

2005 Annual Report  
**Hawksbill Turtle, *Eretmochelys imbricata*, Recovery Program**  
**Hawaii Volcanoes National Park**

Ref: U.S. Fish and Wildlife Service Permit #739923

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### Introduction

Hawksbill turtles are the rarest of all the sea turtles in the Pacific Ocean and are classified as critically endangered on the IUCN list. Due to predation, alterations to nesting habitat, coastal development, and numerous other limiting factors, the recovery and survival of this species requires immediate management, monitoring, and research actions.

The objectives of the Hawaii Island Hawksbill Turtle Recovery Program are to: 1) protect and monitor nesting activities at twelve beaches from Hawaii Volcanoes National Park (HAVO) to South Kona, 2) evaluate nesting biology by determining nest success, inter-nesting interval, and incubation period, 3) control mongooses, feral cats, rats, and pigs from predation on turtle eggs and hatchlings, 4) provide on-site interpretation at public beaches, and 5) survey coastline for unknown nesting habitat.

As in previous years, it was a highly successful season due to the efforts of 37 dedicated volunteers and technicians William Seitz and Kyle Kagimoto. Funding for this program was provided by the HAVO, U.S. Fish and Wildlife Service (USFWS), and the Hawaii Natural History Association.

### Methods

From mid-May to early December 2005, volunteers and technicians provided nearly continuous nightly coverage and predator control at four beaches on the island of Hawaii: Apua Point, Kamehame, Pohue Bay and Awili Point (see Attachment 1). In addition, frequent monitoring for nesting activities was conducted at Halape, Keauhou, Punaluu, Ninole, Horseshoe, Koloa, Kawa, and Kahakahakea.

Standard monitoring methods were implemented on nesting turtles. This included tagging, measuring carapace length and width, noting external injuries or abnormalities, and marking nest sites. During the hatchling emergence phase, personnel rescued and released stranded hatchlings found in vegetation and rock cobbles. Following the major hatchling emergence, all nests were excavated to determine nest success and to rescue

stranded hatchlings that were trapped within the nest cavity. All dates of turtle activity were recorded to determine inter-nesting interval and incubation period.

Small mammal live traps were placed at Apua Point, Halape, Keauhou, Kamehame, Pohue Bay, and Awili Point to control mongooses, feral cats, and rats. Captured animals were euthanized using carbon dioxide.

## Results

A total of 48 nests were found: seventeen at Kamehame, fifteen at Pohue Bay, eleven at Apua Point, four at Awili Point, and one at Halape. A total of sixteen adult female turtles were observed: seven at Kamehame, four at Pohue Bay, four at Apua Point (one of these turtles likely nested at Halape), and one at Awili Point. However, only thirteen of the sixteen adult female turtles were confirmed nesting. Three turtles (two at Kamehame and one at Pohue) were observed on the beach and tagged, although they did not nests or return to their respective beach. Hawksbill activity was also confirmed at Keauhou, Kawa, and Kahakahakea, but no nests were found at these beaches. A total of eight nesting turtles were newly tagged this season: four at Pohue Bay, two at Kamehame, and one each at Apua Point and Awili Point (Table 1). The remaining eight nesting turtles were returnees from previous seasons.

The nesting results for the 2005 season are as follows: Nest success ranged from 10.3 to 98.2% with a mean of 81.2% ( $n = 42$ ). Clutch size ranged from 127 to 301 eggs with a mean of 179.6 eggs ( $n = 45$ ). Incubation period ranged from 51 to 80 days with a mean of 61.3 days ( $n = 33$ ). Nest to nest attempt interval ranged from 16 to 26 days with a mean of 18.3 days ( $n = 22$ ), while nest to nest interval ranged from 16 to 29 days with a mean of 19 days ( $n = 13$ ). We estimate that 6,272 hatchlings safely reached the ocean. Predator control resulted in the removal of a total of 150 mongooses, 32 rats, and 8 feral cats from Apua Point, Halape, Keauhou, Kamehame, Pohue Bay and Awili Point.

Personnel provided interpretation and education to beach users in both formal and informal settings. Faculty and students from Kau High School participated in turtle monitoring at Kamehame as part of a summer learning program. Volunteers and technicians presented educational displays at the University of Hawaii at Hilo and the Kilauea Cultural Festival. Hawaii Island residents participated in four nest excavations at Pohue Bay. Temporary interpretive signs were installed at Apua Point, Keauhou, Halape, Koloa, Kawa, Pohue Bay, Kahakahakea, and Awili Point to educate beach users. Additionally, volunteers interacted with the general public in the field daily.

