# Hawai‘i Island Hawksbill Turtle Project
# 2023 Annual Report

Reporting Period: January 1, 2023 - December 31, 2023

Submitted to the
U.S. Fish and Wildlife Service

By

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In fulfillment of requirements pursuant to
USFWS Permit: TE739923-9;
List of Authorized Individuals for Recovery Permit TE-739923-9,
dated 05/10/2023)

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December 2023

# HAWAIʻI ISLAND HAWKSBILL PROJECT

**Figure 1**. Hawaiʻi Island Hawksbill Project team members taking measurements from Turtle #120, who returned to nest during the late night hours at Kamehame, Hawaiʻi Island, Hawaiʻi.

## INTRODUCTION

This report is presented to the U.S. Fish and Wildlife Service (USFWS) for the Hawaiʻi Island Hawksbill Project (HIHP) conducted January 1, 2023, through December 31, 2023, in fulfillment of the requirement pursuant to USFWS Permit: TE739923-9, dated 07/22/2020 and List of Authorized Individuals, Recovery Permit TE-739923-9, dated 05/10/2023.

## PROJECT GOALS

The objectives of the Hawaiʻi Island Hawksbill Project, based at Hawaiʻi Volcanoes National Park (HAVO) were to:

1) identify hawksbill nesting activity and collect baseline data.
2) manage and protect nesting habitat.
3) protect nests and ensure hatchlings safely reach the ocean.
4) control non-native predators and vegetation; and
5) promote public stewardship of marine ecosystems through educational outreach.

## PROJECT PERSONNEL

Project personnel consisted of two full-time University of Hawaiʻi Pacific Cooperative Studies Unit (UH-PCSU) staff which included a Turtle Recovery Technician and a Wildlife Survey

Assistant. A UH-PCSU Program Administrator also assisted the project, as well as a Wildlife Biologist at HAVO. Additional on-island community volunteers assisted with day checks at four accessible beaches. The National Park Service (NPS) provided five volunteers for the summer term (May-August) and six volunteers for the fall term (August-December).

## METHODOLOGIES

*Nesting Sites Surveyed.* – The HIHP team surveyed for hawksbill nesting activity at three complexes in the Kaʻū District on Hawaiʻi Island (Kamehame Complex, ʻĀpua Complex, Pōhue Complex) that were comprised of 14 beaches (Figure 2).

