

May 12, 2000

Mr. Ernest Kosaka  
Federal Aid Coordinator  
U.S. Fish and Wildlife Service  
P.O. Box 50167  
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Transmitted herewith are 4 copies of Federal Aid in Wildlife Restoration Program Grant Proposal Packages for the Hawaii Game Management Program-FY2001-2005 and the Hawaii Nongame Management Program-FY2001-2005. Also included are the Grant Agreement Documents to fund these programs for fiscal year 2001. The following documents are attached:

Grant Proposal Package

1. W-22-G, Segments 6-10, Hawaii Game Management Program. July 1, 2000 - June 30, 2005.
2. W-23-NG, Segments 6-10, Hawaii Nongame Management Program. July 1, 2000 - June 30, 2005.

Grant Agreement Documents

1. W-22-G, Segment 6, Hawaii Game Management Program. July 1, 2000 - June 30, 2001.
2. W-23-NG, Segment 6, Hawaii Nongame Management Program. July 1, 2000 - June 30, 2001.

Please note that the Grant Proposal Packages are being concurrently submitted to State and County agencies for "Clearing House Review", the State Historic Preservation Office for SHPO clearance, the State Office of Planning for CZM Federal Consistency Review, and made available for public review via the Division's webpage and a notice in the OEQC Bulletin.

Please call me if you have any questions.

Aloha,

PAUL J. CONRY  
Wildlife Program Manager

cc: Leroy Taira, Fiscal

Hawaii Department of Land & Natural Resources  
 Division of Forestry and Wildlife  
GAME MANAGEMENT PROGRAM FY01 - FY05  
 W-22-G, Segments 6-10

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## HAWAII GAME MANAGEMENT PROGRAM

Grant: W-22-G

Grant Period: July 1, 2000 - June 30, 2005

### Introduction

#### Background

One of the major Hawaiian natural resource management issues that has generated debate is the protection of native ecosystems versus public hunting. Hawaii is unique in that none of the game species hunted are native. It is acknowledged that if populations are left unchecked for certain game mammal species, they will have detrimental impacts on our native plants, animals and ecosystems. In addition, Hawaii has the highest number of endangered and threatened plant species (377) in the U.S. and federal law precludes the use of federal funds in a manner that jeopardizes the continued existence of listed, proposed, or candidate threatened and endangered species. Because a large percentage of Hawaii's game program is funded by the Federal Aid In Wildlife Restoration Program (Pittman-Robertson or PR Program), game management decisions made for this program greatly influence management policy for public hunting areas in general.

Finding the balance between ensuring the continued survival of native plants and animals while providing public hunting opportunities is a complex endeavor. Public hunting is an essential tool in controlling game mammals on public and private lands where control is needed. DOFAW's public hunting program supports and facilitates hunting on public and private lands by providing a structured program that is accessible to all which promotes and encourages participation. The program also focuses hunting efforts and provides hunter access to more remote/pristine sites, thereby helping to control game mammal populations in those areas.

There is a need to continue to manage our public hunting areas and wildlife habitat; and to provide habitat improvements and facilities to meet the demand for wildlife-oriented recreational activities through out the State. Hawaii's Five Year PR Game Management Program consists of eight separate Subgrants (W-22-GC through W-29-R) and 35 different projects or segments. This program will fund DOFAW projects to monitor hunter activities and game species population status and characteristics, land leases to provide additional areas available for public hunting, game habitat improvement projects to enhance wildlife populations in public hunting areas, game population management projects to enhance and restore wildlife populations in suitable habitats through control of alien predators, and facility and infrastructure development and operation projects that will aid in data gathering and analysis and other activities that maximize hunter recreational opportunities and staff efficiency. Project statements and a "Schedule of Funded Projects" which provide specifics on planned management activities and expenditures are provided in the following sections.

The State of Hawaii believes that after reviewing the impacts of activities funded in this grant package, findings of "No Effect" or "Not Likely To Adversely Affect Listed Species" are warranted for the Section 7 evaluation on the use of federal funds for this program. A brief overview of the program and additional supporting information is provided below.

#### Program Overview

With an ever increasing human population, there has been a concomitant increase in the demand for consumptive (hunting) and non-consumptive (wildlife study and observation) uses of wildlife game resources. There are approximately 916,000 acres of public hunting areas in Hawaii. Appendix I contains a list of public hunting areas throughout the State and maps of their locations. Hunter checking station data collected throughout the State during FY98 indicated that public hunting areas provided over 13,000 hunter trips for game birds and 23,300 trips for game mammals. That level of effort yielded a harvest of

over 4,500 game mammals and 12,200 game birds from managed public hunting areas. Specific harvest for each game species is shown below:

<u>Game Mammals</u>		<u>Game Birds</u>	
Wild Pig	1,694	Quail (three species)	3,085
Wild Goat	1,011	Pheasant (three species)	1,966
Wild Sheep	263	Chukar Partridge	410
Axis Deer	667	Francolin (three species)	6,049
Black-tailed Deer	46	Wild Turkey	201
Mouflon Sheep	<u>902</u>	Dove (two species)	<u>493</u>
Totals:	4,573		12,204

Participating in game-related wildlife activities is an important recreational outlet for many of Hawaii's residents and visitors. According to the 1996 National Survey of Hunting, Fishing and Wildlife-Associated Recreation, 23,000 persons hunted and spent 258,000 days hunting in Hawaii\*. The survey also indicated that hunters spent \$16,000,000 in the State for hunting-related recreation. Wise management of these resources is essential to ensure that we can continue to provide for the public's needs in the future.

#### Legal Framework

Hawaii's resources are managed under the authority and mandates of several laws and regulations. State law authorizes and mandates the protection, conservation, development and utilization of wildlife resources of the State. Specifically, Hawaii Revised Statutes (HRS) 171-3 mandates that the Department of Land and Natural Resources shall manage and administer forests, forest reserves, wildlife, wildlife sanctuaries, game management areas, public hunting areas, Natural Area Reserves, and other functions assigned by law. Section 183D-2 mandates that the Department shall manage and administer the wildlife and wildlife resources of the State which, by definition, includes both game and nongame species. Section 183D-3 further mandates that the Department shall adopt rules protecting, conserving, monitoring, propagating, and harvesting wildlife and under 183D-4 the Department is given the authority to maintain, manage, and operate game management areas, wildlife sanctuaries, and public hunting areas for these purposes. Within the Department, the Division of Forestry and Wildlife (DOFAW) has been delegated the management responsibility for terrestrial wildlife and the game management component of that program.

Determining wildlife management policy in Hawaii is a complex process. Natural resources are managed under the scrutiny of the public, who represent a wide variety of opinions about resource management. Legislative, congressional, and judicial decisions influence, and may even dictate, natural resource management policy. In addition, many of the statutes and rules that direct management are broad in nature and, at times, conflicting. In order to deal equitably with its varied constituencies and mandates, DOFAW has developed an open and interactive process to determine Guidelines for management strategies for all lands under its jurisdiction. This process has often resulted in emotional and, at times, divisive, debates over potential forest land use and wildlife management practices as demands among user groups increase and we attempt to integrate environmental, local community, hunting, and native Hawaiian cultural concerns. Appendix IV describes the Resource Management Guidelines as they relate to game animal management and how they were used to develop and coordinate activities in this program.

#### Federal Aid Section 7 Assessment

In developing these projects, precautions have been taken to evaluate potential impacts to threatened and endangered species and to incorporate measures which will protect listed species that may be affected by project activities. Hawaii currently has 377 species listed as threatened or endangered, an additional 123

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\* The discrepancies between the National Survey numbers and hunter checking station data are due to the fact that hunter check stations record only information from hunters on public hunting areas. Information on hunting on private land is not included.

proposed or candidate species under consideration for listing and 1,084 species of concern (See Appendix II for a list of endangered, threatened, proposed, and candidate species found on the various Islands throughout the State). A Federal Aid Assessment (Section 7 Evaluation Form) has been completed by the State Federal Aid Coordinator for each project to identify potential impacts and, where needed, incorporate additional measures that the State will take to avoid impacts or ensure that listed species are identified and protected. Completed Section 7 Evaluations Forms are included in Appendix III for reference.

The Division believes that Findings of "No Effect" or "Not Likely To Adversely Affect Listed Species" are warranted for the project activities in this grant package. The following considerations and mitigative measures were factors in reaching those findings.