Several stretches of coastline were checked for potential nesting beaches. Personnel analyzed beaches based on their substrate, vegetation, wave inundation, and human impact. Volunteers followed the coastline on foot between Awili Point and Waiahukini and between Halape and Kaaha. A pocket of sand at Kapoho was monitored for two weeks after public reports of turtle activity. Volunteers and technicians camped at Waimanu several times during the nesting season. Also, a technician examined the coastline between Pohoiki harbor and Keauhou by boat.



## Discussion

This season was one of the most successful in our program's seventeen year history. Personnel documented the highest number of nesting turtles and nests since 1999 (Figure 1). And this season had the second highest number of hatchlings safely reaching the ocean in our program's history (Figure 2). We also tagged the highest number of turtles since 1993 (Figure 3).

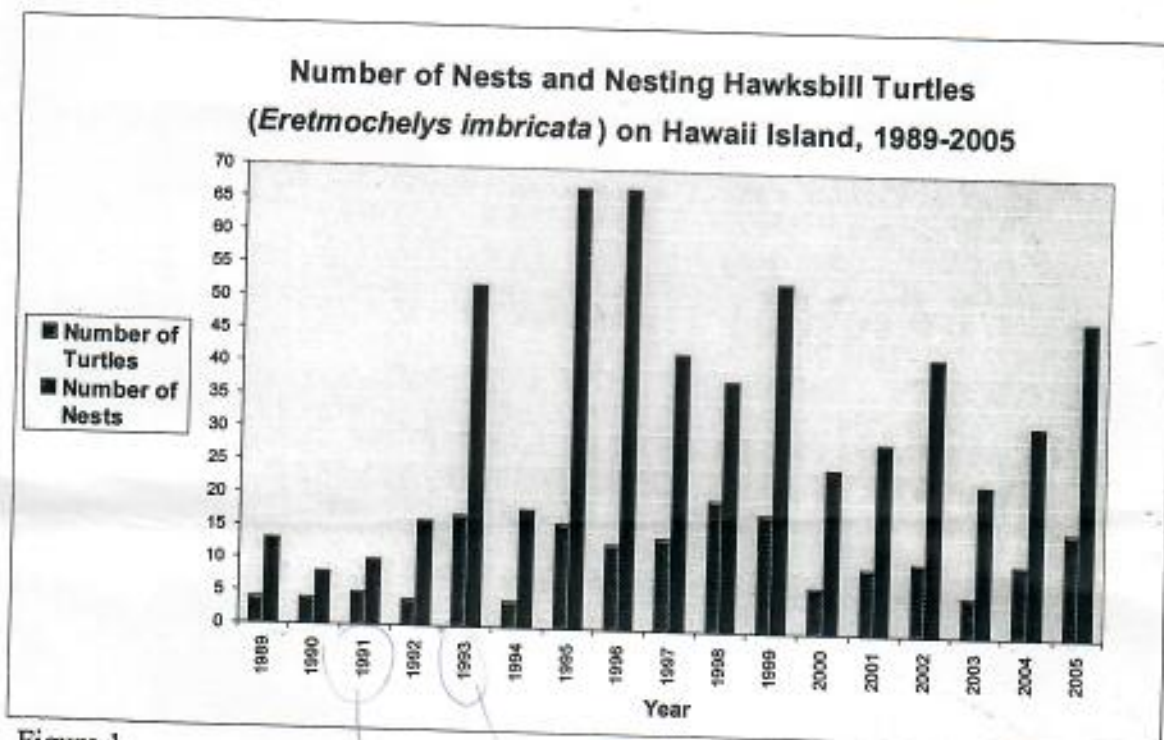


Figure 1.

