn't appear the primary limiting factor.

Recommendations:

Research Management: Monitor; Limiting factors research; Limiting factors management

PHVA: No

Other: Predator control

Captive Population: None

Captive Programs: Initiate a captive program in the near future (0-3 years) and manage at the Nucleus level. Surrogate work on Hawai'i population should begin immediately.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - O'ahu short-eared owl or Pueo

STATUS:

Mace-Lande: Critical

USFWS: Not listed

CITES: Not listed

State of Hawai'i: Not listed on Moloka'i

IUCN: Not listed

Taxonomic status: Subspecies subpopulation

Distribution: O'ahu

Wild Population: ± 200 (guesstimate). Population is suspected to be declining. No subpopulations.

Field Studies: Unaware of specific efforts

Threats: Disease, human interference, pesticides (insecticides and rodenticides), predation by exotics.

Comments: There is very little known about this species. This is a ground nester.

Recommendations:

Research Management: Monitor; Life history research

PHVA: Pending survey and data collection

Other: Disease, pesticide research, husbandry.

Captive Population: None

Captive Programs: No current recommendation

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens chloris* - O'ahu 'Amakihi

STATUS:

Mace-Lande: Vulnerable

USFWS: Not listed

CITES: Not listed

State of Hawaii: Not listed

IUCN: Not listed

Taxonomic status: Subspecies

Distribution: O'ahu - Koolau and Waianae Mountains

Wild Population: 20,000-60,000 (based on 1991 DOFAW Forest Bird Survey)

Field Studies: Not aware of specific efforts

Threats: Disease; also possibly predation by rats, interspecific competition from exotic birds, habitat loss/modification associated with increased use of habitat by humans (hiking, etc.).

Comments: Birds are utilizing some non-native forest areas and may be expanding range. There are questions on disease resistance because this population utilizes lower elevations.

Recommendations:

Research Management: Monitor; Limiting factors research

PHVA: No

Other: Predator control, disease screening, monitoring/survey, nesting biology, interspecific competition.

Captive Population: Surrogate program for species. All collected on Hawai'i.

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Paroreomyza maculata* - O'ahu 'Alauahio or O'ahu Creeper

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawaii: Endangered
IUCN: Not listed

Taxonomic status: Species

Distribution: O'ahu - Koolau and Waianae Mountains; area 400 sq km

Elevation: Above 2,000 ft.

Wild Population: 0-10

Last sighting 1985 - A. Engilis et al., well-documented
Shallenberger 1978, 1 or 2 birds
One sighting, tentatively identified, December 1990 in north Halawa Valley (Saito & Woodside); no documentation
1991 DOFAW Forest Bird Survey - none seen

Field Studies: Unaware of specific efforts

Threats: Disease, predation by rats and cats, interspecific competition from exotics, habitat modification and loss (highway construction), genetic factors, catastrophe/hurricanes.

Recommendations:

Research Management: Survey
PHVA: No
Other: Develop contingency plan pending location of birds

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Vestiaria coccinea* - O'ahu 'Iwi

STATUS:

Mace-Lande: Critical

USFWS: Not listed

CITES: Not listed

State of Hawaii: Endangered

IUCN: Not listed

Taxonomic status: Species population

Distribution: O'ahu - Ko'olau Mountains and Waianae Mountains.

Wild Population: 0-50 (based on 1991 DOFAW Forest Bird Survey)
Several sightings in the 1980's.

Field Studies: Not aware of specific efforts

Threats: Disease, genetics, predation by exotics (rats and cats), habitat modification, interspecific competition, catastrophe (hurricane).

Recommendations:

Research Management: Survey; Monitor; Limiting factors research; Translocation

PHVA: No

Other: Consider reestablishing by translocation from Hawaii.

Captive Population: Surrogate program for species with Hawai'ian 'Iwi collected on Big Island.
22 plus birds collected in December 1992.

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himatione sanguinea* - O'ahu 'Apapane

STATUS:

Mace-Lande: Vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawaii: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: O'ahu - Koolau and Waianae Mountains in ohia forest

Elevation: 500-4,000 ft.

Wild Population: 20,000-50,000 (based on DOFAW Forest Bird Survey, 1991)

Field Studies: Breeding biology (Eddinger, 1970) on Kaua'i population, feeding (Baldwin 1953, Carpenter and Machillen 1976, both on Big Island).

Threats: Disease, and possibly predation by rats, interspecific competitions from exotics, aircraft.

Comments: There are questions on disease resistance because this population utilizes lower elevations. 'Apapane on all islands considered conspecific, but populations have different risk levels on different islands.

Recommendations:

Research Management: Monitor; Limiting factors research
PHVA: Yes, for species
Other: Disease screening, nesting biology, interspecific competition from exotics.

Captive Population: Surrogate program with Hawai'i 'Apapane, collected from Big Island. More than 17 plus birds collected in December 1992 will bring population to approximately 30.

Captive Programs: Not currently recommended.

3.6 MOLOKA'I WORKING GROUP.

I. Critical

Myadestes lanaiensis rutha (Oloma'o)

Vestiaria coccinea (Moloka'i 'I'iwi)

II. Endangered

Asio flammeus sandwichensis (Pueo)

III. Vulnerable

Hemignathus virens wilsoni (Moloka'i 'Amakihi)

Himatione sanguinea sanguinea (Moloka'i Apapane)

Table 24. Threats to the forest birds of the island of Moloka'i by Mace-Lande threat category.

MACE-LANDE	Disease	Predat'n exotics	Interspec compet exotics	Habitat modif	Genetic probs	Hurricanes	Human interfer	Pesticides	Aircraft
Critical and Extinct	3	3	3	3	3	3	0	0	1
Endangered	1	1	0	0	0	0	1	1	0
Vulnerable	2	1	1	1	0	0	1	0	0
TOTAL	6	6	4	4	3	3	2	1	1

Table 25. Research management recommendations by Mace-Lande threat category for forest birds of the island of Moloka'i.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical and Extinct	3	0	1	0	0	1	0
Endangered	0	1	0	0	0	1	0
Vulnerable	0	2	0	2	0	0	0
TOTAL	3	3	1	2	0	2	0

Table 26. Hawai'ian forest birds - Moloka'i.