1. The majority of the activities carried out under this program are routine, ongoing and located in disturbed areas with no or very few listed species. Improvements are located to avoid impacts to listed species during construction and use.
2. 25% of the State's Federal Aid PR Program is dedicated to Nongame/Endangered Species wildlife activities that directly benefit and enhance listed species
3. Many of the Game Management Program activities benefit and enhance listed species. For example, predator control and water unit development for game birds also benefit nene in many areas. Roads, trails and facilities developed or maintained in remote areas increase hunter pressure which help control game mammals.
4. DOFAW's Resource Management Guidelines and distribution maps of listed species were used as planning tools in developing game management project activities and in assessing potential impacts to listed species in completing the State's portion of the Section 7 Assessments. The major focus of the game enhancement program utilizing Federal funds is for game birds, which involves activities that are unlikely to adversely affect listed species.
5. Program activities that might enhance game mammal populations have been purposefully designed, and specific mitigative actions recommended, to avoid activities that directly affect listed species. Program activities that do enhance game mammal populations are done in "Game Production" areas and these projects include a commitment to identify and protect listed species in the area that are at risk from game mammals.
6. Where there is a potential for adverse impacts to listed species, DOFAW has included actions to mitigate impacts such as fencing endangered plants, creation of "No Hunting" safety zones for nene, and educational materials for hunters to increase their awareness of endangered species that may be in Hunting areas.

Section B. Schedule of Funded Projects

## Section C. Job Descriptions

Title: Game Program Coordination  
Project 1: Statewide Coordination  
Period: 2001-2005

Statewide Game Program Coordination

A. Need:

Because of the complexity and volume of the program and geographic separation of project activities, overall coordination must be provided in order to adequately plan, review, administer, and monitor P.R. game projects. Liaison is needed with the U. S. Fish and Wildlife Service, State agencies and other organizations to ensure prompt and efficient handling of project affairs. Statewide program monitoring is needed to ensure compliance with Federal Aid standards and applicable State and Federal laws, regulations, and directives; and to monitor and respond to proposed changes in State laws and regulations which may affect State participation in the game portion of the P.R. program.

B. Objective:

To establish and maintain a system of planning, review, record keeping, project monitoring, supervision, reporting and coordination among staff and outside personnel and agencies adequate to meet the requirements for participation in and administration of the game management portion of the State's Federal Aid in Wildlife Restoration Program.

C. Expected Results and Benefits:

The Game Program Coordination Project will provide staff and procedures to ensure that the State meets its responsibilities for participation in the Federal Aid program, including work planning, record keeping, reporting, supervision of field staff, and coordination of game Federal Aid activities with the Service and other State and agency programs. Coordination of the game portion of the P.R. program will help ensure continued participation in the P.R. Federal Aid program and thereby improve hunting and increase sport hunting opportunities, protect and enhance wildlife habitat on both public and private land, integrate game management activities with other compatible or competing uses, and provide information on the wise management and appropriate use of game species.

D. Approach:

The Federal Aid Coordinator will serve as the principal administrator of the Federal Aid Wildlife Restoration program and be responsible for compiling and submitting the statewide Grant Proposal Package, annual Grant Agreements and annual progress and status reports. Branch personnel will perform coordination activities at the branch level and provide the coordinator with project documents, reports, and recommendations to be incorporated in statewide documents. Coordination with staff or other agencies concerning P.R. project activities will be conducted by written or verbal communication or by attendance at meetings or conferences. The coordinator will provide training sessions for Division staff, review projects in the field throughout the State, and chair P.R. meetings. The coordinator will assure compliance with audit requirements, Federal Aid standards, applicable State and Federal laws and regulations and maximize utilization of available Federal Aid funding. The coordinator or other wildlife staff will attend annual meetings of Region 1 Federal Aid Coordinators, twice-annual meetings of the Western Association of Fish and Wildlife Agencies (WAFWA), and other national federal aid meetings and training as needed. The coordinator will schedule and chair 1-2 statewide federal aid meetings per year. The coordinator will conduct an annual site visit to each Branch to inspect federal aid projects for



Title: Game Land Acquisition  
Project 1: Hawaii County - East Hawaii District  
Period: 2001-2005

Game Land Acquisition - East Hawaii District

A. Need.

The demand for additional recreational hunting areas continues to grow, yet the land area available for public hunting on the island of Hawaii remains limited. Therefore it is important that we maximize the use of the areas already available and gain access to additional lands through lease and/or cooperative partnerships. In order to maintain hunter awareness of nene at Kipuka Ainahou, informational materials will be produced and distributed.

B. Objectives.

- Lease portions of the Kipuka Ainahou and Mauna Loa Forest Reserve, approximately 15,426.9 acres, for wildlife management and game bird and mammal hunting.
- Maintain hunter awareness of nene in public hunting areas.

C. Expected Results and Benefits.

The continued lease of 15,426.9 acres of Hawaiian Home Land in the Kipuka Aina Hou Wildlife Sanctuary, and Public Hunting Area and Mauna Loa Forest Reserve will enable continuation of wildlife management activities and game bird and mammal hunting in the lease area. The lease will provide at least 500 hunter trips for pheasant, quail, Erckel's francolin and turkey during the general game bird season during November through February. Turkeys are now hunted in Kipuka Aina Hou by archers in March when 60 to 100 hunter trips are recorded during the turkey season. An eight month mammal archery season allows for harvests of goats, sheep, and pigs.

The Kipuka Aina Hou area was designated a Game Management Area and public shooting ground in 1954 and opened to game mammal and bird hunting. Nene were first released in this area in the 1970s with a total of 320 birds released during 1973-1975. The area was designated a Nene Wildlife Sanctuary in 1974. The 38,400 acre Sanctuary is located within and considered a portion of the 186,511 acre Mauna Loa Game Management Area where regular game bird and game mammal hunting occurs.

Nene use the area infrequently as habitat is unfavorable. Nene have not been released in the Sanctuary for the last 20 years because of poor survival due to poor quality habitat and predation by small mammals. The number of nene using this general area now is thought to be about 16 birds with 3 or 4 birds occasionally observed in the Kipuka Aina Hou Sanctuary. Nene use is concentrated in adjacent areas, in the vicinity of Puu 6677 (a kipuka vegetated area in the 1935 lava flow) and pastures north of Saddle Road from Kipuka Aina Hou. There is not a resident breeding population in the Sanctuary. The birds that periodically use the area forage there during the day, but roost and breed elsewhere. No successful production has been recorded in the Sanctuary within the past ten years.

D. Approach.

Continue to lease portions of Kipuka Aina Hou and Mauna Loa Forest Reserve from the Department of Hawaiian Home Lands. A pre-season survey of the area will be conducted and hunting will be restricted where any breeding pairs of nene are found. Produce and distribute endangered species educational materials to hunters.

E. Locations.

Leased lands are some 15,426.9 acres in Kipuka Ainahou which is a portion of the Mauna Loa Game Management Area.

F. Estimated Costs.

The cost of this lease is \$.57 per acre which is being waived by the State Department of Hawaiian Home Lands through October of FY00 and a portion of FY01 in exchange for reimbursement of costs for PR related improvements on the Molokai Hawaiian Homes Game Management Area, which was removed from public use by the DHHL in 1994.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$3,323	\$6,897	\$9,846	\$9,846	\$9,846	\$39,758







Title: Game Operations and Maintenance  
Project 3: Maui County  
Period: 2001-2005

Game Operations and Maintenance - Maui County

A. Need.

Increased awareness and interest in the outdoors has increased the demand for multi-use public areas in Maui County. In the recent past approximately 20,000 acres of public hunting lands within Maui County have been lost because of their withdrawal from public use by the private landowners. As available public hunting areas are at a premium and the demands by both the hunter and non-hunting public are beyond the capacity of the available areas, it is ever more important that operation and maintenance of existing facilities be optimized to obtain the fullest recreational benefit from these areas.

B. Objectives.

Operate and maintain facilities and infrastructure in nine public hunting areas totaling 146,959 acres in Maui County (91,311 on Maui, 20,000 on Molokai, 35,648 on Lanai) in order to support wildlife management activities and provide wildlife oriented recreation opportunities to the residents of Maui County and the rest of the State.

C. Expected Results and Benefits.

For the five year duration of this project, within Maui County, approximately 3,050 days will be available for public hunting and a harvest of 3,500 axis deer, 3,000 mouflon sheep, 750 feral pigs, 650 feral goats, 175 turkeys, 1,125 pheasants, 800 chukar, 125 Erckel's francolin, 750 gray francolin, 350 black francolin, and 750 doves.

D. Approach.

Island of Maui: Routine maintenance of three hunter check stations, 50 signs and markers, 2 miles of fence, 12 water units, and 8 self check hunter check stations. Maintenance of 10 miles of access roads by grading, filling, and hand removal of vegetation at edges. Herbicides are not used.