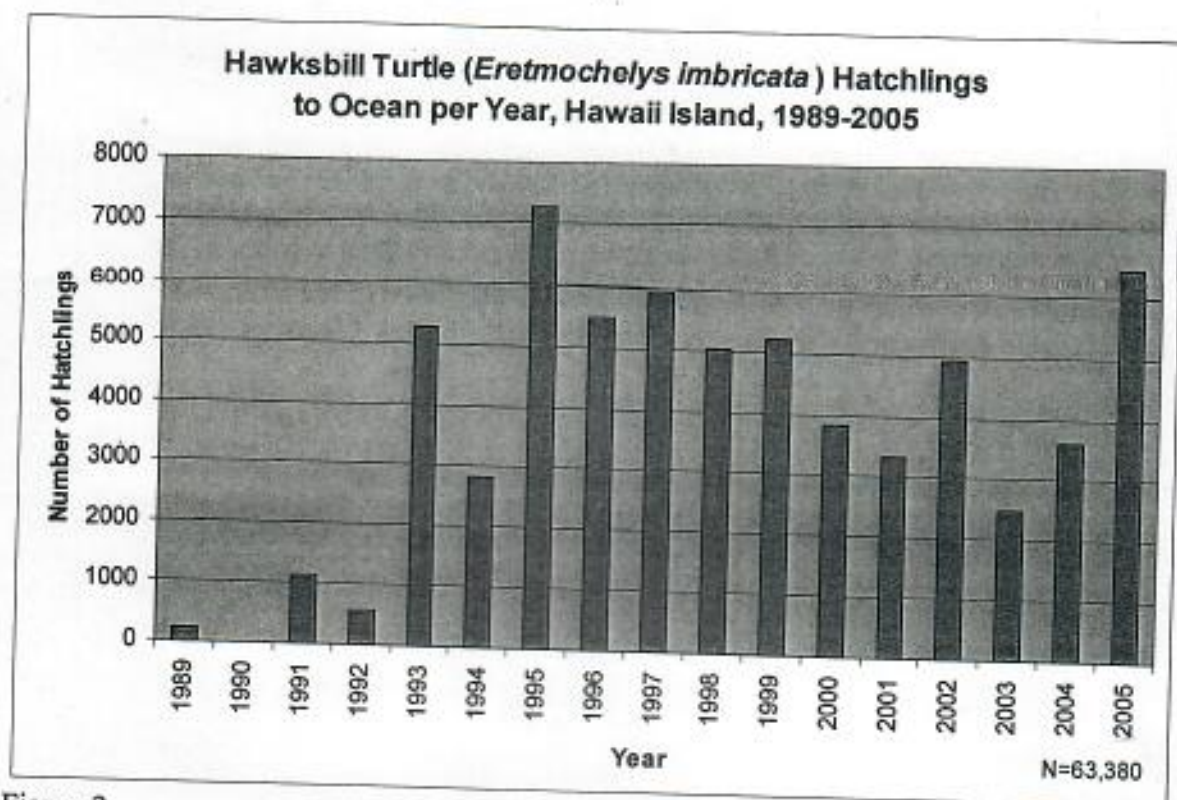


Figure 2.