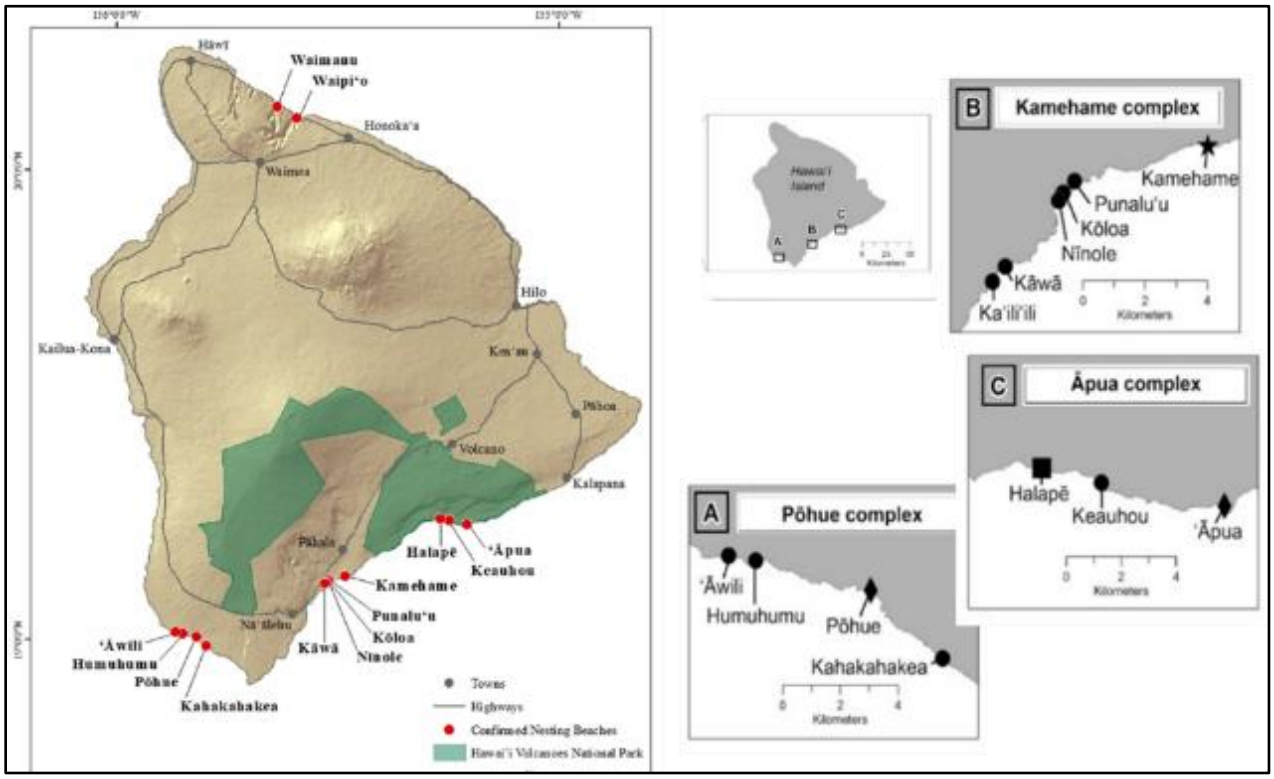


**Figure 2.** Map of Hawaiʻi Island displaying the nesting beaches surveyed by the Hawaiʻi Island Hawksbill Project during the 2023 nesting season. Surveys were conducted in three complexes across 14 beaches. Two beaches in the Pōhue Complex are not displayed because of their ephemeral nature.

*Survey Effort.* – Nesting beaches were surveyed for hawksbills between May and December. Surveys included day checks to look for evidence of nesting females and emerging hatchlings the previous night, as well as night monitoring to actively observe nesting females and emerging hatchlings. Reduced staff and volunteer capacity during the 2023 season limited the amount of

monitoring at potential nesting sites. Field activities were prioritized to maximize coverage at active nesting beaches with less frequent monitoring occurring at the remaining beaches.

*Data Collection.* – Each time a nesting turtle was observed during the nesting hawksbill season, we documented the time and type of nesting activity, and when time of emergence was known we recorded the weather, tides, moon presence and phase, and cloud coverage. As the turtle returned to the ocean, field personnel briefly restrained the female to check for injuries, abnormalities, and tag numbers. If the turtle had not been previously tagged, or if tags were missing, we applied Inconel tags (National Band and Tag Co., Newport, KY; size 681) supplied by the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center. Personnel also scanned the rear flippers of each turtle for PIT (passive integrated transponder) tags with a Biomark Pocket Reader. For each individual, we measured the standard straight carapace and curved carapace length and width. Data collected were used to calculate individual remigration interval, nest-to-attempt inter-nesting interval, and nest-to-nest inter-nesting interval.

We marked successful observed nests with bobbers, metal tags and data loggers. During the hatchling emergence phase, we monitored nests for signs of activity, and recorded the dates and times of all observed hatchling activity. Personnel counted hatchlings and ensured they safely reached the ocean. In addition, we excavated nests to inventory nest contents and rescue trapped hatchlings. Data collected were used to calculate incubation period, clutch size, and hatch/nest success. During nest excavations, we collected specimens of dead hatchlings, dead pipped and partially developed embryos if they were viable for DNA. We placed viable specimens individually into Whirl-Packs (sterile bags) which were kept on ice in the field and then immediately placed in the freezer at the HAVO HIHP Office until shipment to NMFS Pacific Islands Fisheries Science Center.

*Nest protection.* – We installed wire enclosures, referred to as nest cages, over some observed nests to provide protection from predators, vehicular traffic, and human disturbance. In accordance with our U.S. Fish & Wildlife T&E permit, we cut openings along the base of the nest cages after 45 days of incubation so that hatchlings could pass through unobstructed.

*Satelitte tag attachment.* – In collaboration with NMFS Pacific Islands Fisheries Science Center and a graduate student at the University of Hawai‘i at Mānoa we attached satellite transmitters to 2 female hawksbill turtles during the 2023 nesting season (Permit TE72088A). We attached satellite tags on the vertebral scute (typically 2nd vertebral scute) of the turtle after cleaning the carapace of debris and dirt. We applied epoxy to the shell and a fiberglass cloth on which the satellite tag was placed. We then added putty to the sides of the tag, before the epoxy was set, to connect the tag to the carapace. Last, we added a layer of boat paint to help waterproof the tag and to prevent organisms and ebris from forming on the tag.