Island of Molokai: Routine maintenance of two baseyard buildings, 20 signs and markers, 1 mile of fence, 6 water units, 3 self check hunter check stations, 5 access gates, and hand removal of vegetation at edges of access roads. Herbicides are not used.

Island of Lanai: Routine maintenance of one baseyard building, 35 signs and markers, 5 water storage game water units, 17 miles of waterlines supplying 16 water trough units, and hand removal of vegetation at edges of access roads. Herbicides are not used. Maintenance of 4 plant enclosures: 2 for T & E plants and 2 for habitat impact assessment. Efforts will continue on Lanai to annually replace 4 miles of galvanized waterline and troughs to reestablish a complete pipeline water distribution system through the Cooperative Game Management Area.

E. Location.

This project will be conducted on Public Hunting Areas within the County of Maui (Islands of Maui, Molokai and Lanai).

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$63,554	\$63,554	\$63,554	\$63,554	\$63,554	\$327,770





Title: Game Population Management  
 Project 1: Hawaii County - East Hawaii District  
 Period: 2001-2005

Game Population Management - East Hawaii District

A. Need.

There are no native mammalian predators in Hawaii. Niches for small and medium-sized predators are filled by introduced Indian mongooses, feral dogs and cats and rats. In many instances they are the primary limiting factors on ground-nesting birds. There are no naturally occurring large predators to control these introduced predators. Demand for recreational game bird hunting continues to increase, yet populations of game birds cannot keep pace with demand. One reason for inadequate production is heavy predation losses from introduced mongooses, rats, feral cats and feral dogs. Population management is needed to restore game bird populations depressed by predation.

B. Objectives.

Encourage game bird populations at Kapapala Ranch, Mauna Loa, and Kipuka Ainahou GMAs by reducing predators, thus enhancing reproduction and survival of game birds.

C. Expected Results and Benefits.

The reduction in numbers of predators and subsequent increase in game bird reproduction and survival will increase the number of game birds in Kapapala, Mauna Loa, and Kipuka Ainahou GMAs. Reducing predation by 50%, would potentially double the recruitment of young to the game bird population. Increased chick production is expected to result in an additional harvest of 2,900 game birds per year and an additional 2,000 hunter days recreation, a substantial increase in wildlife recreation opportunities to the people of Hawaii.

D. Approach.

Predators will be reduced by trapping introduced mongooses, rats, feral cats and feral dogs using live traps and diphacinone bait stations.

E. Location.

Kapapala, Puu Waawaa, Mauna Kea, and Puu Anahulu GMAs.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$10,630	\$10,630	\$10,630	\$10,630	\$10,630	\$53,150

Title: Game Population Management  
 Project 2: Hawaii County - West Hawaii District  
 Period: 2001-2005

Game Population Management - West Hawaii District

A. Need.

There are no native mammalian predators in Hawaii. Niches for small and medium-sized predators are filled by introduced Indian mongooses, feral dogs and cats and rats. In many instances they are the primary limiting factors on ground-nesting birds. There are no naturally occurring large predators to control these introduced predators. Although game bird population levels are closely linked to annual precipitation, predation can be another limiting factor especially during the nesting and brood rearing seasons. Predator population management plays a key role in relieving predation pressure on game bird populations.

B. Objectives.

Increase game bird populations at Puu Waawaa Cooperative Game Management Area (CGMA), Mauna Kea, Kaohe and Puu Anahulu Game Management Area (GMA), and Kahua Special Permit Area by reducing predators, thus enhancing reproduction and survival of game birds.

C. Expected Results and Benefits.

The reduction in predation and subsequent increase in game bird reproduction and survival will increase the annual production of game birds. This will result in increased game bird harvest and hunter success.

D. Approach.

Numbers of predators will be reduced by utilizing diphacinone fish flavored bait stations in the hunting areas. Live trapping will be conducted for feral cats and feral dogs as needed.

E. Location.

Predator reduction will be conducted at Kaohe, Puuanahulu, and Mauna Kea GMAs; and Puu Waawaa CGMA; and Kahua Special Permit Area.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$15,541	\$15,541	\$15,541	\$15,541	\$15,541	\$77,705

Title: Game Population Management  
 Project 3: Maui County  
 Period: 2001-2005

Game Population Management - Maui County

A. Need.

There are no native mammalian predators in Hawaii. Niches for small and medium-sized predators are filled by introduced Indian mongooses, feral dogs and cats and rats. In many instances they are the primary limiting factors on ground-nesting birds. There are no naturally occurring large predators to control these introduced predators. Demand for recreational game bird and game mammal hunting continues to increase, yet populations of game birds and mammals cannot keep pace with demand. One reason for inadequate production is heavy predation losses from introduced mongooses, rats, feral cats and feral dogs. Population management is needed to meet goals of increased game hunting pressure. In order to restore game birds to their carrying capacity in nesting areas, the introduced predators must be severely reduced or eliminated.

B. Objectives.

Restore game bird populations at the Kahakuloa GMA, the Lanai Cooperative GMA, and Molokai Forest Reserve PHA through the control of non-native predators.

C. Expected Results and Benefits.

The reduction in numbers of predators and subsequent increase in game bird reproduction and survival will increase the number of game birds in the Kahakuloa, the Lanai Cooperative GMA, and Molokai Forest Reserve PHA. Reducing predation by 50%, would potentially double the recruitment of young to the game bird population. This increased chick production is expected to result in an additional harvest of 450 game birds per year and an additional 600 hunter-days of recreation, a substantial increase in wildlife recreation opportunities to the people of Maui County.

D. Approach.

Numbers of predators will be reduced by use of diphacinone bait stations and trapping introduced mongooses, rats, feral cats and feral dogs.

E. Location.

Kahakuloa, Game Management Area on Maui, the Lanai Cooperative Game Management Area on Lanai ,and Molokai Forest Reserve Public Hunting Area on Molokai.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000



Title: Game Population Management  
 Project 5: Game Bird Releases - Maui County  
 Period: 2001- 2005

Game Bird Releases - Maui County

A. Need

The demand for recreational game bird hunting continues to increase in Maui. At present there is only one public game bird hunting area on the island, the Kula Forest Reserve, Hunting Unit C. This hunting area is designated as a multi-use recreational area. At present over thirty (30) miles of hiking trails dissect the area with trail users and other recreational users negatively impacting the game population therein. There is a need to develop new areas and increase game bird populations where densities are low. Game bird releases will augment low populations and expedite re-establishing game bird populations.

B. Objectives

To restore game bird populations in the Kahakuloa Game Management Area by stocking the area with releases of cock and hen Ring-necked pheasants.

C. Expected Results and Benefits

Stocking a breeding population of pheasants in the Game Management Area, to augment the existing population, will accelerate the re-establishment of a sustainable population to eventually producing more game bird hunting opportunities.

D. Approach

A total of 200 pheasants will be released annually for the first two years of this project in the Kahakuloa Game Management Area. The birds will be released in a ratio of approximately one cock to ten hens and they will be at least six weeks of age to allow for sex identification. The birds will be released in late spring or summer. The game bird population in the area will be monitored monthly. No game bird hunting will occur in the area for three years following the last release.

E. Location

The game bird restocking will be conducted within the boundaries of the Kahakuloa Game Management Area.

F. Estimated Costs

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5 yr. Total
\$4,500	\$4,500	\$500	\$500	\$500	\$10,500

Title: Game Habitat Management  
 Project 1: Hawaii County - East Hawaii District  
 Period: 2001-2005

Game Habitat Management - East Hawaii District

A. Need.

Much of the game bird habitat in the game management areas in the East Hawaii District has been degraded by the dense growth of alien vegetation. Dense, mature stands of faya bush and guava in the Kapapala Ranch Cooperative Game Management Area (CGMA) offer little to no value as game bird habitat. Removal of this vegetation type will allow more desirable growth to recover that will provide better forage and cover for game birds. Once removed, cleared areas also need to be managed to maintain desirable vegetation stages by mowing, controlled burns or grazing cattle. Managed cattle grazing can be an effective method to maintain habitat with minimal use of manpower and equipment. In areas where managed grazing is not practical, game bird habitat will be maintained by mowing and controlled burns.

B. Objectives.

Improve game bird habitat annually by clearing 50 acres of dense and otherwise undesirable vegetation in each of the cooperative hunting areas of Kapapala and O’okala. Annually clear, plant, and fence food plots equaling 5 acres for game birds in the Kapapala Ranch Cooperative GMA and use cattle grazing and controlled burns to maintain desired vegetation stages.