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRSTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui, Kaula'i, Moloka'i, Lana'i, O'ahu, Hawai'i, Keho'olawe									N	--	--	5 rehab
			Moloka'i	<u>±</u> 100	0	D	AA-2	E?	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0
Myadestes	lanaiensis	rutha (Oloma'o)	Moloka'i	0-10	1	D	AA-3	C	D,G,Ice,Lm, Pe,Sh	?	S	Np	--	--	0
Hemignathus	virens	('Amakihi)	Kaula'i, O'ahu, Molokai, Maui, Hawai'i & other smaller isls					V		?					
		wilsoni (Moloka'i 'Amakihi)	Moloka'i	1,800	1	S?	AA-2	V?	D,Lm, Pe,Ice	YES?	T,M	N	--	--	0
Paroreomyza	flammea	(Moloka'i creeper)	Moloka'i	EXT	1	D	AA-3	EXT	D,G,Ice,Lm, Sh,Pe	NO	S	Np	--	--	0
Vestiaria	coccinea	(Moloka'i 'I'iwi)	Moloka'i	<50	1	D?	AA-3	C	A,D,G,Ice, Lm,Pe,Sh	YES-spp	S,Lr,TI	Np	--	--	0
Himatione	sanguinea	(Moloka'i 'Apapane)	Moloka'i	<u>±</u> 39,000	1	S	AA-2	V	D,I	YES-spp	T,M	N	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - Moloka'i short-eared owl or Moloka'i Pueo

STATUS:

Mace-Lande: Endangered?
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed on Moloka'i
IUCN: Not listed

Taxonomic status: Subspecies subpopulation

Distribution: Moloka'i - area AA-2

Wild Population: ± 100 (guesstimate); there has never been a survey. Population is suspected to be declining. No subpopulations.

Field Studies: Unaware of specific efforts

Threats: Disease, human interference, pesticides (insecticides and rodenticides), predation by exotics.

Comments: There is very little known about this species. This is a ground nester.

Recommendations:

Research Management: Monitor; Life history research
PHVA: Yes, pending survey and data collection
Other: Disease, pesticide research, husbandry.

Captive Population: None

Captive Programs: No current recommendation

HAWAIIAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Myadestes lanaiensis rutha* - Moloka'i Oloma'o

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Endangered

Taxonomic status: Subspecies

There was a second subspecies, *M. l. lanaiensis* that is now extinct.

Distribution: Moloka'i; Olokui plateau; AA-3 (see map in Scott et al., 1986)

Elevation: Above 900-1500 m

Wild Population: 0-10 - no sub-populations

Sighted in 1988 by A. Engilis (DOFAW Report)

Previous sighting 1979 (USFWS Survey) - 3 in Olokui and 3 in Kamakou

1974 survey - 3 sighted by Scott et al. (reported in 'Elepaio, 1977)

Field Studies: Periodic five-year-interval surveys by DOFAW

Threats: Disease, genetic factors, interspecific competition with exotics, habitat loss, predation by exotics, catastrophe/hurricane, habitat loss/modification because of exotic animals and plants.

Comments: Can be confused in field with Japanese bush warbler.

Recommendations:

Research Management: Survey

PHVA: ?

Other: Continued habitat protection by exclusion of mammals from Olokui. Immediate detailed non-interventive survey work to determine existence. Do surrogate research on Oma'o to evaluate food requirements.

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens wilsoni* - Moloka'i 'Amakihi (Moloka'i)

STATUS:

Mace-Lande: Vulnerable?
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Subspecies population

Distribution: Moloka'i
Elevation: 500 - 5,000 ft.

Wild Population: 1800 \pm 700 pending completion of 1993 report on the 1988 survey. No sub-populations. AA-2.

Field Studies: Unaware of specific efforts

Threats: Disease, interspecific competition with exotics, habitat loss/fragmenttion because of exotic plants and animals, predation by exotics, catastrophe (hurricanes and fire).

Comments: Does not appear to be sensitive to mosquito-borne avian diseases at lower elevations, but this needs to be investigated.

Recommendations:

Research Management: Taxonomy (morphometric and genetic work); Monitor; Translocations (from Maui population).

PHVA: Yes?

Other: Alien species control, basic biology research, inter-specific competition study (Japanese bush warbler).

Captive Population: None

Captive Programs: Not recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Paroreomyza flammea* - Moloka'i Creeper

STATUS:

Mace-Lande: Extinct
USFWS: Endangered
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Extinct

Taxonomic status: Species

Distribution: Pelekunu valley; AA-3
Elevation: Approximately 1000 m.

Wild Population: Extinct

Last sighting was in 1963 (N. Pekelo)
Previous sightings 1961 (2 birds); 1962 (3 birds);
1963 (1 bird)

Field Studies: Last surveyed for in 1988.

Threats: Disease, genetic factors, predation by exotics, habitat loss/modification/fragmentation because of exotic plants and animals, catastrophe/hurricane, interspecific competition with exotics.

Comments: Last one seen by Noah Pekelo (1963) on west rim of Pelekunu valley on Ohialele plateau. This bird was bright orange, vocalized a lot and approached humans readily.

Recommendations:

Research Management: Continued searches/surveys to verify status
PHVA: No unless rediscovered
Other: Continued management of historic habitat

Captive Population: None

Captive Programs: None - pending rediscovery

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Vestiaria coccinea* - Moloka'i 'I'iwi

STATUS:

Mace-Lande: Critical
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Not listed

Taxonomic status: Species population

Distribution: Moloka'i - Kamakou and Olokui; AA-3

Wild Population: < 50

1988 survey on Moloka'i showed 10 records (DOFAW Forest Bird Survey). Population suspected to be declining.