## PREDATOR CONTROL

Non-native predators, mongoose (*Herpestes auropunctatus)*, rats (*Rattus* sp.), and feral cats (*Felis catus*) were targeted for trapping at Pōhue, Kamehame, Halapē and ʻĀpua during the 2023 nesting season. Small and medium live Tomahawk traps, A-24 Goodnature instant kill traps, and DOC250s were used at Pōhue and Kamehame, and only live traps were used at ʻĀpua and Halapē. All traps were baited, set, and checked several times a day when personnel were monitoring or camping. Captured animals in live traps were euthanized humanely using carbon dioxide as recommended by the American Veterinary Association's (AMVA) Panel on Euthansia (AMVA 2001) and approved by The University of Hawaiʻi's Institutional Animal Care and Use Committee (IACUC). Our team in total set 82 live traps, 38 Doc250's and 20 A24 traps, resulting in the dispatch of 37 mongoose and 4 rats. The species, sex, and trap type were recorded for each capture. There were 13 occurrences when trap type was not recorded when set.

## SUMMARY 2023 NESTING SEASON

A total of 401 day checks and 115 night monitoring sessions were conducted across the three complexes during the 2023 nesting season (Table 1). The HIHP documented 82 confirmed nests found at 7 nesting beaches and observed 18 adult females at 5 nesting beaches (Table 1).

### Nesting Summary

The 2023 nesting season had the highest number of confirmed nests since the HIHP project began monitoring nests on Hawaiʻi Island in 1991. Of the 82 confirmed hawkbill nests documented, 7 occurred at ʻĀpua, 11 at ʻĀwili, 3 at Halapē, 38 at Kamehame, 15 at Pōhue, 5 at Punaluʻu, and 3 at Puʻu Mini (Table 1). Nests were documented by personnel who observed the female laying, probed areas of disturbed sand near adult tracks, or located nests by finding depressions in the sand, hatchling tracks, or evidence of depredation.

During the 2023 nesting season, an estimated 8,894 hawksbill hatchlings from 78 nests were estimated to have safely reached the ocean (Table 1). Additional tracks and digs were found during day checks or upon arrival to each of the nesting beaches where adult females were observed, indicating the potential for additional nests. The average clutch size of nests (181 eggs) was similar across beaches, but there was variability in the nest, hatch, and emergence success among nesting beaches (Table 1). ʻĀpua and Halapē had the lowest nest, hatch, and emergence success, while ʻĀwili and Pōhue had the highest (Table 1). A total of 524 specimens of dead hatchlings and/or embryos were collected during nest excavations and were sent to NOAA-NMFS Pacific Islands Fisheries Science Center.

**Table 1.** Summary of the number (no.) day checks and night sessions conducted by Hawai‘i Island Hawksbill Project during the 2023 nesting season, as well as the number of observed females, confirmed and hatched nests, and hatchlings produced. Nest calculations are also presented.

| Nesting Beach | No. day checks | No. night sessions | No. observed females | No. confirmed nests | No. hatched nests | Average clutch size | Average nest success | Average hatch success | Emergence success | Hatchlings produced |
|---|---|---|---|---|---|---|---|---|---|---|
| ‘Āpua | 33 | 21 | 1 | 7 | 7 | 176 (n=5) | 36% | 36% | 25% | 413 |
| ‘Āwili | 22 | 0 | 0 | 11 | 11 | 142 (n=8) | 79% | 79% | 72% | 1202 |
| Halapē | 12 | 24 | 1 | 3 | 3 | 193 (n=3) | 40% | 40% | 35% | 379 |
| Humuhumu | 18 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Kahakahakea | 2 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Kamehame | 56 | 50 | 12 | 38 | 36 | 192 (n=24) | 63% | 62% | 46% | 4005 |
| Kāwā | 30 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Keauhou | 7 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Kōloa | 48 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Nīnole | 1 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Pōhue | 41 | 20 | 3 | 15 | 14 | 180 (n=12) | 78% | 80% | 62% | 1806 |
| Punaluʻu | 113 | 0 | 1 | 5 | 5 | 204 (n=4) | 74% | 74% | 39% | 781 |
| Puʻu Ki | 2 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | 0 |
| Puʻu Mini | 16 | 0 | 0 | 3 | 2 | -- | -- | -- | -- | 308 |
| **Season Total** | **401** | **115** | **18** | **82** | **78** | **181** | **62%** | **62%** | **47%** | **8894** |

## Observed Females

A total of 18 adult female hawksbills were observed this season between 15 May and 9 October 2023: 12 at Kamehame, 3 at Pōhue, 1 at Halapē, 1 at ʻĀpua, 1 at Punaluʻu. Six of the females observed in 2023 were returnees (Table 2) and 12 were neophyte nesters (Table 3). A tissue biopsy sample was collected from a fleshy portion of the axilla region of the flipper from the 12 neophyte females for genetic analysis and sent to the NMFS Pacific Islands Fisheries Science Center. The HIHP has now identified 193 adult female hawksbills on Hawaiʻi Island since tagging began in 1991. The total number of neophyte nesters compared to returnee female hawksbills observed on Hawaiʻi Island has varied from year to year (Figure 3).