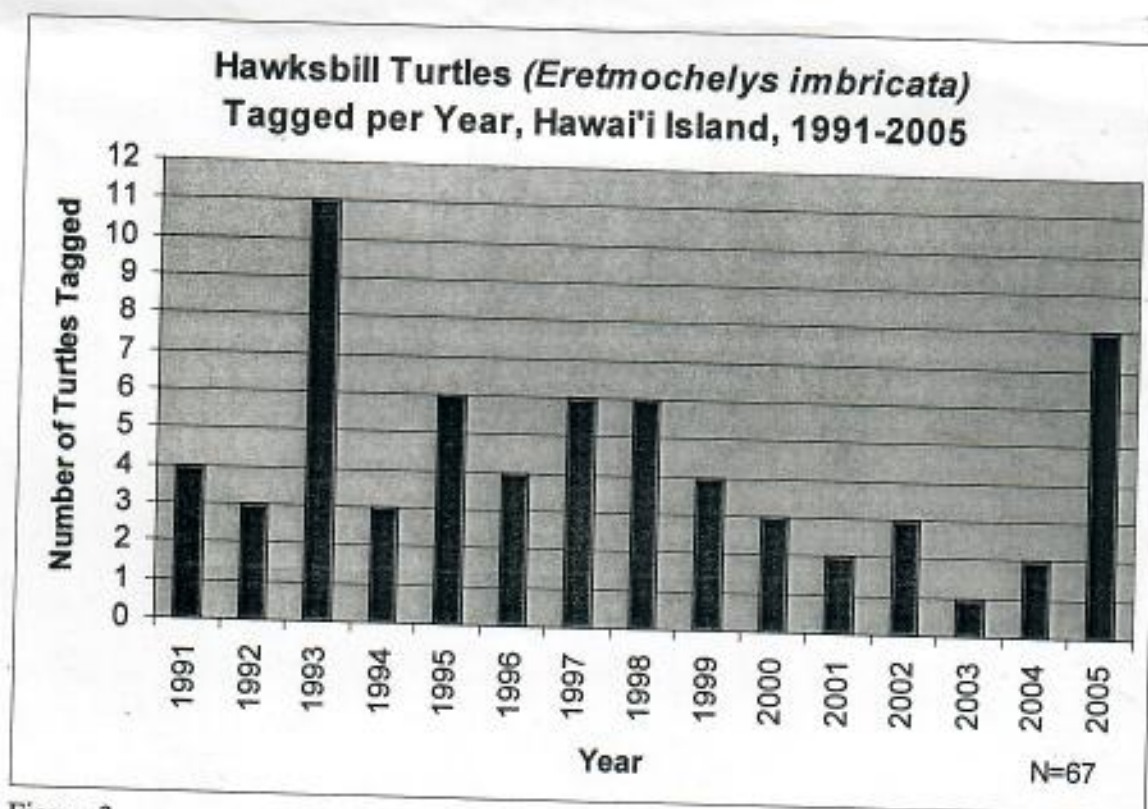


Figure 3.



## Discussion (continue)

**Highlight of the Season--Pohue:** Pohue Bay had a particularly productive season. This season Pohue had 35% (n=15) of all nests and 50% (n=4) of all newly tagged turtles. Nest success ranged from 73.3 to 98.2%, averaging 87.8%. Prior to this season, there were only a total of fifteen documented nests and three tagged turtles since monitoring began in 1993 and tagging began in 1999. Pohue Bay is excellent nesting habitat due to its sandy substrate, the abundance of native morning glory and its remoteness from lights and people. However, it is located on private property and it is very likely that the land owners will develop the area in the future. Data needs to be collected here and at neighboring beaches in order to make important management recommendations to the developer.

**Locating New Nesting Sites:** During the past several years we have focused on locating and protecting new hawksbill nesting habitat. This season, hawksbill activity was confirmed at two long suspected beaches: Awili Point and Kahakahakea. Both beaches are along the same coast and relatively close proximity to Pohue Bay. Awili Point is located in the Manuka Natural Area Reserve and Kahakahakea is located on the same privately-owned property as Pohue Bay. At Awili Point, a newly tagged turtle laid four nests, which had an average nest success of 83.2%. At Kahakahakea, another newly tagged turtle, which was tagged and nested at Pohue Bay, came up on five different days over an eight day period and false nested several times. Additionally, hawksbill tracks were observed at a small black sand beach in between Pohue Bay and Kahakahakea.

There is a very strong possibility that there are more nesting beaches on Hawaii Island that have yet to be identified. This is supported by: 1) the identification of Awili Point and Kahakahakea as nesting habitat this season, 2) the unknown nesting sites for three adult female hawksbills which were observed with false crawls but did not return, and 3) two adult female hawksbills that had not been observed since 1997 (a typical inter-season nesting interval is 2 to 5 years) that likely nested undetected at an unknown site during that eight year period. There are many high potential nesting beaches on the island, especially since hawksbills are able to nest in marginal, rocky habitat. Confirmed nesting beaches on the island are scattered over 150 miles of coastline from Awili Point in the south to Waimanu in the north. Our program has received reports from beach users of possible hawksbill activity at numerous locations along the Kau, Puna, and South Kona coasts. However, limited personnel and funding and the inaccessibility of many of these locations have prevented comprehensive monitoring.

**Use of Multiple Nesting Sites by Individual Turtles:** Again, this season we have documented individual hawksbills utilizing multiple nesting beaches. This season three hawksbills were documented at different nesting sites. One that was tagged and nested at Pohue Bay also false nested on several occasions at Kahakahakea. She may have nested undetected at Kahakahakea since we had very limited coverage at that beach. Another that was originally tagged at Apua Point in 2002 and nested there again this season was observed once at Halape and she may have nested there undetected. The third turtle was newly tagged and false nested at Kamehame this season then later false nested numerous



nights at Kawa. This turtle probably nested undetected at Kawa since we had limited coverage at that area. A fourth turtle was newly tagged and false nested at Kamehame but did not return indicating that she probably nested at an unknown beach. The above data implies that despite high nesting site fidelity, individual hawksbills are utilizing more than one nesting site.