Field Studies: Unaware of current specific efforts

Threats: Disease, genetic factors, aircraft, interspecific competition with exotics, predation by exotics, habitat loss/modification/fragmentation because of exotic plants and animals, catastrophes/hurricanes.

Recommendations:

Research Management: Surveys; Limiting factor research; Translocations from Maui.
PHVA: Yes
Other: Predator control; more intensive wild management for alien species control, habitat maintenance

Captive Population: None

Captive Programs: No current recommendation - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himatione sanguinea* - Moloka'i 'Apapane

STATUS:

Mace-Lande: vulnerable
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Moloka'i - East Moloka'i, AA-2

Elevation: <1000 ft. - > 6000 ft.

Wild Population: 39,000 \pm 2,300 (based on Scott et al., 1986; DOFAW Forest Bird Survey, 1988); One subpopulation

Field Studies: No current field studies other than standard surveys (interval?)

Threats: Disease, human interference. Possibly interspecific competition with exotics, aircraft, habitat loss due to exotic plants and animals, predation by exotics, habitat loss (fragmentation), catastrophes/hurricanes.

Recommendations:

Research Management: Monitoring; Taxonomy
PHVA: Yes, for species
Other: Continued alien species control

Captive Population: None (Hawai'i population only)

Captive Programs: No current recommendation

3.7 LANA'I WORKING GROUP.

I. Critical

Asio flammeus sandwichensis (Pueo)

Himatione sanguinea sanguinea (Lana'i Apapane)

II. Unknown/extinct?

Hemignathus virens (Lana'i 'Amakihi)

Table 27. Threats to the forest birds of the island of Lana'i by Mace-Lande threat category.

MACE-LANDE	Disease	Pesticides	Predat'n exotics	Genetic probs	Interspec compet exotics	Habitat modif	Fire	Hurricane	Human interfer	Habitat loss
Critical and Extinct?	3	3	3	2	2	2	2	2	1	1
Endangered	0	0	0	0	0	0	0	0	0	0
Vulnerable	0	0	0	0	0	0	0	0	0	0
TOTAL	3	3	3	2	2	1	2	2	1	1

Table 28. Research management recommendations by Mace-Lande threat category for forest birds of the island of Lana'i.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history
Critical and Extinct?	1	2	0	2	0	2	0
Endangered	0	0	0	0	0	0	0
Vulnerable	0	0	0	0	0	0	0
TOTAL	1	2	0	2	0	2	0

Table 29. Hawai'ian forest birds - Lana'i.

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRSTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui, Kaua'i, Moloka'i, Lana'i, O'ahu, Hawai'i, Keho'olawe									N	--	--	5 rehab
			Lana'i	+50	0	D	AA-2	C	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0
Hemignathus	virens	('Amakihi)	Kaua'i, O'ahu, Moloka'i, Maui, Hawai'i & other smaller isls					V		?					
Hemignathus	virens	wilsoni (Lana'i Amakihi)	Lana'i	EXT?	ext?	D	AA-3?	EXT ?	D,G,L,Lm, lce,Pe,Ps, Sh,Sf	YES?	T,S	Np	--	--	0
Himatione	sanguinea	(Lana'i 'Apapane)	Lana'i	<100	1	D	AA-3	C	D,G,lce, Sh,Sf, Pe,Ps,Lm	YES- spp	T,M,Lr	Np	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - Lana'i short-eared owl or Pueo

STATUS:

Mace-Lande: Critical

USFWS: Not listed

CITES: Not listed

State of Hawai'i: Not listed - O'ahu population is listed as Endangered

IUCN: Not listed

Taxonomic status: Subspecies subpopulation

Distribution: Lana'i; Area AA-2

Wild Population: 50 \pm 25; there has never been a survey. Population is suspected to be declining. No subpopulations.

Field Studies: Unaware of specific efforts

Threats: Disease, human interference, pesticides (insecticides and rodenticides), predation by exotics.

Comments: There is very little known about this species, although biologists do not believe there are any inter-island differences genetically. Species is a ground nester.

Recommendations:

Research Management: Monitor; Life history research

PHVA: Yes, pending survey and data collection

Other: Disease, life history studies, pesticide research

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Hemignathus virens wilsoni* - Lana'i 'Amakihi (Lana'i)

STATUS:

Mace-Lande: Extinct?
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Endangered
IUCN: Not listed

Taxonomic status: Subspecies population

Distribution: Lana'i

Wild Population: Extinct? Area - AA-3?

Last reported in 1976 by Littirai

Field Studies: Not aware of current specific efforts

Threats: Disease, genetic factors, interspecific competition with exotics, habitat loss and/or modification because of exotic plants and animals, catastrophe/hurricane, pesticides, predation by exotics, catastrophe/fires.

Comments: Possible extinction due to malathion which has been used to eradicate fruitflies on Lana'i. Island is owned by the Dole Corporation. Lana'i could be a possible future site of Moloka'i population translocation.

Recommendations:

Research Management: Survey to determine existence, Taxonomy
PHVA: Yes, if existence confirmed
Other: restoration of habitat

Captive Population: None

Captive Programs: Not currently recommended - pending

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Himantione sanguinea* - Lana'i 'Apapane

STATUS:

Mace-Lande: Critical
USFWS: Not listed
CITES: Not listed
State of Hawai'i: Not listed
IUCN: Not listed

Taxonomic status: Species population

Distribution: Lana'i; 3-4 sq. km. AA-3.

Wild Population: <100 Population is declining. 5 documented observations in 1992 (by T. Pratt).

Field Studies: Unaware of specific recent efforts

Threats: Disease, genetic factors, interspecific competition with exotics, habitat loss because of introduced large mammals (for hunting purposes), habitat modification due to exotic plants, pesticides, predation by exotics, catastrophe/fire/hurricane.