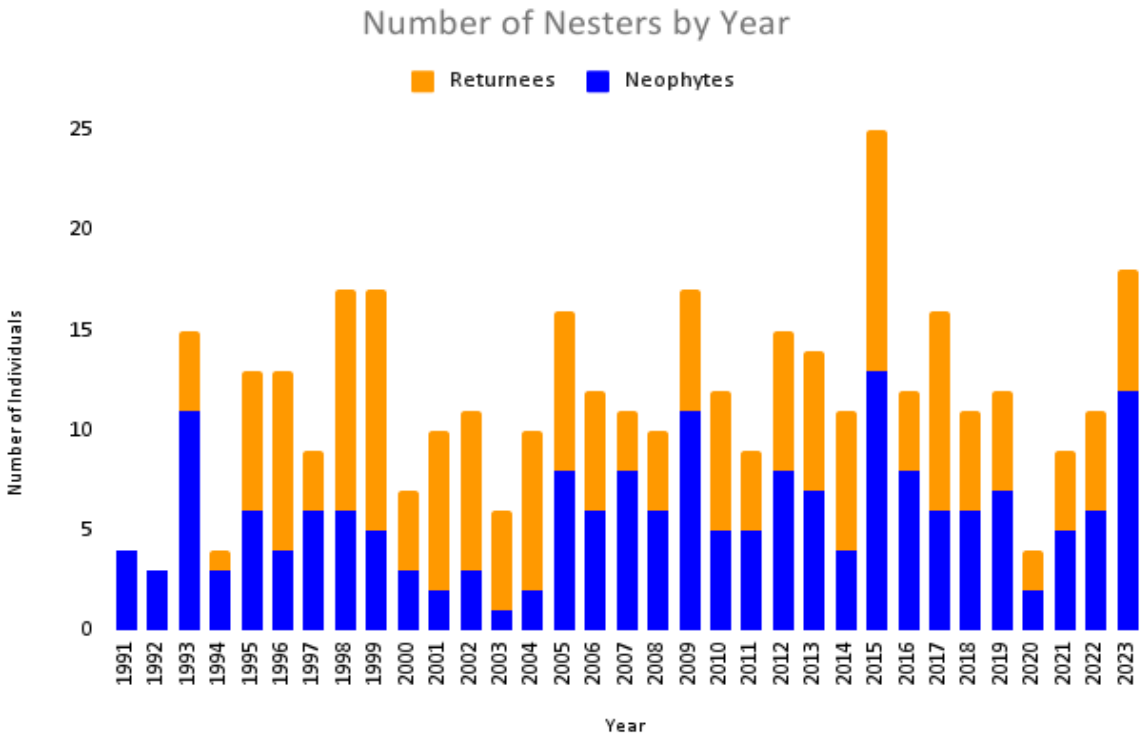


**Figure 3.** The number of newly tagged or neophyte nesters and returnee hawksbill sea turtles observed by by the Hawaiʻi Island Hawksbill Project from 1991-2023 on the Island of Hawaiʻi. Data presented has not been adjusted to account for effort over time.

Two of the 18 females were satellite tagged by HIHP personnel. A third female, identified as "Rocket Girl", was originally encountered and tagged by NOAA personnel on Maui Island. Though Rocket Girl was not physically encountered by our team, activity from NOAA's transmitter cross-referenced with observed nesting activity allowed us to confirm Rocket Girl's nesting patterns.

**Figure 4**. Hawksbill hatchlings emerging from "Rocket Girl's" last nest of the season at Punalu‘u Beach. Photo Credit: Kaylee Roofner

**Table 2.** Identification information for the 6 return-nester hawksbill turtles observed by the Hawai‘i Island Hawksbill Project on the Island of Hawai‘i during the 2023 nesting season. LFF = left front flipper, RFF = right front flipper, LRF = left rear flipper, RRF = right rear flipper.

| Turtle ID | LFF | RFF | LRF | RRF | Seasons Returned | Location |
|---|---|---|---|---|---|---|
| 14 | B-759 | PI1866 | Absent | PI1951<br>PIT tag:<br>982000407647076 | ‘93, ‘95, ‘00, ‘03, ‘12, ‘16 | Kamehame |
| 74 | PI1838 | ID47 | PI1820<br>PIT tag:<br>982000407647269 | PI1819<br>PIT tag:<br>982000407647401 | ‘07, ‘09, ‘11, ‘13, ‘15, ‘19, ‘21 | Kamehame |
| 120* | 3D90 | 3D70 | 3D91<br>PIT tag:<br>982000407671706 | 8C63<br>PIT tag:<br>982000407648041 | ’13 | Kamehame |
| 133 | 8C09 | 8C51 | 8C55<br>PIT tag:<br>982000407647582 | Tag Scar<br>PIT tag:<br>982000407647441 | ‘15 | Kamehame |
| 163 | 9C60 | 9C59 | 9C84<br>PIT tag:<br>982000407672568 | 9C85<br>PIT tag:<br>982000407646610 | ‘18 | Pōhue |
| 167 | PI1837 | PI1829 | PI1826<br>PIT tag:<br>982000407647914 | PI1827<br>PIT tag:<br>982000402162672 | ‘19 | Pōhue |