### **Conclusion/Recommendation**

**Measure of Success:** It is difficult to evaluate the success of our program by comparing number of nesting turtles per season since our program is relatively new and that hawksbill turtles may take 15-20 plus years to reach sexual maturity. We currently measure our success by the number of nests that we protect, the number of hatchlings successfully entering the ocean, the effectiveness of our predator control program, and the discovery of new nesting beaches. Prior to our involvement, mongooses destroyed many nests as reported by fisherman.

However, this year there might be a hint of success as measured by the arrival of eight untagged turtles this season. These turtles could possibly be a result of our efforts in the early 1990's in protecting eggs and releasing hatchlings.

**Protect nesting coastline:** It is very important to manage not only one particular beach but a series of beaches as we have documented individual turtles utilizing multiple sites. In the past, we were encouraged to put most of our efforts to the beaches with the highest number of nests such as Kamehame. However, we have noticed that it might be equally important to monitor all the beaches along the entire coastline since individual turtles are utilizing multiple beaches. Also, it appears that in some seasons, the number of nests at Kamehame is over its carrying capacity which creates problems. For instance, for the past several years we have observed the digging activity of nesting turtles impacting previous laid nests. It appears that the nesting area at Kamehame is too small. This overcrowding situation could be mitigated by translocating eggs or hatchlings to other beaches along the same coastline.

**Urgency to Protect New Nesting Sites and Funding Requirements:** From 1989 to 1992, the program was initiated with minimal funds and coverage, usually incidental to other backcountry programs. From 1993 to 2001, USFWS, NPS, and Hawaii Natural History Association were the primary funding partners for this program. Over recent years funding has been through several State and Federal grants, NPS, Hawaii Natural History Association and World Turtle Trust.

Due to the dramatic increase in incompatible coastal development over the past few years, it is imperative that we immediately expand our nest search around the entire island. We have received reports from hikers and fishers of possible nesting in numerous remote beaches around the island; however, personnel and funding constraints have prevented any systematic follow-up monitoring. Our efforts and recommendations are high priority actions as identified in the 1998 Recovery Plan for U.S. Populations of the Hawksbill Turtle.