Comments: Population estimate may be generous. Survey is difficult because of vertical terrain in habitat. Possible poisoning due to malathion. This island is privately owned by the Dole Corporation.

Recommendations:

Research Management: Taxonomy; Monitor; Limiting factors research
PHVA: no
Other: intensive management for alien species control.

Captive Population: None. Hawai'ian 'Apapane is part of surrogate program (17 birds).

Captive Programs: Not currently recommended - pending

3.8 SMALLER ISLAND WORKING GROUP.

I. Unknown

Asio flammeus sandwichensis (Pueo)

--Kaho'olawe and Ni'ihau

II. Endangered

Acrocephalus familiaris kingi (Nihoa Millerbird)

Telespyza ultima (Nihoa finch)

III. Vulnerable

Telespyza cantans (Laysan finch)

Table 30. Threats to the forest birds of the smaller islands by Mace-Lande threat category.

MACE-LANDE	Habitat modif	Disease	Hurricane	Interspec compet exotics	Unknown	Tsunami	Climate	Fire	Predat'n exotics
Critical	0	0	0	0	0	0	0	0	0
Endangered	2	2	2	2	0	0	0	1	1
Vulnerable	1	1	1	0	0	1	1	0	0
Unknown	0	0	0	0	2	0	0	0	0
TOTAL	3	3	3	2	2	1	1	1	1

Table 31. Research management recommendations by Mace-Lande threat category for forest birds of the island of Hawai'i.

MACE-LANDE	Survey	Monitor	Transloc	Taxon	Limiting factor mgmt	Limiting factor research	Life history	Husbandry
Critical	0	0	0	0	0	0	0	0
Endangered	0	2	0	0	0	0	0	1
Vulnerable	0	1	0	0	0	0	1	0
Unknown	2	0	0	0	0	0	0	0
TOTAL	2	3	0	0	0	0	1	1

Table 32. Hawai'ian forest birds endemic to the smaller islands (Ni'ihau, Laysan, Kaho'olawe, and Nihoa).

TAXON			WILD POPULATION									CAPTIVE PROGRAMS			
SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
Asio	flammeus	sandwichensis (Short-eared owl or Pueo)	Maui,Kaua'i, Moloka'i,Lana'i, O'ahu,Hawai'i, Keho'olawe									N	--	--	5 rehab
			Kaho'olawe	UNK	1	UNK	AA-2	?	?	PEND SURV	S	N	--	--	0
			Ni'ihau	UNK	1	UNK	AA-2	?	?	PEND SURV	S	N	--	--	0
Acrocephalus	familiaris														
	familiaris	kingi (Nihoa millerbird)	Nihoa	200-300(?)	1	S	AA-3	E	Sh,D, St,Pe,Ice,Lm	NO?	M	Np	--	--	0
Telespyza	cantans	(Laysan finch)	Laysan	10,000	2	S	AA-3	V	D,Lm, Sh,St,C	YES	M	N	--	--	6
	ultima	(Nihoa finch)	Nihoa	1,000-3,000	1	S	AA-3	E	D,Ice,Lm,Sh, Lm	YES	H,M	N	--	--	0

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Asio flammeus sandwichensis* - Kaho'olawe and Ni'ihau Short-eared owl or Pueo

STATUS:

Mace-Lande: Unknown

USFWS: Not listed

CITES: Not listed

State of Hawai'i: Not listed - O'ahu population is listed as Endangered

IUCN: Not listed

Taxonomic status: Subspecies subpopulations

Distribution: Kaho'olawe and Ni'ihau

Wild Population: Unknown

Field Studies: Unaware of specific efforts

Threats: Unknown

Comments: There is very little known about this species, although biologists do not believe there are any inter-island differences genetically. Species is a ground nester.

Recommendations:

Research Management: Survey

PHVA: Pending survey and data collection

Other:

Captive Population: None

Captive Programs: Not currently recommended

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Acrocephalus familiaris kingi* - Nihoa Millerbird

STATUS:

Mace-Lande: Critical
USFWS: Endangered
CITES: Not listed
State of Hawaii: Endangered
IUCN: Vulnerable

Taxonomic status: Species, only other subspecies on Laysan is extinct.

Distribution: Nihoa - 1.97 km²

Wild Population: 200-400 generally, but fluctuates

Conant et al. 1981: 338 ±192

Recovery Plan estimate 1984: 200-600

Field Studies: Conant has tried to study but reports difficulty mist netting. Numbers low. A fair amount of information by Conant is in informal reports (need to obtain). Also USFWS surveys other than Conant's.

Threats: Catastrophes including hurricanes and fire. Possible introduction of disease, exotic plants, or exotic animals leading to interspecific competition and modification of habitat.

Comments: Numbers have remained fairly constant on average. There are annual fluctuations. If translocation successful, downlist to endangered.

Recommendations:

Research Management: Monitor for decline.

PHVA: No?

Other: Study biology to establish techniques for translocation to Laysan. Consider disease screening. Might cause some decline of Laysan Finch through competition for food and nest sites. Rabbits caused extinction of Laysan millerbird but have long since been eradicated. Control human access to island.

Captive Population: None

Captive Programs: Not currently recommended - pending.

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Telespyza ultima* - Nihoa Finch

STATUS:

Mace-Lande: Endangered

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: Rare

Taxonomic status: Species

Distribution: Nihoa Island. 1.87 sq. km.

Wild Population: 1,000-3,000

Conant et al. 1981: 1,608 \pm 418

Northwest Recovery Plan 1984: 3,000-5,000
range 1,318-6,686 for 1964-1975

USFWS Honolulu Refuges, Conant, for recent estimates, usually done periodically

Field Studies: Surveys - see section above. Unpublished data by Conant and USFWS Refuges.

Threats: Disease, habitat modification via introduction of non-native plants and animals, potential introduction of predators (none currently present), catastrophic events/hurricane, climate (i.e., severe drought, possibly associated with ENSO events).

Comments: Situation is similar for Nihoa Millerbird and Laysan Finch. Similar types of threats. Nihoa finch may be good surrogate for working out Palila captive breeding techniques. Captive population might be considered within near future.

Recommendations:

Research Management: Monitor

PHVA: Yes. Desirable since there is only 1 population.

Other: Continue monitoring non-natives and controlling or removing non-native introductions. Limit human access to island. Useful to establish another population.

Captive Population: None

Captive Programs: Not currently recommended (see Comments above)

HAWAI'IAN FOREST BIRDS CAMP TAXON REPORT

SPECIES: *Telespyza cantans* - Laysan Finch

STATUS:

Mace-Lande: Vulnerable

USFWS: Endangered

CITES: Not listed

State of Hawaii: Endangered

IUCN: Rare

Taxonomic status: Species

Distribution: Laysan Island. Translocated population at Pearl and Hermes Reef (on several tiny islands). Sea level, all low elevation islands making them more susceptible to tsunamis. 1.87 sq. km.

Wild Population: 10,000

Morin and Conant (in press) 1988-90, unpublished USFWS Northwestern Refuge unpublished reports, Dennis et al. (1991) - ca. 10,000 twenty year average with wild fluctuations. No evidence of a decline. Approximately 500-800 of these are scattered on several small islands at Pearl and Hermes Reef.

Field Studies: Conant unpublished trip reports on banding and morphometrics; 1984-present, Morin studied breeding biology, nesting studies, and population estimates 1986-1990; Sincock and Kridler conducted experimental translocations, 1977 unpublished report. See Northwestern Hawaiian Passerine Recovery Plan.

Threats: Extremely vulnerable to disease (no known disease events on the island), potential introductions of non-native plants or animals which would modify the habitat (strict control measures are enforced for researchers, illegal landings occur), fluctuations in food supply because of weather (possibly associated with El Nino, catastrophic event/hurricane or tsunami, lack of typical fear response).

Comments: Conant has morphometric data indicating that the translocated population is morphologically diverging. Fleischer et al. (1991) demonstrated some genetic differences among the populations. The translocated population was established approximately 20 years ago. Drown easily if humans leave access to open water. Captive breeding techniques still need to be worked out; Honolulu Zoo population has not produced viable young. May be a good surrogate for Palila.

Recommendations:

Research Management: Monitor

PHVA: Yes

Other: Maintain good monitoring system for non-native introductions and continue current vegetation control of non-native (*Cenchrus echinatus* which competes with native plants used for nesting). More intensive study on breeding system and disease.

Husbandry techniques.

Captive Population: 4.1 at Honolulu Zoo. Brought in in 1987. Consider augmentation from wild population.

Captive Programs: Not currently recommended (see Comments and Captive Population, above)

4. ALL HAWAI'IAN FOREST BIRDS - MACE-LANDE ASSESSMENT AND RECOMMENDATIONS.

**HAWAI'IAN FOREST BIRDS
CONSERVATION ASSESSMENT
AND MANAGEMENT PLAN**

Final Report

Compiled and Edited by

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**Produced by Participants of the
Hawai'ian Forest Birds
Conservation Assessment and Management Plan Workshop
held 7-12 December 1992
Hilo, Hawaii**

SECTION 4

SPREADSHEET FOR ALL HAWAI'IAN FOREST BIRD TAXA

4.1 ALL HAWAI'IAN FOREST BIRD TAXA

Table 33. All Hawai'ian forest birds.

TAXON		WILD POPULATION										CAPTIVE PROGRAMS			
	SCIENTIFIC NAME	RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM	
1	ANSERIFORMES														
2	ANATIDAE														
3	Branta sandvicensis	(Nene) Maui,Hawai'i,Kaua'i	<500	4			E				Oi	N	1	>1,000	
4	Branta sandvicensis	Maui	<200	1	S?	AA-2	C	Pe,I,D,G,L,Sh,Sf,Ps	YES	M,Lm,Lr					
5	Branta sandvicensis	Hawai'i	<339	1	D	AAA	C	Pe,Ps,I,D,G,L	YES	Ti,Lr,Lm,M					
6	Branta sandvicensis	Kaua'i	100	2	I	AA-1	C	Pe,D,G,Sh	YES	M,Ti					
7	FALCONIFORMES														
8	ACCIPITRIDAE														
9	Buteo solitarius	(I'oa or Hawai'ian hawk) Hawai'i	1,400-2,500?	1	S	AAA	V	I,Ps,H,L,Pe	NO	M	N	--	--	0	
10	STRIGIFORMES														
11	Asio flammeus	sandwichensis (Short-eared owl or Pueo) Maui,Kaua'i, Moloka'i,Lana'i, O'ahu,Hawai'i, Kaho'olawe					V				N	--	--	2-5 rehab	
12	Asio flammeus	Maui	±100	1	D	AA-1	E?	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0	
13	Asio flammeus	Kaua'i	±2,000	0	D	AA	V	D,Ps,Ice	PEND SURV	M,Lr	N	--	--	0	
14	Asio flammeus	Moloka'i	±100	0	D	AA-2	E?	D,I,Ps,Pe	PEND SURV	M,Lr	N	--	--	0	