*Satellite tagged 7/16/2023

**Table 3.** Identification information for 11 neophyte female hawksbill turtles observed by the Hawai‘i Island Hawksbill Project (HIHP) on the Island of Hawai‘i during the 2023 nesting season. Rocket Girl’s information is not included in the table since she was not originally tagged by the HIHP. LFF = left front flipper, RFF = right front flipper, LRF = left rear flipper, RRF = right rear flipper.

| Turtle ID | LFF | RFF | LRF | RRF | Date Tagged | Location |
|---|---|---|---|---|---|---|
| 183* | PI2025 | PI2704 | PI1882<br>PIT tag:<br>982000190636622 | PI1881<br>PIT tag:<br>982000167796242 | UNK | Kamehame |
| 184 | | | PI1883<br>PIT tag:<br>982000407648693 | PI1884<br>PIT tag:<br>982000407646116 | 6/15/2023 | Kamehame |
| 185 | | | PI1949 | PI1950 | 6/23/2023 | Kamehame |
| 186 | | | PI1898<br>PIT tag:<br>982000407672661 | PI1897<br>PIT tag:<br>982000407646964 | 6/27/2023 | Pōhue |
| 187 | | | PI1855 | PI1856 | 6/26/2023 | Halapē |
| 188 | | | PI1947<br>PIT tag:<br>982000407648657 | PI1948<br>PIT tag:<br>982000407646056 | 7/1/2023 | Kamehame |
| 189 | | | PI1946<br>PIT tag:<br>982000407647181 | Two Tag Scars<br>PIT tag:<br>982000407646850 | 7/12/2023 | Kamehame |
| 190** | | | PI1945<br>PIT tag:<br>982000407647231 | PI1944<br>PIT tag:<br>982000407648597 | 7/12/2023 | Kamehame |
| 191 | | | PI1848 | | 7/20/2023 | ‘Āpua |
| 192 | | | PI1942<br>PIT tag:<br>982000407647273 | PI1940 | 8/7/2023 | Kamehame |
| 193 | | | PI1953<br>PIT tag:<br>982000407647757 | PI1952<br>PIT tag:<br>982000407646380 | | Kamehame |

* Original metal tagged on Maui. Also, knowns as “Barnacle Billie”
** Satellite tagged 7/16/2023

**SUMMARY 2023 NESTING BEACHES**

The summaries below describe the day check and night monitoring conducted by HIHP personnel, NPS volunteers, or part-time community volunteers that collaborate with the project. For some of the small, accessible beaches, HIHP relies primarily on dedicated community volunteers to conduct the majority of day checks. A total of seven beaches were documented to have hawksbill nesting activity this year (ʻĀpua, ʻĀwili, Halapē, Kamehame, Pōhue, Punaluʻu, Puʻu Mini).

***ʻĀpua***

Survey Effort: A total of 33 day checks and 21 nights of monitoring were conducted by HIHP personnel during the 2023 nesting season. HIHP personnel monitored hawksbill nesting at **ʻ**Āpua from 11 April through 19 December. Night monitoring began on 31 May and concluded on 16 November.

Nesting Activity: A total of 7 nests were documented at **ʻ**Āpua Point this season. Nesting activity was initiated by a set of tracks on 2 July and hatchling activity began on 11 September when the team discovered hatchling tracks. One nest was observed being laid by a neophyte turtle and all other nests were discovered by hatchling activity or by predation of nests by non-native predators. Mean clutch size was 176 eggs (range: 148-246). Mean nest, hatch, and emergence success was 36% (range: 9-51), 36% (range: 9-50), and 25% (range: 7-44), respectively. Two nests were excluded from calculations due to depredation evidence. Approximately 413 hatchlings were produced this season at ʻĀpua. A total of 52 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Female Encounters: One neophyte turtle was encountered at ʻĀpua on July 2nd and 20th and received an Inconel tag and is now identified as turtle #191.

Predator Control: HIHP personnel set live tomahawks traps 11 times throughout the nesting season and dispatched 2 male mongoose and 2 female mongooses.

