

APPENDIX 1

INSHORE AERIAL SURVEY

PERIOD COVERED: October 1, 1998 to September 30, 1999

SUMMARY

A total of 23 inshore aerial surveys were conducted in FY99 for a total of 1,563 persons and 1,360 gear units. Hook and line was the most frequently encountered method with 848 persons and 841 gear units. A ratio of participants / method observed in areas outside the inshore participation route to the total number for all methods surveyed during the "inshore aerial" were calculated as variables (P_2 values) for the inshore expansion. The values ranged from 65% for weekend hook and gaffs to 100% for rare and night-practiced methods, e.g., surround net, drag net, other methods, and SCUBA spear fishing.

Incidental biological sightings resulted in a total of 211 turtles, 639 dolphins, 29 sharks, 22 eagle rays, 3 manta rays, and 2 sting rays for FY99.

BACKGROUND

Inshore fishing surveys have been conducted by the Division of Aquatics and Wildlife Resources (DAWR) since the early 1960's, to monitor and collect a long-term database on the total fishing effort and catch from Guam's reefs. The inshore-catch and inshore-participation surveys were developed to collect catch and effort data in near-shore areas easily accessible by motor vehicle. In addition, the inshore-aerial survey was established in the early 60's and reinstated in FY90 to survey effort in areas that could not be easily accessed by a vehicle.

PROCEDURES

"Inshore-aerial" surveys were conducted twice monthly on regularly scheduled participation days (one weekday / weekend). Start times are moved up in one-hour intervals for each subsequent survey (0800-1200h), then repeated after reaching 1200h. Visual observations of areas not covered in the "inshore-participation" survey (Fig.1 locations: 22, 27, 28, 35-39, 44-50, 58, 59, 70, and 73-92) included fishing effort data. The first scheduled weekday and weekend participation survey dates of each month were selected to allow rescheduling in the event of poor weather conditions.

Each survey started in location 11 and proceeded in a clockwise direction all the way around the island to location 12 (Fig. 1). The seaward flight distance from the reef margin was 200-300m with an altitude of 170-200m. The aerial itinerary also included a semi-circular flight pattern within Cocos Lagoon and Apra Harbor. In addition, the pilot was instructed to circle over reef flat areas when it was difficult to observe or determine activity.

The aerial survey observations were sorted by method and type day (weekday / weekend). A ratio of the persons / method observed in areas outside the inshore participation route were compared to the total number of persons / method observations for the island for each type day. The resultant P_2 values provided variables (%) that could be used to expand inshore participation values to island-wide participation values.

Other biological data collected, included incidental observations of marine mammals, turtles, sharks, and rays at or near the surface of various reef zones, e.g., Pago Bay and the fore reef slope, along the aerial survey route.

RESULTS

The most frequently encountered methods included hook and line, cast net, gill net, snorkel spear, hooks and gaffs, and other methods, while surround net, spear SCUBA, and drag net methods were less common. Ratio frequencies were highest (100%) for the least common methods, which were due to the rarity of their use during the day, e.g., spear SCUBA and drag net are primarily night methods. Hook and line, cast net, gill net, surround net, snorkel spear, hooks and gaffs, and other methods (weekday and weekend days respectively) had P_2 values (Table 1) listed as percentages: (91 / 82), (82 / 70), (88 / 96), (100 / 100), (82 / 86), (85 / 65), and (74 / 93), respectively for FY99.

Table 1. P_2 values derived from aerial survey data in FY99. Ratios were calculated from a ratio of method sightings within aerial locations to participation locations. Methods abbreviations are listed as follows: Hook and Line (HL); Cast Net (CN); Gill Net (GN); Surround Net (SN); Spear Snorkel (SpSn); Spear SCUBA (SpSc); Hooks and Gaffs (HG); Drag Net (DN); and Other Methods (OM).

Ratios	HL	CN	GN	SN	SpSn	SpSc	HG	DN	OM
Weekday	20/210	8/37	6/43	0/10	14/65	0/0	2/11	0/0	7/20
Weekend	111/507	13/31	6/144	0/71	22/139	0/0	7/13	0/0	3/43
WD Ratio	210/230	37/45	43/49	10/10	65/79	0/0	11/13	0/0	20/27
WE Ratio	507/618	31/44	144/150	71/71	139/161	0/0	13/20	0/0	43/46
WD P_2	91	82	88	100	82	100	85	100	74
WE P_2	82	70	96	100	86	100	65	100	93

Aerial survey counts indicated hook and line with the greatest number of participants in FY99 (Table 2).

Table 2. Total number of people and gear units observed during aerial surveys in FY99. Method abbreviations are listed in Table 1 with weekday (WD) and weekend (WE) days listed below.

Methods	Within Par Route				Outside Par Route			
	Persons		Gears		Persons		Gears	
	WD	WE	WD	WE	WD	WE	WD	WE
HL	210	507	210	500	20	111	20	111
CN	37	31	34	30	8	13	5	13
GN	43	144	19	53	6	6	4	3
SN	10	71	2	10	0	0	0	0
SpSn	65	139	65	139	14	22	14	22
SpSc	0	0	0	0	0	0	0	0
HG	11	13	11	13	2	7	2	7
OM	20	43	20	43	7	3	7	3
Total	396	948	361	788	57	162	52	159

Dolphins topped the list of the most frequently sighted marine animals during the aerial surveys with 639 sightings. The greatest monthly total of 262 dolphin sightings occurred

in July. Turtle, shark, and eagle ray sightings ranked second, third, and fourth, respectively with annual sightings. The greatest monthly total of turtles and sharks were sighted in September with 67 and 14 respectively and eagle rays in October with 11. In addition, a total of 3 manta rays and 2 stingrays were sighted in FY99 (Table 3).

Table 3. Number of turtle, dolphins, shark, and ray sightings by aerial surveys around Guam in FY99.

SPECIES	MONTHS												TOTAL
	O	N	D	J	F	M	A	M	J	J	A	S	
Turtle	27	10	3	17	14	8	12	6	13	26	8	67	211
Dolphin	40	0	3	30	52	30	6	75	75	262	25	41	639
Shark	1	1	1	5	2	1	2	0	0	0	0	14	29
Sting Ray	0	0	0	0	0	0	0	0	0	0	2	0	2
Eagle Ray	11	4	1	1	0	0	0	3	1	1	0	0	22
Manta Ray	0	0	0	0	0	1	0	1	0	1	0	0	3

Cancellation due to poor weather conditions occurred only once on in FY99, which was on 4/27/99.

RECOMMENDATION

An aerial survey study should be conducted to determine the best route (outer reef margin or mid-reef flat) to observe fishing methods. In addition, there is a need to train office personnel on how to conduct the aerial survey. This will help reduce the number of cancelled surveys when the primary investigator is not available.

PROJECT COST

Flights cost approximately \$10,780.

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