TAXON		WILD POPULATION											CAPTIVE PROGRAMS			
	SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
65	Paroreomyza	montana	newtoni (Maui creeper)	Maui	35,000	2	S	AA-1	V	D,Ice,Lm	NO	M,Lh	I-1	S	3(I)	0
66	Paroreomyza	flammea	(Moloka'i creeper)	Moloka'i	EXT	1	D	AA-3	EXT	D,G,Ice,Lm,Sh,Pe	NO	S	Np	--	--	0
67	Paroreomyza	maculata	(O'ahu creeper)	O'ahu	0-10	2?	D	AA-1	C	D,Pe,L,Lm,G,Ice,Sh	NO	S	Np	--	--	0
68	Loxops	coccineus	(Akepa)													
69	Loxops	coccineus	coccineus (Hawai'ian Akepa)	Hawai'i	14,000	4	D?	AA-1	E	D,Ice,Lm,Pe	YES	M,Lh,Lr	N	--	3	0
70	Loxops	coccineus	ochraceus (Maui Akepa)	Maui	0-10	1	D	AA-2	C	D,G,Lm,Ice,Sh,Pe	NO	S	Np	--	--	0
71	Loxops	caeruleirostris														
72	Loxops	caeruleirostris	(Kaua'i Akepa)	Kaua'i	3,000-5,000	1	D?	AA-2	E	D,Pe,L	NO	M,Lr	I-2	S,N	3(I)	0
73	Subfamily Drepanidinae															
74	Vestiaria	coccinea	(Hawai'i 'I'iwi)	Hawai'i	<340,000	1	D	AA	V	D	YES	M,Lr,Lh	Oi	S	2(N)	25
75	Vestiaria	coccinea	(Kaua'i 'I'iwi)	Kaua'i	10,000-20,000	1	S?	AA-1	V	D,Pe,Lm,A,Ice,Sh	YES-spp	M	N	--	--	0
76	Vestiaria	coccinea	(Maui 'I'iwi)	Maui	+19,180	1	S	AA-1	V	D	YES-spp	M	I-2	S	2(N)	0
77	Vestiaria	coccinea		West Maui	UNK	1	D	AA-3	C	D,Lm,Ice,Pe,G,Sh	YES-spp	S,M	Np	--	--	0
78	Vestiaria	coccinea	(Moloka'i 'I'iwi)	Moloka'i	<50	1	D?	AA-3	C	A,D,G,Ice,Lm,Pe,Sh	YES-spp	S,Lr,TI	Np	--	--	0
79	Vestiaria	coccinea	(O'ahu 'I'iwi)	O'ahu	<50	2	D	AA-1	C	D,G,Sh,Pe,Lm,Ice	NO	S,M,Lr,TI	Np	--	--	0
80	Palmeria	dolei	(Crested honeycreeper)	Maui	+3,800	1	D?	AA-2	E	D,Ice,Pe,Lm,Sh	YES	S,Lh,Lr,Lm	I-1	S,N	2(N)	0
81	Himatione	sanguinea	sanguinea (Hawai'i 'Apapane)	Hawai'i	1,000,000	1	S	AA	V	D,Pe,Ice,Lm	NO	M,Lh	Oi	S	2(N)	30

TAXON		WILD POPULATION										CAPTIVE PROGRAMS				
	SCIENTIFIC NAME			RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRSTS	PVA/WKSP	RESRCH MGMT	REC	PROG TYPE	DIFF	NUM
82	Himatione	sanguinea	(Kaua'i 'Apapane)	Kaua'i	100,000	1	D?	AA-1	V	D,Lm,P,Sh	NO	M	N	--	--	0
83	Himatione	sanguinea	(Lana'i 'Apapane)	Lana'i	<100	1	D	AA-3	C	D,G,Ice,Lm,Sh,Sf,Pe,Ps	YES-spp	T,M,Lr	Np	--	--	0
84	Himatione	sanguinea	(Maui 'Apapane)	Maui	94,000	1	S	AA-1	V	D	YES-spp	M,Lr	I-1	S	2(N)	0
85	Himatione	sanguinea		W. Maui	1,600	1	D	AA-2	V	D	YES-spp	M,Lr	N	--	--	0
86	Himatione	sanguinea	(Moloka'i 'Apapane)	Moloka'i	+39,000	1	S	AA-2	V	D,I	YES-spp	T,M	N	--	--	0
87	Himatione	sanguinea	(O'ahu 'Apapane)	O'ahu	20,000-50,000	1	S?	AA-1	V	D	NO	M,Lr	N	--	--	0
88	Melamprosops	phaeosoma	(Po'ouli)	Maui	≤50	1	D	AA-2	C	D,G,Pe,Sh,Lm	YES	S	Np	--	--	0

**HAWAI'IAN FOREST BIRDS
CONSERVATION ASSESSMENT
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Final Report

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S. Ellis, C. Kuehler, R. Lacy, K. Hughes, and U.S. Seal

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SECTION 5

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SECTION 6

APPENDICES

APPENDIX I.

LIMITING FACTORS FOR CAPTIVE PROGRAMS

Given the current level of avian husbandry techniques for softbills, the following limiting factors were delineated:

- 1) Capture (C) - keeping birds alive:
 - a) Stress resulting in:
 - mortality in the trap (mist net)
 - mortality in the field cage
 - mortality during transport to the captive propagation facility
 - capture influenced (stress) disease
 - b) Nutrition (N):
 - do we know what the birds eat in the wild?
 - will they eat after capture?
 - will they learn to eat alternative food items
in captivity or are "native foods" necessary?
 - if "native foods" are necessary, are they accessible?
 - c) Aggression (A)
 - do the birds need to be housed separately
- 2) Keeping the birds alive in captivity
 - a) Enclosure expertise (E):
 - knowledge of optimum cage size and design to manage aggression problems (A), disease issues (V) and promote breeding
 - b) Climate and elevation considerations (CE)
 - natural habitat/elevation/climate vs. captive environment habitat parameters may impact artificial incubation (AI), disease sensitivity and breeding success.
 - c) Behavioral knowledge to keep aggression (A) related death low
 - d) Veterinary knowledge (V) - if they get hurt or sick, do we have the expertise to improve the condition
 - e) Nutrition (N) - can we maintain the taxa long term on captive diets
- 3) Sexing
 - this technology is available
- 4) Breeding Expertise in Related Birds (B)
 - do they breed in captivity (B)
 - can birds be parent-reared (P)
 - can eggs be successfully artificially incubated (AINC)
 - can chicks be hand-reared (HR)

- can we artificially inseminate birds (AI)
 - what is the best way to establish pair bonds in aggressive nectivorous birds? (B)
-

5) Problems

- Veterinary technology for this group (V)
- Problems; unsolved husbandry issues (P)

**APPENDIX II.
TAXON-BY-TAXON EVALUATIONS FOR CAPTIVE MANAGEMENT**

In order to assist in making recommendations for captive programs, each group of Hawai'ian forest birds was evaluated with regard to the potential for captive propagation, and a series of codes developed to assist in the evaluation of each taxon.

CODES.

Each genus or species name is followed by a series of letters indicating: 1) the overall level of avicultural difficulty; 2) the feeding strategy; and 3) those areas of husbandry or captive maintenance for which techniques are **not** established. Examples of documented captive breeding for related species are also included (1991 ISIS Abstract; National Academy of Science Report; A. Lieberman, unpubl. data; P. Luscomb, unpubl. data; C. Kuehler, unpubl. data; F. Duvall, pers. comm.). The codes and definitions are as follows:

Overall Husbandry Difficulty

1-3 Ranking of husbandry difficulty: 1 being the least difficult and 3 being the most difficult.

Feeding Strategy

F	Frugivore
G	Granivore
O	Omnivore
I	Insectivore
C	Carnivore

Avicultural/Husbandry Factors

A	Aggression factors identified and controlled
AI	Artificial insemination techniques
AINC	Artificial incubation
B	Breeding technology
C	Capture stress or alleviation of capture mortality
CE	Duplication of climate or elevation factors
HR	Hand rearing
N	Nutrition
M	Undetermined softbill mortality
V	Veterinary care/needs

Taxonomic Accounts Regarding Husbandry Feasibility.

ANATIDAE

- Many documented cases of waterfowl breeding in captivity
- Technology is well-established

STRIGIFORMES:

- many documented cases of owls breeding in captivity

CORVIDAE:

Difficulty - 1

Feeding strategy - F/O

Similar species that have been propagated - crested jay, blue jay, steller's jay, scrub jay, bushy-crested jay, San Blas jay, purplish-backed jay, azure jay, curl-crested jay, plush-crested jay, white-tailed jay, green jay, magpie jay, eurasian jay, lanceolated jay, purple jay, Taiwan blue magpie, yellow-billed blue magpie, green magpie, short-tailed magpie, azure-winged magpie, rufous treepie, southern treepie, collared treepie, racket-tailed treepie, magpie, nutcracker, chough, alpine chough, jackdaw, rook, American crow, hooded crow, pied crow, brown-necked raven, raven, white-necked raven, 'alala.

TURDIDAE:

Difficulty - 1

Feeding strategy - F

Husbandry techniques needed - AI, V, M

Diet - fruit, seeds, berries, insects

Similar species that have been propagated - solitaires: (slate-colored solitaire), daurian redstarts, Turdus: ground scraper thrush, clay-colored robin, song thrush, *Garrulax*: approximately 15 species.

SYLVIIDAE:

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - C, N, A, V, B, E, AINC, HR, AI, M

Diet - moths & caterpillars

Similar species that have been propagated - black-caps, bush warblers

MUSCICAPIDAE:

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - N, V, B, E, AINC, AI, M

Diet - insects (gleaners and flycatchers)

Similar species that have been propagated - yuhinas, Chatham Island black robin

DREPANIDAE:

It is difficult to compare breeding success in other birds to the Drepanidae, species by species.

Following is a list of some of the birds which have bred in captivity, which may share some characteristics of behavior, diet, foraging behaviors and captive breeding to some of the Hawai'ian

forest birds. Captive propagation data for the following species may provide some relevant husbandry information when trying to work with Hawai'ian softbills:

- spot crowned euphonias, yellow-throated euphonias, violaceous euphonias, golden browed chlorophonias, green honeycreepers, red-legged honeycreepers, scarlet thighed dacnis, black masked dacnis, golden masked tanagers, spangle-cheeked tanagers, turquoise tanagers, silver-throated tanagers, purple honeycreepers, bananaquits, orangequits, golden tanagers, blue-necked tanagers, bay-headed tanagers, new world melodious finches, garrulax, solitaires, yuhinas, costa's hummingbirds, ruby-topaz hummingbird, broad-billed hummingbirds, red-tailed comets, peruvian sheartail, streamer-tail, buff-throated sunbirds, copper sunbirds, olive-backed sunbirds, beautiful sunbirds, purple-throated sunbirds, blue-faced honeyeaters, yellow-tufted honeyeaters, black-cap, Chatham Island robin, bush warblers

DREPANIDAE

Telespyza cantans (Laysan finch):

Difficulty - 1

Feeding strategy - O

Husbandry techniques needed - AI, B, V, M

Diet - eggs, carrion, seeds, roots, insects

Comment: Basic husbandry is well established for finches as a group.

Telespyza ultima (Nihoa finch):

Difficulty - 1

Feeding strategy - O

Husbandry techniques needed -AI, V, M

Diet - seeds, flowers and insects (omnivorous)

Comment: Basic husbandry is well established for finches as a group.

Psittirostra psittacea (Hawai'i 'O'u):

Difficulty - 2

Feeding strategy - F/I/N

Husbandry techniques needed - N, V, B, E, AINC, HR, M

Diet - fruits, insects, buds, blossoms and nectar

Comment: tanagers, euphonias and chlorophonias may be good surrogate species for this group.

Loxioides bailleui (Palila):

Difficulty - 1

Feeding strategy - F/I

Husbandry techniques needed - AI, V, M

Diet - mamane buds, flowers, leaves, pods, and insects

Comment: Basic husbandry is well established for finches as a group. Palila have been kept for short periods (~17 days) in field aviaries while the birds were fed natural food items. The Honolulu Zoo has also maintained Palila. This species appears to be "heat sensitive" in captivity (Luscomb, pers. comm.).