***ʻĀwili (Road to the Sea)***

Survey Effort: A total of 22 day checks were conducted at ʻĀwili during the 2023 nesting season. No night monitoring occurred at this nesting beach. HIHP personnel monitored hawksbill nesting at ʻĀwili from 2 May through 12 December. In addition, HIHP received reports from the community and other conservation agency members on nesting activity on six separate occasions.

Nesting Activity: A total of 11 nests were documented including 5 nests discovered by tracks and hand probing, 4 nests found by hatchling activity, and 2 discovered by depredation evidence.

Mean clutch size was 142 eggs (range: 95-191). Mean nest, hatch, and emergence success was 79% (ranged 68-92), 79% (68-92), 72% (range: 54-85), respectively. Three nests were excluded from calculations due to predation evidence. Approximately 1,202 hatchlings were produced this season at ʻĀwili. A total of 40 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Female Encounters: Only day checks were conducted so no females were documented.

Predator Control: No predador control was conducted.

***Halapē***

Survey effort: A total of 12 day checks and 24 nights of monitoring were conducted by HIHP personnel during the 2023 nesting season. HIHP personnel monitored hawksbill nesting at Halapē both day checks and night monitoring from 1 June through 16 November.

Nesting Activity: A total of 3 confirmed nests were documented and excavated during the 2023 nesting season. The first signs of female nesting activity were reported by a backcountry camper to the HIHP on 16 May based on adult turtle tracks on the beach. In addition, another backcountry camper called HIHP personnel on 29 September and reported finding two dead hatchlings on the beach. HIHP personnel were able to find the nest by probing the area using the pictures and GPS points provided by the camper. All three nests were found by hatchling activity. The first documented hatchling activity was on 24 July. Mean clutch size was 193.3 eggs (range: 183-210). Mean nest, hatch, and emergence success was 40% (range: 20-60), 40% (range: 21-60), 35% (range: 21-46), respectively. Approximately 379 hatchlings were produced this season at Halapē. A total of 27 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Female Encounters: One neophyte turtle was encountered at ʻHalapē on 28 June and received an Inconel tag and is now identified as turtle #187. She was first observed emerging and later abandoned six chambers in an attempt to nest and false crawled.

Predator Control: HIHP personnel set live tomahawk traps at Halapē a total of 36 times and dispatched a total of 16 male mongoose and 7 female mongoose.

***Humuhumu***

A total of 18 day checks were conducted during the 2023 nesting season at Humuhumu from 20 June to 6 December. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Kahakahakea***

Kahakahakea was monitored twice this season, but due to its inaccessibility for turtles to emerge on the beach from Tropical Storm Darby last season it was not heavily monitored.

***Kamehame***

Survey Effort: Kamehame was monitored periodically throughout the year in order to conduct a naupaka restoration project behind the nesting site. HIHP personnel spent a total of 9 days improving the area before the nesting season began. A total of 54 day checks and 50 nights of monitoring were conducted by HIHP personnel during the 2023 nesting season.

Nesting Activity: A total of 38 nests were observed and documented at Kamehame. The first signs of activity were female tracks which ocurred on 15 May. The first signs of hatchling activity began 25 July with a nest depression, and the last hatchling activity was recorded on 22 December with a nest excavation. Eight nests were observed being laid, 5 nests discovered by tracks and probing, 16 by hatchling activity, 1 by predation, 3 dug up by other females, and 1 by beach inundation. One nest was translocated at Kamehame due to its susceptibility to inundation. During the season we lost 2 nests due to beach inundation before an excavation could occur. Approximately 4,005 hatchlings safely reached the ocean at Kamehame. A total of 266 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Mean clutch size was 192 eggs (range: 102- 249). Mean nest, hatch, and emergence success was 63% (range: 12-97), 62% (range: 12-97), 46% (range: 12-78), respectively. Of the 38 nests, 14 nests were excluded from calculations due to two nests found with depredation evidence, two nests lost to inundation, six nests with overlapping chambers, inaccurate data collection, and three nests dug up by other females.

Female Encounters: During the 2023 hawksbill nesting season, 12 nesting hawksbills were documented at Kamehame. A total of 8 neophyte nesters (ID #183, 184, 185, 188, 189, 190, 192 and 193) and 4 returnee nesters (ID #14, 74, 120, and 133) were observed and documented. Two of the nesting females were satellite tagged with the help of a graduate student from University of Hawai‘i at Mānoa (Turtle ID# 120 and 190). A tissue sample for genetic testing was successfully collected from turtle ID #14, 120, 133, 183, 184, 185, 188, 190, 192 and 183.