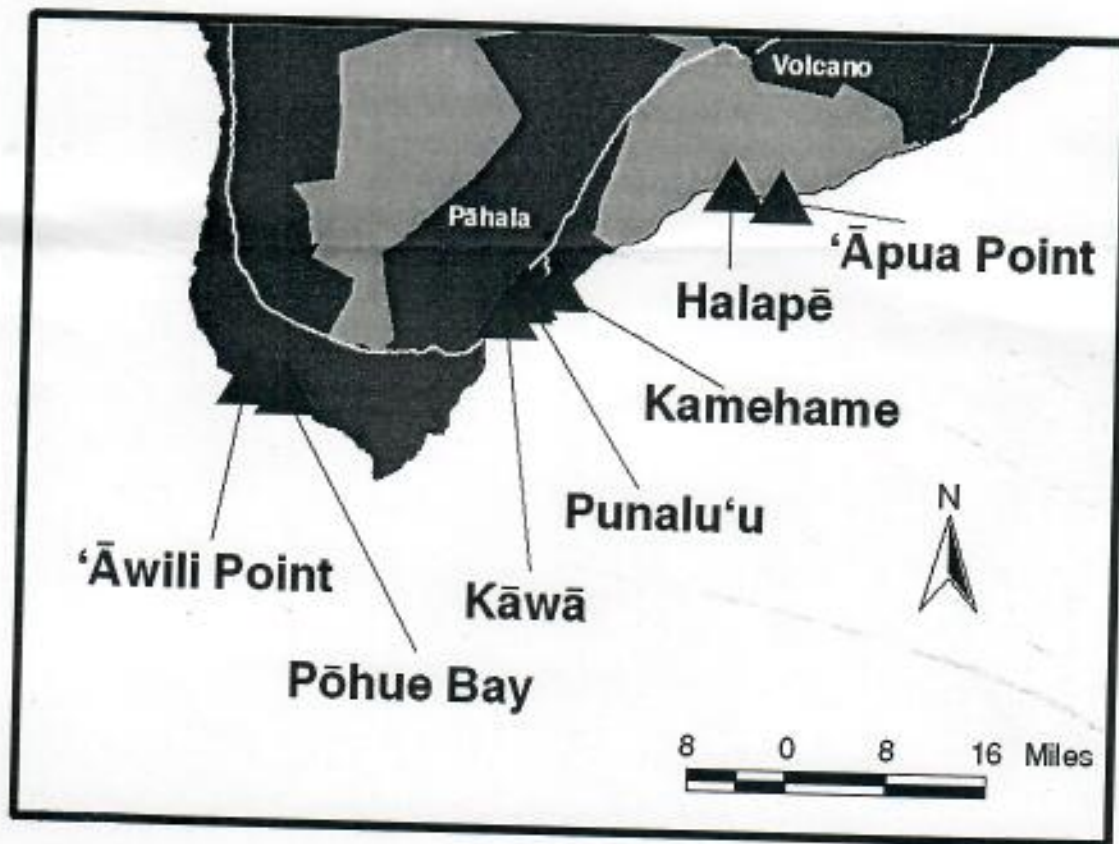
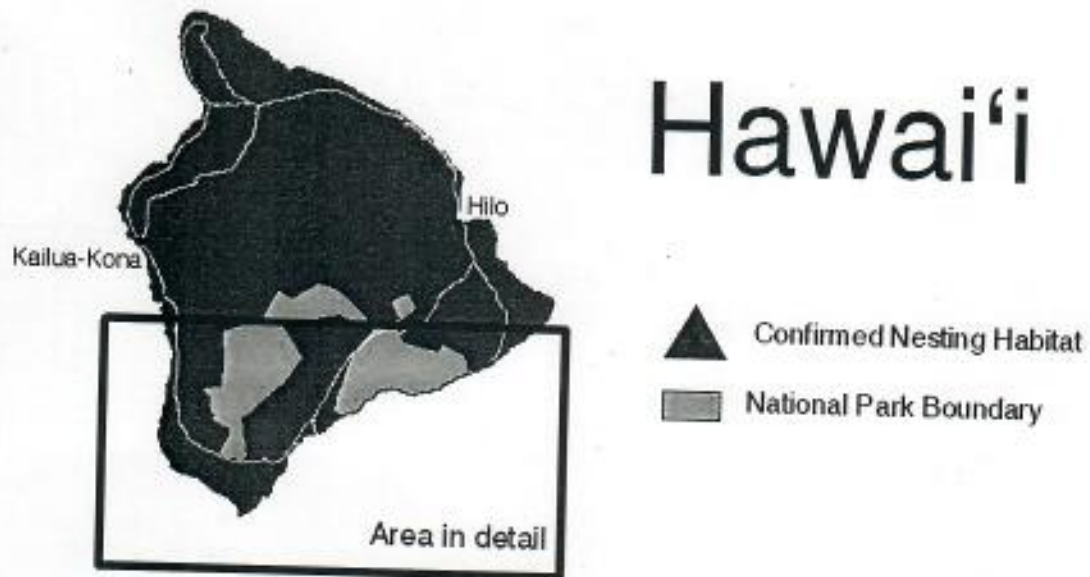


Figure 4. Hawksbill turtle nesting beaches on Hawaii Island.



**Hawksbill turtles (*Eretmochelys imbricata*) newly tagged in 2005  
Hawaii Island**

<u>ID#</u>	<u>TAG NUMBERS</u>				<u>DATE</u>	<u>LOCATION</u>
	<u>LFF</u>	<u>RFF</u>	<u>LRF</u>	<u>RRF</u>	<u>TAGGED</u>	
60	566-X	486-X	567-X	562-X	6/14/2005	Apua Point
61	90-M	89-M	92-M	91-M	6/23/2005	Kamehame
62	492-X	497-X	498-X	495-X	7/8/2005	Awili Point
63	96-M		95-M	97-M	7/10/2005	Kamehame
64	85-M	88-M	84-M	83-M	7/16/2005	Pohue Bay
65	8A23	8A22	8A21	8A24	8/1/2005	Pohue Bay
66	8A20	8A18	8A34	8A17	8/5/2005	Pohue Bay
67	8A75		8A77	8A78	9/20/2005	Pohue Bay

Table 1.