C. Expected Results and Benefits.

This project will improve, annually, at least 100 acres of wildlife habitat degraded by undesirable growth in the Kapapala and O’okala GMAs and clear, plant and fence 5 acres in the Kapapala Ranch CGMA. The game bird habitat improvement is expected to produce an additional 500 game birds per year and 700 hunter days of recreation. Additionally, enclosure fences around cleared areas will direct the grazing activities of ungulates and create a desired edge effect for game birds. These activities are expected to eventually double the carrying capacity for game birds and reduce the threat of total habitat destruction by wildfire.

D. Approach.

Mature, dense stands of faya bush and guava will be cut and the stumps poisoned by trained technicians in Kapapala Ranch CGMA. Cleared patches will be planted with food crops and areas fenced to control cattle overgrazing. Cattle grazing and burning will be done selectively in pastures to maintain a vegetation stage best suited for bird habitat.

E. Location.

O’okala Cooperative Game Management Area and Kapapala Ranch Cooperative Game Management Area on the island of Hawaii.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	\$55,000



Title: Game Habitat Management  
 Project 2: Hawaii County - West Hawaii District  
 Period: 2001-2005

Game Habitat Management - West Hawaii District

A. Need.

Puuanahulu Game Management Area (GMA) used to support large numbers of feral animals in an extensive dryland forest and it was extremely popular with hunters. However, large wild land fires have eliminated much of the dryland forest in Puuanahulu GMA resulting in significant habitat loss. Areas which were formerly forested are now dense fields of alien fountain grass (*Pennisetum setaceum*). Although Puu Waawaa Cooperative GMA continues to offer excellent public hunting opportunities for feral animals, portions of it have been degraded due to heavy browsing. Planting and protecting seedling stock is necessary to recover portions of the habitat which were lost to fire and/or over-browsing. It is a daunting task considering the slow growth rates of local trees, minimal precipitation, and the tremendous amount of flashy fuel found in these areas. In other areas, much of the game bird habitat has been degraded by the dense growth of vegetation. Clearing some vegetation will promote greater edge effect by providing open areas for game birds to loaf and forage for invertebrates while affording nearby cover.

B. Objectives.

- Plant 2,000 to 3,000 tree seedlings annually to begin to alleviate habitat loss in degraded public hunting areas.
- Where feasible, reduce fire threat to tree planting area by mowing around the site in Puuanahulu GMA.
- Improve game bird habitat annually by mowing 15 acres of dense and otherwise undesirable vegetation in the Kaohe Game Management Area.

C. Expected Results and Benefits.

This project will improve, annually, at least 15 acres of wildlife habitat degraded by undesirable growth in the Kaohe GMA and begin to alleviate habitat loss. These activities are expected to increase the carrying capacity for game birds and reduce the threat of catastrophic habitat destruction by wildfire. Species of shrub/trees planted will provide additional fruit and berries for game birds.

D. Approach.

Annually plant 2,000 to 3,000 shrub/tree seedlings in select areas within Puu Waawaa CGMA and Puuanahulu GMA utilizing protective fences or tree shelters. Tree shelters consist of a four-foot length of plastic pipe which surrounds the tree seedling, thereby preventing feral sheep from browsing on it. Annually mow 15 acres of grass in the Kaohe Game Management Area to improve game bird habitat.

E. Location.

Kaohe and Puuanahulu GMAs, and Puu Waawaa CGMA on the island of Hawaii.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$17,000	\$17,000	\$17,000	\$17,000	\$17,000	\$85,000



Title: Game Habitat Management  
 Project 3: Maui County  
 Period: 2001-2005

Game Habitat Management - Maui County

A. Need

The increased use by the public hunter coupled with the loss of public hunting lands within Maui County has placed greater demand on the remaining public lands for hunting. One means of keeping up with the per capita use of a given area is by increasing the game bird species' carrying capacity of the remaining areas through habitat management.

B. Objectives:

Annually clear and maintain 30 acres of brush and undesirable vegetation at the Kahakuloa GMA in order to provide habitat for doves, francolins and pheasants.

C. Expected Results:

To provide an additional 280 hunter days and a harvest of 250 game birds.

D. Approach:

Undesirable non-native plants such as Christmas berry, haole koa, and kiawe will be cleared with a small bulldozer with some clearing/maintenance done with hand tools. Desirable game bird food plants will be planted in the cleared sites.

Site surveys to locate threatened and endangered plants will be conducted prior to habitat management site selection. Sites for management will be located in areas without threatened and endangered plants, or if threatened and endangered plants are detected they will be protected by fencing.

E. Location:

Kahakuloa Game Management Area on the island of Maui.

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	\$55,000

Title: Game Habitat Management  
 Project 4: Honolulu County  
 Period: 2001- 2005

Game Habitat Management - Oahu

A. Need.

Habitat management is necessary in the Kuaokala Game Management Area (GMA) to improve the feeding, nesting and loafing habitat for game birds. Much of the area is in need of restoration due to a history of inappropriate range management and generally poor soil and weather conditions. The plant species present are dominated by non-native grass species, which provide little food value for game birds unless carefully managed. These grasses grow in dense stands, which offer cover around the edges, but are largely under-utilized because their density provides no clear areas for game bird feeding and loafing.

B. Objectives.

- Convert 10 acres of brushy non-native vegetation to herbaceous game bird habitat per year in Kuaokala GMA, and to maintain these improved areas with cattle grazing and mowing.
- Construct one half mile of fence per year to facilitate range management for the maintenance of game bird enhancement areas.

C. Expected Results and Benefits.

To increase the number of game birds at the Kuaokala GMA in order to provide hunting for 700 hunters per season, with a harvest of 200 birds.

D. Approach.

Site surveys to locate threatened and endangered plants will be conducted prior to habitat management site selection. Threatened and endangered plants will be fenced and excluded from game habitat improvement areas.

Habitat areas will be cleared by bulldozing and/or mowing of thick introduced brush (e.g. Christmas berry) and grass (e.g. molasses grass). As in the past, all native plants will be flagged prior to bulldozing and DOFAW personnel will work with the bulldozer operator to make sure native plants are not disturbed. Seeds of local tree species will be collected for propagation and outplanted when appropriate. Stands of native plants will be protected and enhanced by eliminating non-native weeds. Where appropriate, Paspalum grass, corn and/or millet will be planted to provide plants which provide food and cover for game birds.

Fences will be built and maintained to manage cattle for the maintenance of habitat management areas and, where necessary, to protect listed plants. In areas where mowing is not practical, game bird habitat will be maintained by grazing alone.

E. Location.

Kuaokala GMA.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$19,000	\$19,000	\$19,000	\$19,000	\$19,000	\$95,000





Title: Game Facilities Construction  
 Project 1: Hawaii County - East Hawaii District  
 Period: 2001-2005

Game Facilities Construction - East Hawaii District

- A. Need.  
 Large portions of O’okala, and Kipuka Ainahou Cooperative Game Management Areas (CGMAs) are not utilized by game birds where there is no permanent source of water. Installing additional game bird water units will expand game bird numbers in the CGMAs. Informational signs will be posted to ensure hunter compliance with hunting area boundaries and other hunting regulations. Hunting trends in the Piha section of Hilo Forest Reserve require accurate assessment. A hunter checking station will be built at the trailhead.
- B. Objectives.  
 Enhance game populations and obtain better distribution of game birds. Provide improved information to hunters by posting additional signs and markers.
- C. Expected Results and Benefits.  
 Increase the number and distribution of game birds on O’okala and Kipuka Ainahou GMAs by expanding their range to areas where there is no current permanent water source. This is expected to encourage an estimated 300 hunter trips and an additional harvest of 200 game birds per year.
- D. Approach.  
 Install additional game bird water units in both O’okala and Kipuka Ainahou CGMAs. Two hundred informational signs will be posted where they are needed each year. A hunter checking station will be constructed at lower Piha Trailhead.
- E. Location.  
 O’okala, and Kipuka Ainahou Cooperative Game Management Areas and at other public hunting areas throughout the East Hawaii District of Hawaii Island.
- F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$5,200	\$5,200	\$5,200	\$5,200	\$5,200	\$26,000

Title: Game Facilities Construction  
 Project 2: Hawaii County - West Hawaii District  
 Period: 2001-2005

Game Facilities Construction - West Hawaii District

A. Need.

Large portions of Puu Waawaa Cooperative Game Management Area (CGMA) receive less than 10 inches of annual rainfall and consist of dense stands of highly flammable fountain grass (*Pennisetum setaceum*) which creates a serious fire hazard and is very poor game bird habitat. In order to improve the area for game birds, it is necessary to reduce the dense stands of grass. This could be accomplished by mowing, but it is far more cost effective to utilize livestock to trample and graze the area. Bringing a waterline into these under-utilized game bird areas would provide water for game bird guzzlers and livestock water troughs, making the area more attractive to both livestock and game birds, thereby creating large expanses of new game bird habitat. Informational signs are needed to promote hunter compliance with hunting area boundaries and other hunting regulations.