On 22 May, turtle #74 was found upside down alive during a day check (Figure 5). It seemed like she had fallen off the edge of a rock ledge after a nesting attempt the previous night. This rock was exposed after tropical storm Darby in July of 2021 which altered the beach from its original form. The turtle was briefly restrained for a detailed evaluation to determine if there were any injuries (looking for obvious bruises or cuts etc.). Both of the turtle’s eyes were swollen and NOAA was contacted and briefed with the evaluation. We then released the turtle

back into the ocean. To prevent potential strandings, the monitoring team constructed a rock wall to evade hawksbills from falling over the ledge. There was not another stranding observed this season. Turtle #74 was observed again on 21 June and her eyes appeared to have recovered. Turtle #74 was observed a total of 15 times during the 2023 nesting season and all observations were during false crawl activities.

**Figure 5.** The picture on the left shows Turtle #74 when found upside down after potentially falling off a rock ledge. Her tracks were observed at the very top of rock ledge. The picture on the right shows turtle #74 right eye swollen most likely from being upside down for a long period of time.

A highlight of the nesting season was observing Turtle #14, first tagged in 1993, two times during the nesting season. She was last observed in 2016 and has now been documented a total of 7 nesting seasons (Table 2). Another highlight was observing Turtle #183, who was confirmed to be a well-known and documented turtle named "Barnacle Billie". Barnacle Billie has been observed multiple times near Maui and this is the first known nesting attempt.

Satellite Tags: A total of two turtles were satellite tagged by a UH graduate student, assisted by project staff. The turtles satellite tagged were turtle ID #120 and turtle ID #190 both on 13 July.

Predator Control: HIHP personnel set kill traps, Doc250, a total of 37 times and removed 1 male mongoose, 1 female mongoose, and 2 mongoose of unknown sex. A single A24 kill trap was set behind the nesting area and a total of 8 hits of unknown source were documented. Live

tomahawk traps were set a total of 40 times, and we dispatched 5 male mongoose, 2 female mongoose, and 1 juvenile cat.

***Kāwā***

A total of 30 day checks were conducted at Kāwā by community members and HIHP personnel during the 2023 nesting season. Monitoring started on 1 July and concluded on 21 November. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Keauhou***

A total of 7 day checks were conducted at Keauhou. Monitoring began on 1 June and concluded on 11 October. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Kōloa***

A total of 48 day checks were conducted at Kōloa by community volunteers and HIHP staff. Monitoring began 4 June and concluded on 20 September. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Nīnole***

Nīnole was monitored only one time this season on 1 November. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Pōhue***

Survey effort: A total of 43 day checks and 20 nights of monitoring were conducted by HIHP personnel during the 2023 nesting season. HIHP personnel monitored hawksbill nesting at Pōhue from 4 April through 13 December. Night monitoring began on 13 June and concluded on 16 September.

Nesting Activity: A total of 15 nests were documented at Pōhue. The first sign of nesting activity was observed by tracks on 18 May and hatchling activity was first observed on 17 July. Four nests were observed being laid, 4 found from tracks and digs, and 7 discovered by hatchling emergences. Three nests laid below the high tide line at Pōhue were translocated from their *in situ* location due to their susceptibility to inundation. One nest was washed out before development was complete by Tropical Storm Dora on 8 August. Approximately, 1,806 hatchlings safely reached the ocean at Pōhue. A total of 102 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Three nests were excluded from calculations due to storm inundation (n=1) and depredated activity (n=2). Mean clutch size was 180 eggs (range: 120-239). Mean nest, hatch, and

emergence success was 78% (range: 52-97), 80% (range: 57-97), and 62% (range: 16-96), respectively.

Female Encounters: During the 2023 hawksbill nesting season, 3 nesting hawksbills were documented at Pōhue. Two females were returnees (turtle ID #163 and #167) and 1 was neophyte (#186). A tissue sample was collected from turtle #186 for genetic testing.

Predator Control: HIHP personnel set 21 A24 kill traps, and 1 live tomahawk trap when personnel were present at the nesting beach. A total of 3 rats (two males and one of unknown sex) were dispatched at Pōhue.

***Punalu‘u***

Survey Effort: A total of 113 day checks were conducted at Punaluʻu by community volunteers and HIHP staff. Monitoring began 1 June and concluded on 24 November. No night monitoring occurred at Punaluʻu due to safety concerns.

Nesting Activity: HIHP personnel were contacted on 1 June by NOAA officials that a satellite tagged turtle named “Rocket Girl” appeared to be heading down to the southern coast of Hawaiʻi Island. NOAA continued to update HIHP personnel with the locations of Rocket Girl throughout the nesting season. On 15 June, a community volunteer notified HIHP personnel about adult tracks at Punaluʻu, and based on the satellite data the nest was confirmed to be Rocket Girl. She laid a total of five nests at Punaluʻu during the 2023 nesting season. Nesting cages were placed on 4 out of the 5 nests to protect them from non-native predators. During all five nest excavations, the public was informed to observe nest excavations and possible releases of trapped hatchlings.