Pseudonestor xanthophrys (Maui parrotbill):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - C, N, V, E, B, AINC, HR, M, AI

Diet - insects (This species has a unique bill used to split wood in a can-opener type fashion and the upper mandible and tongue are used to pry out insect larvae).

Hemignathus virens ('Amakihi):

Difficulty - 2

Feeding strategy - N/I/F

Husbandry techniques needed - V, E, B, AINC, HR, AI, M

Diet - nectar, insects, fruit,

Comment: These birds have been partially hand-reared and successfully maintained in captivity (confirm data).

Hemignathus parvus ('Anianiau):

Difficulty - 2

Feeding strategy - I/N

Husbandry techniques needed - C?, N?, V, E?, B?, AINC, HR, AI, M

Diet - insects and nectar

Comment: An 'Anianiau raised in captivity lived to be nine years of age (confirm data).

Hemignathus lucidus (Nuku-pu'u):

Difficulty - 3

Feeding strategy - I/N

Husbandry techniques needed - C, N, V, E, B, AINC, HR, AI, M

Diet - spiders, caterpillars, weevils and nectar

Hemignathus munroi (Akiapola'au):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - C, N, V, E, B, AINC, HR, AI, M

Diet - insects

Comment: This species has a complicated feeding behavior and is the "woodpecker" of the islands.

It has also been observed feeding on sap. The chicks require a long period of parental care (possibly up to one year). There is quite a bit of natural history data available (Pratt).

Oreomystis species (Creepers):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed -C, N, V, E, B, AINC, HR, AI, M

Diet - insects

Comment: Eddinger has partially hand-reared and maintained this species (confirm data).

Paroreomyza species (Creepers):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed -C, N, V, E, B, AINC, HR, AI, M

Diet - insects

Loxops coccineus (Akepa):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - C, N, V, E, B, AINC, HR, AI, M

Diet - caterpillars, spiders and nectar

Loxops caeruleirostris (Kaua'i Akepa):

Difficulty - 3

Feeding strategy - I

Husbandry techniques needed - C, N, V, E, B, AINC, HR, AI, M

Diet - caterpillars, spiders, and nectar

Comment: The Kaua'i akepa has been maintained in captivity. (confirm data).

Vestiaria coccinea ('Iwi):

Difficulty - 2

Feeding strategy - N/I

Husbandry techniques needed - N?, V, E, B, AINC, HR, AI, M

Diet - nectar and insects

Palmeria dolei (Crested honeycreeper):

Difficulty - 2

Feeding strategy - N/I

Husbandry techniques needed - C, A, N, V, E, B, AINC, HR, AI, M

Diet - nectar, insects

Himatione sanguinea ('Apapane):

Difficulty - 2

Feeding strategy - N/I/F

Husbandry techniques needed - V, E, B, AINC, HR, AI, M

Diet - nectar, insects, fruit

Melamprosops phaeosoma (Po'ouli):

Difficulty - 3

Feeding strategy - I/C/F

Husbandry techniques needed - C, N, V, E, B, AINC, HR, AI, M

Diet - insects, snails, fruits

Comment: Field studies on 2 active nests have been done.

There are currently no self-sustaining captive populations of tanagers, hummingbirds, sunbirds, warblers, flycatchers or honeyeaters (with the possible exception of yellow-tufted honeyeaters). The birds listed above as "surrogate" species are documented breedings, not long-term propagation programs with self-sustaining captive populations. **The most important question to ask when considering the establishment of a captive self-sustaining softbill population is not whether or not the birds will breed in captivity, but, whether or not they can be bred in sufficient numbers to offset mortality.** This requires many cages, many birds, and experienced staff. In general, thrush and finch-like birds (difficulty level = 1) will be the easiest to breed and maintain under captive conditions. Captive maintenance and propagation of nectivorous birds (difficulty level = 2) will be easier than insectivorous gleaners and flycatchers (difficulty level = 3).

**APPENDIX II.
ONGOING HAWAI'I SURROGATE FOREST BIRD
CAPTIVE PROPAGATION PROGRAM**

A Hawai'i Surrogate Forest Bird Captive Propagation Program, with participation by five mainland zoos as well as the Honolulu Zoo, has been ongoing since 1988. For this report, information was not readily available concerning collection mortality, long-term survivability, causes of mortality in captivity, and breeding success. These data will be of critical importance to the development of further captive programs. The following data regarding the Hawai'i Surrogate Forest Bird Captive Propagation Program were available (data format is male.female.unknown sex):

1st Collection - 1988 - 30 'Amakihi Collected

INSTITUTION

Brookfield Zoo	3.3
Bronx Zoo	4.4
Philadelphia Zoo	5.5
National Zoo	3.3

1988 - 14 died

1989 - 2 died

1990 - 7 died

1992 - 1 died

24 died

2nd Collection - 1991 - 24 'Amakihi, 22 'I'iwi, 6 Oma'o

	'Amakihi	'I'iwi	Oma'o
INSTITUTION			
Brookfield Zoo	4.4	4.4	0
Houston Zoo	4.4	2.2	0.0.4
National Zoo	2.2	2.4	0
Philadelphia Zoo	<u>2.2</u>	<u>2.2</u>	<u>0.0.2</u>
TOTAL	24	22	6

1991: 3 'I'iwi died, 4 'Amakihi died, 2 Oma'o died

Current Inventories:

	'Amakihi	'I'iwi	Oma'o	'Apapane	Laysan Finch
INSTITUTION					
Brookfield	2.3	3.4	0	0	0
Houston	5.3	1.3	2.1	0	0
Philadelphia	2.3	2.1	1.0	0	0
National Zoo	3.4	3.3	0	0	0
Honolulu Zoo	<u> </u>	<u>1.0</u>	<u>1.1</u>	<u>8.6</u>	<u>5</u>
	25	21	6	14	5

**APPENDIX III.
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