B. Objectives.

Enhance populations and obtain better distribution of game birds by installing two miles of waterline and 10 game bird guzzlers in the Puu Waawaa CGMA. Promote hunter compliance by installing additional informational signs and markers.

C. Expected Results and Benefits.

Increase in the number and distribution of game birds in Puu Waawaa CGMA by expanding their range to areas where there is no current permanent water source. Game birds will also benefit from livestock grazing and trampling dense vegetation breaking up the area and creating better habitat for invertebrates which game birds thrive on. The result of this improvement will be increased game bird harvest and hunter success as well as a reduced fire threat to the remaining dryland forest in the Puu Waawaa area.

D. Approach.

Lay two miles of high density polyethylene pipe along the Puu Waawaa CGMA makai road (Old Kiholo Road) in Year 1 (FY01) and install 10 lateral lines that terminate at a gamebird guzzler annually. The waterline will also supply livestock water troughs placed intermittently in strategic locations.

Place informational signs at various hunter checking stations and/or entry points to hunting areas.

E. Location.

Puu Waawaa Cooperative Game Management Areas and at other public hunting areas throughout West Hawaii District.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$9,000	\$9,000	\$9,000	\$9,000	\$9,000	\$45,000

Title: Game Facilities Construction  
 Project 3: Maui County  
 Period: 2001-2005

Game Facilities Construction - Maui County

- A. Need.  
 The expansion of the Kula Forest Reserve (Hunting Unit C), the increases in hunting pressure within the Molokai Forest Reserve (Hunting Units C, D, and E), and the national recognition of the Lanai hunting program have created a need for additional facilities and infrastructure for recreational hunting, such as water units, signs and markers, and additional fencing.
- B. Objectives.  
 Establish three hunter check stations, markers and signs in the Molokai Forest Reserve PHA to obtain better distribution of hunters and hunter use, and obtain harvest data.  
 Construct game bird water storage type units on Maui and Molokai and additional pipeline troughs on Lanai to encourage game birds to utilize more of the habitat available to them.
- C. Expected Results and Benefits.  
 The construction of water units is expected to enhance survival of game birds during the dry season. Buildings and structures, signs and markers, will promote better management and utilization of public hunting areas within Maui County.
- D. Approach.  
 Three drop box type hunter self check stations on footings will be constructed at primary entrances in the Molokai Forest Reserve PHA, (years 1, 2 and 3). One storage type game bird water unit will be constructed in the Molokai Forest Reserve PHA (Year 3 (FY03)). On Maui, two storage-type game bird water units will be constructed in the Kahakuloa and Kula Forest Reserve hunting areas (years 2 and 4). On Lanai, five pipeline trough game bird water units will be installed (years 1, 2, 3, 4 and 5). Twenty-five signs and markers will be placed per year, per island where needed.  
 Potential construction sites will be inspected for native plant species and located to avoid impacts to listed species. Site surveys will be conducted prior to building water units and fences in order to avoid impacts to any listed plants. Hunter checking stations, signs, and markers will be located to avoid threatened and endangered plants.
- E. Location.  
 Kahakuloa Game Management Area and Kula Forest Reserve Forest Reserve on Maui, Molokai Forest Reserve Public Hunting Area on Molokai, and Lanai Cooperative GMA on Lanai.
- F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$2,012	\$3,812	\$6,512	\$3,112	\$1,312	\$16,760

Title: Game Facilities Construction  
 Project 4: Honolulu County  
 Period: 2001- 2005

Game Facilities Construction - Oahu

A. Need.

Additional game bird guzzlers are needed at Kuaokala GMA to encourage game birds to establish more uniform population distribution. The construction and/or replacement of hunter checking stations is necessary to monitor hunter use of public hunting areas. Buildings are needed for protection and storage of game management materials and supplies. Waterline construction will improve range management at Kuaokala GMA.

B. Objectives.

- Construct storage structures and additions as needed to facilitate game management programs. Facilities may be located at Kawainui Marsh, Makiki Baseyard and/or Kuaokala GMA.
- Construct/replace one game bird guzzler per year for five years at Kuaokala GMA to obtain better distribution of game birds.
- Construct/replace one hunter check-in station per year for five years at the entrance to public hunting areas at existing cleared sites.
- Install one-half mile of waterline at Kuaokala GMA per year.

C. Expected Results and Benefits.

Five additional game bird guzzlers are expected to distribute game birds into 40 acres of under utilized-habitat at Kuaokala GMA. Hunter check stations will provide hunter effort and success data on 5200 acres of public hunting areas. Storage facilities will enhance game management operations capability. Waterline construction will allow specific range management prescriptions to improve game bird habitat and hunter access.

D. Approach.

Game bird guzzlers will be constructed and/or replaced using an existing design which includes a cattle and pig proof perimeter fence enclosing a metal roofed structure which drains into a catchment tank attached to a livestock watering tray. Waterline installation will be laid above ground with no grading or site disturbance necessary. Potential installation sites will, none-the-less, be inspected for native plant species and located to avoid impacts to listed species. The hunter check-in stations will be located at existing, cleared sites. They will be located to avoid threatened and endangered plants. Storage facilities will utilize steel shipping containers and frame structures covered by a galvanized metal roof.

E. Location.

The game bird guzzlers will be located at Kuaokala GMA. The hunter check stations will be located at Poamoho, Waianae Kai, Nuuanu, and Pupukea Forest Reserves. Storage buildings will be located at Makiki baseyard, Kawainue baseyard, and Kuaokala GMA. Waterline will be installed at Kuaokala GMA.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000



Title: Game Facilities Construction  
Project 5: Kauai County  
Period: 2001-2005

Game Facilities Construction - Kauai County

A. Need:

The replacement of a 20,000 gallon water tank, 6,000 square foot rain catchment and 1.5 mile of pipeline that was begun during the previous segment needs to be completed. Additional hunter campsites are needed to increase hunting pressure in under utilized remote areas where feral ungulates need to be controlled. Cattle guards, fencing and gates are needed to provide access to hunters in Kekaha Game Management Area, yet keep feral livestock out of adjacent forest reserve and State Park lands. Game range study exclosures and plant protection fences will be needed in Puu Ka Pele, and Na Pali Kona Forest Reserves, two Natural Area Reserves, and portions of State Parks to protect rare native plants from damage by feral herbivores. Additional signs will be needed to effectively manage public hunting areas.

B. Objectives:

- Complete replacement of 1,000 gallon water tank, rain catchment and pipeline.
- Encourage hunting pressure in remote areas where feral ungulates need to be controlled, and are under-utilized, by providing hunter campsites.
- Provide hunter access to Kekaha GMA without exposing forest reserves to trespass cattle.
- Protect remnant endangered plants in highly degraded habitats from ungulate damage by constructing fenced exclosures, thereby allowing for sustained yield hunting in surrounding areas.
- Post appropriate informational signs and markers to effectively manage hunting areas.

C. Expected Results and Benefits:

Completion of the water tank, rain catchment and pipeline in Kekaha GMA, that have deteriorated in the past 30 years, will provide adequate water for game mammals and birds. Construction of hunter camp sites is expected to increase hunting pressure on feral game populations in remote areas where they negatively impact native ecosystems. Hunters will be more able to access and use areas in remote areas where game populations are under-utilized. The construction of cattle guards, gates and fences will enable hunters to enter game management areas, but prevent livestock from entering adjacent forest reserves and State Parks. Exclosure fences will protect isolated threatened and endangered plants from feral animals, yet enable hunters to utilize the game resources in surrounding highly degraded habitats. Appropriate signs will facilitate management of hunters in hunting areas.

D. Approach:

A 20,000 gallon water storage tank, 6,000 square foot rain catchment and 1.5 miles of pipeline will be completed in Kekaha GMA to replace a 30 year old deteriorated system. Three additional hunter campsites will be constructed in Waimea Canyon, and one in Na Pali Coast State Park, with required composting toilets. Three cattle guards, with gates and 0.2 miles of fencing will be constructed on entrance roads to Kekaha Game Management Area. Four hundred informational, boundary and safety zone signs and markers (80 per year) will be posted. A total of 0.2 miles of fencing will be used to create small exclosures to protect threatened and endangered plants within GMAs and forest reserves, to enable continued hunting while protecting endangered plants.

E. Location:  
Kauai County, Kekaha and Mokihana Ridge Game Management Areas.

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$225,000

Title: Game Surveys and Inventories  
Project 1: Game Mammal Surveys  
Job 1: Hawaii County - East Hawaii District  
Period: 2001-2005

Game Mammal Surveys - East Hawaii District

A. Need.

With the loss of former game mammal hunting areas to competing environmental concerns such as the Natural Area Reserves System (NARS) and the court ordered Mauna Kea Sheep Eradication Program, demands on remaining public hunting areas (PHAs) have been increased. Public hunting has dramatically increased in many areas, as more hunters compete for the same resources in fewer hunting areas. Consequently, there is an increased need to obtain current data on hunter activities to measure the demand, evaluate the distribution and composition of herds in terms of numbers, sex and age; examine habitat use; and monitor diseases.

Another need is to monitor the impacts of feral game mammals on range quality and determine movements of feral pigs in and around sensitive native wildlife and plant habitats. This information is necessary to ensure that game mammal hunting is conducted to balance recreational opportunities with conservation and restoration of rare and endangered native species.

B. Objectives.

- Determine the status and distribution, population densities, reproductive success, status and trends of game mammals in the East Hawaii District.
- Determine game mammal hunter pressure, success and the effect of hunting on game mammal distribution and numbers.
- Monitor diseases and parasitism in game mammals.
- Survey new areas as potential candidates for additional public hunting areas.

C. Expected Results and Benefits.

The data collected at hunter check-in stations and from surveys of game mammal populations will be combined with information from previous years to provide a basis for management, development, maintenance actions, and proposals for research involving game mammals and their habitat.

The information produced will be used as a basis for wildlife management recommendations which maximize wildlife recreation opportunities while insuring compatibility with forest and wildlife management objectives.

D. Approach.

Quantitative information on game mammal populations, distribution, reproductive success and impact on habitat as well as hunter effort and success will be gathered annually and analyzed. Survey methods for particular species which have been developed to monitor populations or indices of abundance shall be used. These include aerial censuses using fixed winged aircraft or helicopter, strip or total area counts on the ground, density indices based upon the occurrence of sign correlated to habitat type. Diseases and parasites of game mammals and game birds will be monitored as necessary in coordination with the Hawaii State Department of Agriculture.

E. Location of Work:  
Island of Hawaii, East Hawaii District

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$17,352	\$17,352	\$17,352	\$17,352	\$17,352	\$86,760

Title: Game Surveys and Inventories  
Project 1: Game Mammal Surveys  
Job 2: Hawaii County - West Hawaii District  
Period: 2001-2005

Game Mammal Surveys - West Hawaii District

A. Need.

With the loss of former game mammal hunting areas to competing environmental concerns such as the Natural Area Reserves System (NARS) and the court ordered Mauna Kea Sheep Eradication Program, demands on remaining public hunting areas (PHAs) have been increased as more hunters compete for the same resources. Furthermore, there is growing public scrutiny over potential conflicts between native and non-native plant and animal issues within our existing public hunting areas. Consequently, there is an increased need to obtain current data on hunter activities to measure the demand, evaluate the distribution and composition of herds in terms of numbers, sex and age; examine habitat use; and monitor diseases. Another need is to monitor the impacts of feral game mammals on range quality and determine movements of feral pigs in and around sensitive native wildlife and plant habitats. This information is necessary to ensure that game mammal hunting is conducted to balance recreational opportunities with conservation and restoration of rare and endangered native species.

B. Objectives.

- Determine the status and distribution, population densities, reproductive success, status and trends of game mammals on the island of Hawaii, West Hawaii District.
- Monitor habitat condition and assess game mammal carrying capacity in PHAs.
- Determine game mammal hunter pressure and success, and the effects of hunting on game mammal distribution and numbers.
- Survey new areas as possible candidates for additional game management areas.
- Monitor diseases and parasitism in game mammals.

C. Expected Results and Benefits.

The data collected at hunter check-in stations, and surveys of game mammal populations will be combined with information from previous years to provide a basis for management, development, maintenance actions, and proposals for research involving game mammals and their habitat.

The information produced will be used as a basis for wildlife management recommendations which maximize wildlife recreation opportunities while insuring compatibility with forest and wildlife management objectives.

D. Approach.

Quantitative information on game mammal populations, distribution, reproductive success and impact on habitat as well as hunter effort and success will be gathered annually. Survey methods for particular species which have been developed to monitor populations or indices of abundance shall be used. These include aerial censuses using fixed winged aircraft or helicopter, strip or total area counts on the ground, density indices based upon the occurrence of sign correlated to habitat type, and monitoring animal movement/distribution by radio tracking from the ground and/or air. Diseases and parasites of game mammals will be monitored as necessary in coordination with the Hawaii Department of Agriculture.

E. Location of Work:  
Island of Hawaii, West Hawaii District

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$18,048	\$18,048	\$18,048	\$18,048	\$18,048	\$90,240

Title: Game Surveys and Inventories  
Project 1: Game Mammal Surveys  
Job 3: Maui County  
Period: 2001-2005

Game Mammal Surveys - Maui County

A. Need.

With an ever increasing public demand for recreational game mammal hunting within the County of Maui brought about in part by heightened national recognition of the program, coupled with the previous loss of lands available for hunting, the quality and quantity of the hunt is declining. An continued influx of the environmentally minded seeking the wonders of the outdoors has placed additional demands on game habitats.

Data on the status and trends of game mammal populations and the condition of their habitats are needed to manage these populations effectively and to maximize recreational hunting opportunities while assuring compatibility with other forest and wildlife management objectives. Hunter checking stations provide information on hunting pressure and animal harvest. This information is necessary to measure the effectiveness of habitat management activities.

B. Objectives.

- Determine the distribution, population densities, reproductive success, status and trends of game mammals in Maui County.
- Monitor the impact of game mammals on their habitats.
- Determine game mammal hunter pressure and success, and the effects of hunting on game mammal distribution and numbers.
- Monitor the effects of weather, habitat improvements and hunter's activities on game mammal habitats.
- Monitor diseases and parasitism in game mammals.

C. Expected Results and Benefits.

The gathering, interpretation, evaluation and reporting of the information will provide a basis for management, development, maintenance and proposals for research involving game mammals and their habitats. The information produced will be used to evaluate past management practices and hunting seasons to form the basis for the design and implementation of new programs, public hunting seasons and regulations. The information will also be used to evaluate the effects of game mammals on their ranges in terms of adverse impacts on native and non-native habitat and to take action to avoid any negative impacts. The data will be used to design and implement programs which maximize hunter opportunities and success, manage game mammals and their habitats more intensely for these purposes while protecting native habitat and native non-game species.

D. Approach.

Fifteen hunter checking stations will either be manned or operated on a self-checking basis in the district to gather hunter harvest data, collect biological data, and monitor diseases and parasites. Telephone and mail hunter interviews will augment checking station work. Surveys of game mammals will be made using techniques applicable to particular species or habitats to determine species abundance, herd composition, distribution, reproductive success and adaptation to habitat. Habitat conditions will be assessed through the use of

exclosures and line transects in cooperation with other agencies. Game mammals will be sampled in the field for the presence of disease or parasites in coordination with veterinarians. Data will be used to produce recommendations for management, development, research projects and for possible hunting season regulation changes. Heavily used habitats will be located through the use of radio telemetry and those data will be used in making future management decisions.

E. Location.

Private and public hunting areas on the islands of Maui, Molokai and Lanai.

F. Estimated Cost.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$49,310	\$49,310	\$49,310	\$49,310	\$49,310	\$246,550

Title: Game Surveys and Inventories  
Project 1: Game Mammal Surveys  
Job 4: Honolulu County  
Period: 2001- 2005

Game Mammal Surveys - Oahu

A. Need.

Data on the status and trends of game mammal populations and the condition of their habitats are needed to manage these populations effectively and to maximize recreational hunting opportunities, while assuring compatibility with other forest and wildlife management objectives. Information on hunter effort and success is needed to assess game mammal population trends. Habitat surveys are needed to assess game mammal habitat conditions, the status of watershed quality and condition, and the effects these introduced animals may be having on native vegetation communities.

B. Objectives.

- Determine hunter participation and hunter success in 14 public hunting areas (PHAs) and one Game Management Area (GMA) on Oahu.
- Monitor range conditions of feral pigs and goats.
- Determine game mammal population status in hunting areas.

C. Expected Results and Benefits.

Information collected on hunter effort and success will be used to assess game mammal population trends and will provide data on which to base recommendations for hunting seasons, which maximize hunting recreation opportunities while insuring protection of watersheds and native vegetation.

Habitat surveys results will be used to assess game mammal habitat, quantify the status of watershed conditions in public hunting areas, and the measure the effects that game animals may be having on native vegetation communities.

D. Approach.

Hunter participation and game harvest information will be collected on a monthly basis from 12 hunter check-in stations. Effort and success data will also be collected by questioning individual hunters in the field or over the phone, and by working with the local hunters associations and clubs.

Aerial surveys will be conducted to obtain trends in populations of feral goats in the Waianae Mountains.

Trail surveys will be made on foot to assess feral pig and goat distribution and abundance. Habitat assessments will be made based on animal sign along transects, and observations of vegetation type and condition. Surveys will utilize standardized sampling methods.

Radio telemetry will be utilized to track and map movements of individual animals.

E. Location.

Public hunting areas on Oahu.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$100,000

Title: Game Surveys and Inventories  
Project 1: Game Mammal Surveys  
Job 5: Kauai County  
Period: 2001-2005

Game Mammal Surveys - Kauai County

A. Need.

Measurement of game mammal population trends, habitat conditions and the levels of hunting pressure are needed to effectively manage the game resources for sustained yield hunting where it is appropriate, and to protect native ecosystems. Measurements of hunting pressure, in terms of hunter trips made, total game killed, and hunter success are needed to gauge the effectiveness of the public hunting program for supplying recreational demands. In certain areas where pristine forest and rare plants need to be protected from feral animal damage, measurement of animal impacts and the degree of habitat damage is necessary to focus animal reduction efforts for ecosystem protection.

B. Objectives.

- Measure the status of game mammal populations, the condition of their habitats, the levels of hunting pressure, and numbers of game mammals harvested to manage game mammals more effectively.
- Analyze survey data to provide a basis for making recommendations for hunting seasons and/or bag limits that maximize recreational benefits in appropriate areas, while providing for the protection of native ecosystems and threatened and endangered plants in areas that need to be preserved.

C. Expected Results and Benefits.

The information collected will be used to measure the effectiveness of game habitat development projects and hunting season management in meeting the annual recreational goal of 12,000 hunter trips, and the harvest of 700 feral goats, 600 feral pigs and 100 black-tailed deer on Kauai public hunting areas. The information collected in pristine forest areas will be used to focus the need for animal control for ecosystem protection.

D. Approach.

Sixteen hunter checking stations will be maintained throughout game mammal hunting seasons, to collect information on total number of hunter trips made, and numbers and species of game mammals taken in each hunting unit. Habitat conditions and ungulate impacts on both native and introduced vegetation will be monitored on established browse use/coverage transects, and with photo-stations. Vegetation at game range study enclosures will be measured for continued long term coverage/use trends. Data collected on game harvests, game population trends and the results of vegetation condition surveys will be analyzed and subsequently used for recommendations on hunting season and bag limit changes. Recommendations will be targeted to achieve the management objectives of each hunting unit, whether to maximize recreational opportunity where lands are zoned for sustained yield hunting, or to minimize habitat damage in areas where lands are zoned for protection of native ecosystems and threatened and rare plants.

E. Location.

Island of Kauai

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$44,000	\$44,000	\$44,000	\$44,000	\$44,000	\$220,000

Title: Game Surveys and Inventories  
 Project 2: Game Bird Surveys  
 Job 1: Hawaii County - East Hawaii District  
 Period: 2000-2005

Game Bird Surveys - East Hawaii District

A. Need.

There is a continual loss of game bird hunting areas to competing environmental concerns such as the Natural Area Reserves System (NARS) and the court ordered Mauna Kea Sheep Eradication Program. Consequently, demands on remaining public hunting areas (PHAs) have increased. Public hunting is concentrated in choice areas, as more hunters compete for the same resources in less acreage. It is important to obtain current data on hunter activities to measure use, evaluate habitat, and monitor diseases.

B. Objectives.

- Determine the status and distribution, population densities, reproductive success, status, and trends of game birds in East Hawaii.
- Monitor habitat conditions.
- Determine hunter pressure and success.
- Survey new areas as possible candidates for additional public hunting areas.
- Monitor diseases and parasitism.

C. Expected Results and Benefits.

The data collected at hunter check-in stations, along with information from previous years, will provide a basis for management, development, and maintenance actions. Game birds will be checked for pathogens to determine the effects of parasitism and disease as limiting factors. The resulting information will be used as a basis for wildlife management recommendations to maximize wildlife recreation opportunities.

D. Approach.

Quantitative information on game bird populations, distribution, reproductive success and impact on habitat as well as hunter effort and success will be gathered annually. Diseases and parasites of game birds will be monitored as necessary in coordination with the Hawaii State Department of Agriculture. New hunting areas will be actively sought.

E. Location of Work:

Island of Hawaii, East Hawaii District

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$ 11,200	\$ 11,200	\$ 11,200	\$ 11,200	\$ 11,200	\$56,000

Title: Game Surveys and Inventories  
 Project 2: Game Bird Surveys  
 Job 2: Hawaii County - West Hawaii District  
 Period: 2001-2005

Game Bird Surveys - West Hawaii District

A. Need.

With a yearly increase in the demand for game bird hunting opportunities, there is a need to improve the quality of the hunting experience by maximizing productivity and increasing hunting opportunities and hunter success.

B. Objectives.

- Monitor the distribution, population densities, reproductive success, status and trends of game birds in West Hawaii.
- Determine hunter effort and success, and the effects of hunting on game bird distribution and numbers.
- Evaluate the success of implemented habitat improvement and predator control programs on game bird productivity and hunter success.
- Assess the effects of limiting factors, including disease, parasitism, predation, and weather, on the distribution density and reproductive success of game birds and on their habitats.

C. Expected Results and Benefits.

The surveys proposed will provide the basis to formulate and design new management programs that eventually lead to improved public hunting opportunities.

Data produced from surveys will aid in the evaluation of management practices and techniques, and enable us to identify potential lands suitable for use as game bird hunting areas.

Data obtained will be combined with information gathered in previous years for use in making wildlife management decisions.

D. Approach.

Quantitative data on game bird populations, distributions, reproductive success, and hunter effort and success will be obtained from surveys and hunter checking stations. Surveys may incorporate the use of aerial surveys, ground based strip-transect routes, call counts, and telephone and/or mail surveys. Other lands with a potential for eventual incorporation into public hunting will be surveyed and pursued.

E. Location of Work:

Island of Hawaii, West Hawaii District

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$90,000

Title: Game Surveys and Inventories  
Project 2: Game Bird Surveys  
Job 3: Maui County  
Period: 2001-2005

Game Bird Surveys - Maui County

A. Need.

With a yearly increase in demand for game bird hunting opportunities coupled with the loss of lands for public game bird hunting on Maui and Molokai, hunting in the terms of quality and quantity are on a decline. An increase of non-hunting, multi-use activities within the same public game bird hunting areas on Maui and Lanai have negatively impacted the hunting program and adversely affected game bird survival, productivity, and availability. Therefore we need to manage game bird resources and their habitats more intensely in order to maximize productivity, increase hunter opportunities and harvest, and to improve the quality of the hunting experience.

B. Objectives.

- Monitor the distribution, population densities, reproductive success, status and trends of game birds in the County of Maui - Maui, Lanai and Molokai.
- Determine hunter effort and success, and the effects of hunting on game bird distribution and numbers.
- Evaluate the success of habitat improvements in improving game bird productivity and hunter success.
- Assess the effects of human activities and land uses on game bird distribution and reproductive success in terms of alterations to their habits and habitats.
- Determine the effects of limiting factors, such as disease, parasitism, predation and weather, on the distribution, density, and reproductive success of game birds and their habitats.

C. Expected Results and Benefits.

The gathering, interpretation, evaluation, and reporting of the information will provide a basis for game bird management, development, maintenance and proposals for research programs involving game birds and their habitats within Maui County, and to make recommendations concerning compatible and non-compatible uses within the public game bird hunting areas.

Game bird survey information will be used to evaluate efficacy of previous management practices and hunting seasons. This information will form the basis for the design and implementation of new management programs and public hunting season regulations. It will also be utilized to seek out new areas for game management. Studies of the causes of decreasing game bird productivity will provide answers for management and the means for reversing such trends.

Survey information will be used to identify potential lands suitable for use as game bird hunting areas, which will allow us to actively pursue development of additional lands for the purpose of public hunting to replace lost areas.

D. Approach.

Hunter check stations on Maui, Molokai and Lanai will be run on a self check basis throughout the game bird season for the collection of harvest data. Distribution maps will be

maintained to show current range of established game birds. Game bird population densities, distribution and brood survival will be monitored to assess the status and population trends. Game bird habitats on public hunting areas and potential public game bird hunting areas will be surveyed to determine the effect of the environment and hunter's activities on game bird production and hunting. The value of habitat improvements within public hunting areas in Maui County will be assessed and utilized in planning further improvement and/or development projects. Brood survivals and total game bird densities will be correlated with rainfall within the game management areas. Reports with recommendations for management programs, habitat development, public hunting area acquisition, and lease or Cooperative Agreement will be prepared periodically and annually.

E. Location.

Public hunting areas on the islands of Maui, Molokai, and Lanai

F. Estimated Cost:

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$30,000

Title: Game Surveys and Inventories  
 Project 2: Game Bird Surveys  
 Job 4: Honolulu County  
 Period: 2001- 2005

Game Bird Surveys - Oahu

A. Need.

Data on the status and trends of game bird populations and the condition of the habitats in which they are found are needed to manage these populations effectively and to maximize recreational hunting opportunities. Analysis of hunting effort and success and population survey data will provide information on species distribution and abundance, habitat trends in game bird hunting areas and the effectiveness of habitat management programs.

B. Objectives.

- Monitor game bird distribution and abundance in the public hunting and game management areas on Oahu.
- Determine hunter effort and success in the Kuaokala GMA and the Mokuleia and Makua Keaau PHAs.

C. Expected Results and Benefits.

The surveys will provide data on game bird population distribution, trends, and limiting factors, which can be used as a basis for wildlife management actions. Habitat survey results will be used regulate hunter pressure on game bird populations.

D. Approach.

Game birds will be surveyed by line transect methods and mapping of individual birds. Checking station data will be analyzed to determine hunter effort and success. Habitat assessments will be made based on vegetation type and condition.

E. Location.

Kuaokala, Mokuleia and Makua Keaau public hunting areas, Oahu.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$57,500

Title: Game Bird Surveys and Inventories  
 Project 2: Game Bird Surveys  
 Job 5: Kauai County  
 Period: 2001-2005

Game Birds Surveys - Kauai County

A. Need.

The monitoring of game bird populations, their habitats and levels of hunting pressure are needed to effectively manage the resources for maximum public benefit. Measurements of hunting pressure, in terms of hunter trips made, and hunter success ratios are needed to measure the effectiveness of recent habitat improvements and management actions. Investigation into the cause of poor game bird productivity needs to be continued. Although the stage in the game bird life cycle where losses are occurring has been determined, the specific cause(s) have not.

B. Objectives.

- Measure the status of game bird populations, the levels of hunting pressure, and the numbers of game birds harvested on Kauai's public hunting areas
- Determine the cause of small clutch sizes, low hatchability and poor chick survival of pheasants and francolins in public hunting areas.

C. Expected Results and Benefits.

The information collected will measure the effectiveness of habitat development projects and hunting season management in meeting our annual harvest goal of 1.0 game bird per hunter trip in Kauai public hunting areas. Finding the cause of game bird productivity problems may lead to management actions that can reverse the downward trend. Survey results will be analyzed and used to make game bird management recommendations.

D. Approach.

Six hunter checking stations will be maintained throughout the game bird hunting season to collect information on total hunter trips made, hours hunted, and the numbers and species of game birds taken in each area. Data will be analyzed to measure hunting pressure, hunter success, and species composition for each area. Pre-hunting season surveys will be made in game management areas with volunteers and their bird dogs to determine relative game bird availability. Hunting season recommendations and habitat management decisions will be based upon the results of those surveys. Up to three wild caught francolin pairs will be captured and maintained in captivity to compare their clutch sizes and hatching success with what has been found in the wild. An attempt to confirm the cause of low hatchability, and poor chick survival will be made by identifying whether it is nutrition, disease, or habitat quality that is causing low productivity.

E. Location.

Kekaha, Puu Ka Pele, Mokihana Ridge, and Wailua GMAs on the island of Kauai.

F. Estimated Costs.

Year 1 (FY01)	Year 2 (FY02)	Year 3 (FY03)	Year 4 (FY04)	Year 5 (FY05)	5-yr. Total
\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$40,000



Title: Game Mammal Research  
Project 1: Development of Ungulate Monitoring Techniques  
Period: 2001-2002

Game Mammal Research - Development of Ungulate Monitoring Techniques

A. Need.

A method for quickly assessing ungulate impact on vegetation structure and composition has recently been developed by New Zealand biologists. This has been tested in pilot studies on The Nature Conservancy's Pu'u Ali'i and Kamakou Preserves on Molokai and in the Hanawi Preserve on Maui to determine whether this methodology is applicable to Hawaiian forests. Unfortunately, the ungulate densities were found to be very low in the pilot areas, which will make it difficult to make accurate inferences about likely ungulate abundance/impact relationships in areas where ungulate densities are much higher and where the goal of ungulate management is not just to minimize ungulate impacts, but also to provide hunting opportunities. In order to obtain this information, it is necessary to extend field testing to include forested areas in which ungulate densities, particular pigs, are higher and more akin to those likely to exist in Game Management Areas

B. Objectives.

- Apply the New Zealand ungulate indices and impact assessment methodology in Puu Waawaa Forest Bird Sanctuary, where there are moderate densities of feral pigs, to test the applicability of the method in assessing ungulate abundance and impacts on vegetation in Hawaii.
- Re-measure ungulate activity and impacts approximately 12 months after pig numbers in the area are reduced to assess the extent and speed of the vegetative response.

C. Expected Results and Benefits.

This research will provide a baseline against which the effectiveness of future management (for conserving vegetation structure) can be assessed as well as providing information on the impact/density relationships of feral ungulates on vegetation in moderate to high ungulate density areas. Re-measurement 12 months after severe reduction in feral ungulates will provide data on the effectiveness of the ungulate removal program on the nature, and the extent and speed of the vegetative response.

D. Approach.

A series of ten to twenty, 500-meter transects will be established randomly throughout the sanctuary. The number of transects will depend upon funding and the amount of field assistance available. The transects will be permanently marked. Animal activity levels will be recorded using methods established by other researchers in Hawaii. At every second station along the activity transect, a two meter vegetation plot will be established. The presence or absence of woody plants will be recorded by species and by tier, in four tiers, for virtually all broad leaf tree species other than *Styphelia* and for selected grassy and herbaceous species, ferns and vines (e.g. *Astelia freycinetia*). In each tier, the number of the two species of tree ferns (*Cibotium menziesii*, *Cibotium glaucum*) that are consistently and frequently targeted by pigs will be counted, using the height to the top of the tightly curled fronds in the crown to delimit tiers. The list of indicator species recorded on Molokai and Maui will be modified because tree ferns, a preferred pig food, are extremely rare in the sanctuary. Initial trials will have begun in FY00.

E. Location.  
Puu Waawaa Forest Bird Sanctuary (1,540 hectares)

F. Estimated Cost.

FY01	FY02	FY03	FY04	FY05	5 Yr. Total
\$24,000	\$24,000	-	-	-	\$48,000

Title: Game Mammal Research  
 Project 2: Development of Techniques to Measure Hunter Effort and Success  
 Period: 2003 - 2005

Game Mammal Research - Development of Techniques to Measure Hunter Effort and Success

A. Need.

Although hunting data are routinely collected at both manned and unmanned hunter check stations, it is uncertain whether these data accurately represent hunter effort and success. Our methods of collecting and compiling hunter effort and success data need to be evaluated so that we can more effectively serve the hunting public. Unmanned checking stations, i.e. mail boxes with forms for hunters to fill out as they enter and leave the hunting area, are much less expensive than manned stations, but if the data they provide are inaccurate, they may not be cost effective. If the data we are currently collecting are not an accurate indication of hunter use and success, other methods need to be developed.

B. Objectives.

- To determine the reliability of hunter effort and success information that is presently being gathered at hunter checking stations.
- To ascertain if other methods such as mail or telephone surveys are needed to obtain accurate information on hunter effort and success.
- To develop other methods of determining hunter effort and success data if a need is identified.

C. Expected Results and Benefits.

A determination of the reliability of current hunter effort and success data obtained using current methods and whether or not other methods are needed to obtain accurate information on hunting in Hawaii.

D. Approach.

Data from manned and unmanned hunter checking stations will be compared to data gathered by mail, telephone or point of sale surveys, using standardized survey techniques. Data will be gathered and different techniques tested over a three year period (2003-2005). Efficiency of the different methods will be evaluated using standard statistical analysis and a comparison of costs for different techniques.

E. Location.

State-wide application.

F. Estimated Cost.

FY01	FY02	FY03	FY04	FY05	5 Year Total
-	-	\$24,000	\$24,000	\$24,000	\$72,000

Section D. Summary of Activities and Costs