**Figure 6.** The HIHP team with community volunteers that helped monitor activity around the last nest laid by "Rocket Girl".

Mean clutch size was 204 eggs (range: 194-216). Mean nest, hatch, and emergence success was 74% (range: 69-78), 74% (range: 69-78), 39% (range: 17-50), respectively. One nest was excluded from calculations due to depredation. Approximately 781 hatchlings safely made it to the ocean at Punaluʻu. A total of 30 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from excavated nests for genetic sampling.

Predator Control: No predator control was conducted.

***Puʻu Ki***

A total of 2 day checks were conducted by HIHP personnel at Puʻu Ki, and an unknown number of day checks were also periodically conducted by community volunteers. No nesting activity was documented at this nesting beach. No predator control was conducted at this nesting beach.

***Puʻu Mini***

A total of 15 day checks were conducted at Puʻu Mini by HIHP staff. Monitoring began 20 June 20 and concluded on 12 December.

Nesting Activity: Three nests were documented at Puʻu Mini. The first sign of activity documented was false crawl tracks on 20 June 20 and the first nest was found 1 September by predation. One of the three confirmed nests were discovered by predation and two were discovered by hatchling activity. One was completely lost due to predation, possibly by a dog.

Mean clutch size, nest, hatch and emerge success were not calculated because all nests all showed signs of predation evidence. Approximately 308 hatchlings safely reached the ocean at Puʻu Mini. A total of 5 specimens (dead hatchling, dead pipped, partially developed embryos) were collected from nest excavation for genetic analysis.

Female Encounters: Only day checks were conducted so no females were documented.

Predator Control: No predator control was conducted.

## EDUCATION, OUTREACH, TRAINING

HIHP has utilized a number of different approaches to promote public stewardship of hawksbill turtles and coastal marine ecosystems from education and outreach events, to handing out project stickers and informational hawksbill nesting cards, to the creation of social media profiles and a website for the project.

Project personnel provided on-site and off-site interpretation, in both formal and informal settings including public nest excavations, presentations at scientific meetings and schools, group beach cleanups, and while patrolling beaches (Figure 7). In these interactions, personnel took the opportunity to talk about hawksbill and general marine turtle biology and conservation, as well as the goals and accomplishments of the project and the nesting season. Outreach events included local community members, tourists, park visitors, and class and school groups ranging from first grade to university students. Overall, HIHP personnel participated in over 10 outreach events during the reporting time period.

**Figure 7.** HIHP personnel conducting a nest excavation in front of a local elementary class.

**Outreach Events**

- Educational Outreach at Punaluʻu Beach with Kahuku School (from Oʻahu), reaching 31 students and 8 faculty members.
- February 9th, 2023, a virtual "Turtle Talk" was presented to five classes at Eminence Community School to students from 1st to 5th grade.
- March 10th, 2023, a virtual "Turtle Talk" was conducted with Monrovia Elementary School with approximately 40 students and staff.
- March 18 - 24, 2023 the recovery technician and survey assistant attended the 41st Annual International Sea Turtle Symposium (ISTS) was hosted in Cartagena, Columbia (Figure 8).
- April 5th, 6th, and 11th, a virtual presentation about the project was presented at UH Hilo to help promote recruitment of university students. Two oral presentations were given by members of the HIHP project. The first presentation was presented by the UH graduate student on the foraging habits of hawksbills, and the second presentation was given by the project's Sea Turtle Recovery Technician on the long-term monitoring efforts of the project (1989 – 2018) and the recovery trajectory of hawksbill turtles (Gaos et al 2021- Frontiers in Marine Science 8:770424).
- July 27th , 2023, the team presented at the "Reef Talk" for the Malama Kai Foundation in Kona.
- June 15th HIHP met with students and staff from the Lanakila Learning Center at Punaluʻu Beach during the Center's "Hawaiʻi Plants and Animals" class. The HIHP team was able to share and discuss the importance of the naupaka plant for nesting hawksbill habitat. The class was also able to observe the probing of the first nest at Punaluʻu since 2018.
- Five public nest excavations at Punaluʻu in 2023 with approximately 50-100 people in attendance.
- Ms. Warner's 3rd grade class was present during the nest excavation of nest #5 at Punaluʻu beach. (Figure 7).
- On October 6, 2023, the project's Wildlife Biologist (NPS), Turtle Recovery Technician, and Wildlife Survey Assistant meet with NOAA, USFW, RCUH attended the 3rd Annual Workshop on Sea Turtle Research and Conservation in Hawaiