

## **JOB PROGRESS REPORT RESEARCH PROJECT SEGMENT**

**STATE:** Territory of Guam

**PROJECT NO.:** W-1-R-6  
**SUBPROJECT NO.:** W-1  
**STUDY NO.:** 1  
**JOB NO.:** 1

**JOB TITLE:** Determination of Current Population Size and Distribution of Guam Deer  
(1460)

**PERIOD COVERED:** October 1, 1997 to September 30, 1998

### **SUMMARY**

Official logs with deer harvest statistics for Andersen Air Force Base (AAFB) were examined and revealed a total of 3,481 hunter sorties, a harvest of 87 deer, and a harvest rate of one deer per 40.0 hunter-days. Population trend data obtained with spotlight counts at Pati Point, AAFB showed a significant increase ( $P < 0.001$ ) in deer numbers, with an average of 13.5 animals recorded per km during counts. On Naval Ordnance Annex (NOA) spotlight counts revealed a non-significant increase ( $P > 0.05$ ) in deer numbers, from 1.9 animals recorded per km in FY97 to 2.4 in FY98. Spotlight counts were expanded to the Munitions Storage Area (MSA; formerly the Conventional Weapons Storage Area) on AAFB. Revision of Guam's existing deer hunting regulations are ongoing in an attempt to increase deer take and reduce extensive habitat damage, especially on military lands.

### **BACKGROUND**

The Guam deer (*Cervus mariannus*), or Philippine deer, has been under investigation by the Division of Aquatic and Wildlife Resources (DAWR) since 1961 (DAWR 1961-1997). Preliminary information on distribution, population trends, and biology appeared in Wheeler (1979). Deer hunting statistics have been compiled annually since 1968. Guam has a split deer hunting season, running from October 1 to December 31 and from September 1-30. There is a bag limit of one antlered deer per season per license holder exclusive of any special harvest.

### **OBJECTIVES**

To determine the current size and distribution of the deer population on Guam and to monitor population trends.

### **PROCEDURES**

1. Conduct monthly spotlight counts on AAFB and NOA, and periodic counts elsewhere on the island.
  - a. Record number, sex, age, and group composition.
  - b. Analyze count data and compare with previous data to discern population trends.
2. Monitor hunter participation and harvest during the legal hunting season.

3. Collect biological data from animals killed during the hunting season and from incidental sources such as road kills or confiscated animals.

## RESULTS

### Deer Hunting Statistics

Records of hunting activity and harvest were kept by officials at AAFB during the deer hunting season (Table 1). According to hunter logs from AAFB, 1,647 hunter-days (2777 sorties; gun hunting only) were expended at Northwest Field (NWF) and resulted in the harvest of 82 deer. At Andersen South, 15 hunter-days (52 sorties; bow hunting only) were registered, with no deer taken. Hunting areas on the main portion of the base (MSA, Tarague basin, near the landfill, and areas north and east of the flight-line) recorded 483 hunter-days (652 sorties; primarily bow hunting), with five deer harvested. The Naval Computer and Telecommunications Area Master Station (NCTAMS) was closed to all hunting this year.

Table 1. Hunter effort and deer taken on AAFB during FY98, based on official hunter logs.

|   | <u>Oct</u> | <u>Nov</u> | <u>Dec</u> | <u>Jan</u> | <u>Feb</u> | <u>Mar</u> | <u>Apr</u> | <u>May</u> | <u>Jun</u> | <u>Jul</u> | <u>Aug</u> | <u>Sep</u> | <u>Total</u> |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| <b>Andersen Air Force Base</b>            |            |            |            |            |            |            |            |            |            |            |            |            |              |
| <u>Northwest Field</u> (gun hunting only) |            |            |            |            |            |            |            |            |            |            |            |            |              |
| No. hunter sorties                        | 741        | 657        | 547        |            |            |            |            |            |            |            |            | 832        | 2777         |
| No. hunter days (8 hr)                    | 456        | 395        | 313        |            |            |            |            |            |            |            |            | 483        | 1647         |
| Deer taken                                | 19         | 19         | 25         |            |            |            |            |            |            |            |            | 19         | 82           |
| Days effort/take                          | 24.0       | 20.8       | 12.5       |            |            |            |            |            |            |            |            | 25.4       | 20.1         |
| <u>Main Base</u> (primarily bow hunting)  |            |            |            |            |            |            |            |            |            |            |            |            |              |
| No. hunter sorties                        | 247        | 292        | 113        |            |            |            |            |            |            |            |            | 344        | 652          |
| No. hunter days (8 hr)                    | 99         | 129        | 49         |            |            |            |            |            |            |            |            | 152        | 429          |
| Deer taken                                | 0          | 3          | 0          |            |            |            |            |            |            |            |            | 2          | 5            |
| Days effort/take                          | --         | 43.0       | --         |            |            |            |            |            |            |            |            | 76.0       | 85.8         |
| <u>Andersen South</u> (bow hunting only)  |            |            |            |            |            |            |            |            |            |            |            |            |              |
| No. hunter sorties                        | 25         | 27         | 0          |            |            |            |            |            |            |            |            | 0          | 52           |
| No. hunter days (8 hr)                    | 7          | 8          | 0          |            |            |            |            |            |            |            |            | 0          | 15           |
| Deer taken                                | 0          | 0          | 0          |            |            |            |            |            |            |            |            | 0          | 0            |
| Days effort/take                          | --         | --         | --         |            |            |            |            |            |            |            |            | --         | --           |

Hunter questionnaires were discontinued in FY96 because of a lack of manpower and low return rates in previous years, which may have resulted in biased sampling of the hunter community. Proposed revised hunting regulations may remedy this problem by requiring hunters to complete the questionnaire prior to license purchase.

### Spotlight Count Trends

Spotlight counts at Pati Point showed that deer numbers significantly increased this year (Mann Whitney *U*-Test,  $U' = 54$ ,  $n_1 = 6$ ,  $n_2 = 9$ ,  $P < 0.001$ ) from FY97. The average number of deer seen per count increased from 63.2 (9.6 deer/km) in FY97 to 87.3 (13.5 deer/km) in FY98 (Table 2). The largest single nightly count on AAFB increased from 73 deer in FY97 to 97 deer in FY98.

Table 2. Composition of deer seen during spotlight counts at Pati Point on AAFB, FY98.

| Class          | ----- 1997 ----- |      |     | ----- 1998 ----- |     |      |      |     |      |      |      |      | Total | Mean | SD  |
|----------------|------------------|------|-----|------------------|-----|------|------|-----|------|------|------|------|-------|------|-----|
|                | Oct              | Nov  | Dec | Jan              | Feb | Mar  | Apr  | May | Jun  | Jul  | Aug  | Sep  |       |      |     |
| Unclassed buck | 6                | 5    |     | 5                |     | 0    | 2    |     | 1    | 0    | 1    | 0    | 20    | 2.2  | 2.4 |
| Spike          | 2                | 2    |     | 4                |     | 5    | 3    |     | 3    | 4    | 2    | 2    | 27    | 3.0  | 1.1 |
| 2 pt           | 10               | 5    |     | 3                |     | 7    | 2    |     | 0    | 8    | 2    | 3    | 40    | 4.4  | 3.3 |
| 3 pt           | 11               | 6    |     | 12               |     | 6    | 5    |     | 3    | 4    | 8    | 6    | 61    | 6.8  | 3.0 |
| 4 pt           | 0                | 1    |     | 0                |     | 0    | 0    |     | 0    | 0    | 0    | 0    | 1     | 0.1  | 0.3 |
| Doe            | 37               | 35   |     | 35               |     | 42   | 43   |     | 31   | 37   | 38   | 36   | 334   | 37.0 | 3.7 |
| Yearling       | 6                | 7    |     | 6                |     | 9    | 7    |     | 12   | 16   | 16   | 16   | 95    | 10.6 | 4.5 |
| Fawn           | 2                | 4    |     | 3                |     | 9    | 1    |     | 2    | 4    | 7    | 7    | 39    | 4.3  | 2.7 |
| Unclassed deer | 18               | 23   |     | 13               |     | 9    | 19   |     | 40   | 24   | 10   | 13   | 169   | 18.8 | 9.6 |
| Total deer     | 92               | 88   | nc  | 81               | nc  | 87   | 82   | nc  | 92   | 97   | 84   | 83   | 786   | 87.3 | 5.4 |
| Miles traveled | 3.9              | 4.4  |     | 4.0              |     | 4.0  | 4.0  |     | 4.2  | 4.0  | 4.0  | 4.0  | 36.5  | 4.1  | 0.2 |
| Km traveled    | 6.4              | 7.1  |     | 6.4              |     | 6.4  | 6.4  |     | 6.8  | 6.4  | 6.4  | 6.4  | 58.6  | 6.5  | 0.3 |
| Deer/mi        | 23.6             | 20.0 |     | 20.3             |     | 21.8 | 20.5 |     | 21.9 | 24.3 | 21.0 | 20.8 | 194.2 | 21.6 | 1.5 |
| Deer/km        | 14.6             | 12.4 |     | 12.7             |     | 14.5 | 12.8 |     | 13.5 | 15.2 | 13.1 | 13.0 | 121.8 | 13.5 | 1.0 |

nc = no count was made.

Spotlight counts in the MSA were initiated in October due to the large deer numbers and heavy vegetation damage seen in the area. The October count used two spotlights and a total of 267 deer were seen along the 22.5-km route. Deer were surveyed with one spotlight for the remainder of the year (Table 3). The average number of deer seen per count, excluding the October count, was 123.8 (8.2 deer/km).

Table 3. Composition of deer seen during spotlight counts in the Munitions Storage Area on AAFB, FY98.

| Class          | ----- 1997 ----- |      |     | ----- 1998 ----- |     |      |      |     |      |      |     |     | Total | Mean  | SD   |
|----------------|------------------|------|-----|------------------|-----|------|------|-----|------|------|-----|-----|-------|-------|------|
|                | Oct*             | Nov  | Dec | Jan              | Feb | Mar  | Apr  | May | Jun  | Jul  | Aug | Sep |       |       |      |
| Unclassed buck |                  | 6    |     |                  |     | 4    | 4    |     | 5    | 1    |     |     | 20    | 4.0   | 1.7  |
| Spike          |                  | 2    |     |                  |     | 4    | 3    |     | 1    | 2    |     |     | 12    | 2.4   | 1.0  |
| 2 pt           |                  | 9    |     |                  |     | 2    | 2    |     | 0    | 5    |     |     | 18    | 3.6   | 3.1  |
| 3 pt           |                  | 4    |     |                  |     | 5    | 7    |     | 2    | 1    |     |     | 19    | 3.8   | 2.1  |
| 4 pt           |                  | 0    |     |                  |     | 0    | 0    |     | 0    | 0    |     |     | 0     | 0     | 0    |
| Doe            |                  | 63   |     |                  |     | 71   | 86   |     | 36   | 48   |     |     | 304   | 60.8  | 17.5 |
| Yearling       |                  | 13   |     |                  |     | 14   | 21   |     | 9    | 18   |     |     | 75    | 15.0  | 4.1  |
| Fawn           |                  | 11   |     |                  |     | 13   | 11   |     | 9    | 10   |     |     | 54    | 10.8  | 1.3  |
| Unclassed deer |                  | 50   |     |                  |     | 28   | 35   |     | 24   | 28   |     |     | 165   | 33.0  | 9.2  |
| Total deer     |                  | 158  | nc  | nc               | nc  | 141  | 169  | nc  | 86   | 113  | nc  | nc  | 667   | 133.4 | 30.3 |
| Miles traveled |                  | 9.8  |     |                  |     | 14.2 | 14   |     | 6.6  | 7.6  |     |     | 52.2  | 13.4  | 3.2  |
| Km traveled    |                  | 15.8 |     |                  |     | 22.9 | 22.5 |     | 10.6 | 12.3 |     |     | 84.1  | 16.8  | 5.1  |
| Deer/mi        |                  | 16.1 |     |                  |     | 9.9  | 12.1 |     | 13.0 | 14.9 |     |     | 66.0  | 13.2  | 2.2  |
| Deer/km        |                  | 10.0 |     |                  |     | 6.2  | 7.5  |     | 8.1  | 9.2  |     |     | 41.0  | 8.2   | 1.3  |

nc = no count was made

\* two spotlights were used (see text)

On NOA, deer numbers showed a non-significant increase (Mann Whitney *U*-Test,  $U' = 27$ ,  $n_1 = 5$ ,  $n_2 = 8$ ,  $P > 0.05$ ) in FY98 (Table 4) from FY97. The average number of deer

recorded per count climbed from 44.8 animals (1.9 deer/km) in FY97 to 52.0 animals (2.4 deer/km) in FY98 (Table 4). The largest single nightly count increased from 52 deer in FY97 to 91 deer in FY98.

Table 4. Composition of deer seen during spotlight counts an Ordnance Annex, FY98.

| Class          | ----- 1997 ----- |     |      | ----- 1998 ----- |      |     |      |     |      |      |      |      | Total | Mean | SD   |
|----------------|------------------|-----|------|------------------|------|-----|------|-----|------|------|------|------|-------|------|------|
|                | Oct              | Nov | Dec  | Jan              | Feb  | Mar | Apr  | May | Jun  | Jul  | Aug  | Sep  |       |      |      |
| Unclassed buck | 3                |     | 3    |                  | 6    |     | 3    |     | 0    | 4    | 2    | 4    | 25    | 3.1  | 1.7  |
| Spike          | 2                |     | 1    |                  | 4    |     | 0    |     | 2    | 1    | 3    | 1    | 14    | 1.8  | 1.3  |
| 2 pt           | 1                |     | 3    |                  | 7    |     | 2    |     | 0    | 0    | 0    | 0    | 13    | 1.6  | 2.4  |
| 3 pt           | 0                |     | 3    |                  | 7    |     | 1    |     | 3    | 3    | 8    | 1    | 26    | 3.3  | 2.9  |
| 4 pt           | 0                |     | 0    |                  | 1    |     | 0    |     | 0    | 0    | 0    | 0    | 1     | 0.1  | 0.4  |
| Doe            | 11               |     | 2    |                  | 27   |     | 11   |     | 33   | 16   | 17   | 12   | 129   | 16.1 | 9.8  |
| Yearling       | 2                |     | 4    |                  | 2    |     | 5    |     | 7    | 8    | 6    | 10   | 44    | 5.5  | 2.8  |
| Fawn           | 1                |     | 3    |                  | 1    |     | 2    |     | 9    | 2    | 2    | 5    | 25    | 3.1  | 2.7  |
| Unclassed deer | 22               |     | 12   |                  | 36   |     | 16   |     | 9    | 9    | 13   | 4    | 121   | 15.1 | 10.0 |
| Total deer     | 42               | nc  | 49   | nc               | 91   | nc  | 40   | nc  | 63   | 43   | 51   | 37   | 416   | 52   | 17.7 |
| Miles traveled | 14.0             |     | 13.5 |                  | 15.0 |     | 13.5 |     | 11.0 | 14.0 | 13.9 | 15.5 | 110.4 | 13.8 | 1.3  |
| Km traveled    | 22.5             |     | 21.7 |                  | 24.2 |     | 21.7 |     | 17.7 | 22.5 | 22.4 | 25.0 | 177.7 | 22.2 | 2.2  |
| Deer/mi        | 3.0              |     | 3.6  |                  | 6.1  |     | 3.0  |     | 5.7  | 3.1  | 3.7  | 2.4  | 30.6  | 3.8  | 1.3  |
| Deer/km        | 1.9              |     | 2.3  |                  | 3.8  |     | 1.8  |     | 3.6  | 1.9  | 2.3  | 1.5  | 19.1  | 2.4  | 0.9  |

nc = no count was made.

### Depredation Permits

Twenty-two animal depredation permits were issued during this fiscal year. Of these, 11 permits were issued to farmers registered with the Guam Department of Agriculture. Nineteen permits authorized deer take in agricultural areas, while three permitted take in suburban areas. One permit authorized deer take on a military installation (AAFB). The requirement of a monthly report of deer take by permittees was initiated this year. Thirty-one deer were killed on AAFB, most of which came from control efforts inside Area 50. No deer were reported taken under other permits for non-military lands.

### Hunting Regulations

New hunting regulations allowing unlimited year-round take of deer were proposed by the DAWR in FY98. Severe habitat damage in areas of moderate to high deer abundance prompted the proposal. A public hearing was held in June concerning the regulations. Field trips were subsequently held on AAFB to demonstrate the impact of deer on native vegetation. Officials from related agencies as well as a few members of the public attended the field trips. Oral and written testimony was collected and reviewed.

Because of public concern about over-harvesting in non-military parts of the island, the regulations were revised to reduce the take to three deer of either-sex per fiscal year, with the deer season reduced to a six-month period. These proposed hunting regulations will be submitted to the Twenty-fourth Guam Legislature for approval and will hopefully be enacted for the FY '00 hunting season.

## Supertyphoon Paka / El Nino-Southern Oscillation

Supertyphoon Paka struck Guam on December 16-17 with estimated winds of 150-185 mph. The forests of central and northern Guam sustained extensive damage. The island subsequently experienced a severe dry season associated with an El Nino-Southern Oscillation event. Continued deer browsing magnified the habitat damage sustained from these two events. By July, many areas (i.e., MSA, Tarague basin, Pati Point, and Haputo) exhibited a lack of forest undergrowth. Many seedlings and saplings that survived Supertyphoon Paka were heavily browsed on. During the dry season, DAWR staff noticed greater than normal deer mortality on military lands. The increased fatalities may be related to a lack of food caused by heavy browsing pressure, general forest degradation brought on by Supertyphoon Paka, and the severe dry season.

### **RECOMMENDATIONS**

Continue spotlight counts at present intensity at Pati Point and MSA on AAFB and on NOA. Expansion of spotlight counts to other areas is recommended. Biological data should be collected from carcasses whenever possible. Written guidelines concerning hunter logbooks should be given to the proper military personnel to ensure complete and accurate hunter participation records on military lands. Hunting on NCTAMS should be reopened. A comprehensive investigation into the movements and habitat use of these ungulates is needed. A study to examine the impacts of deer on native ecosystems remains a high priority.

### **PROGRAM COST**

The estimated cost of the deer population and distribution project under W-1R-6 is \$32,000.

### **LITERATURE CITED**

Division of Aquatic and Wildlife Resources. 1961-1997. Job Progress Reports - Federal Aid to Fish and Wildlife Restoration. Guam Dept. Agric., Mangilao.

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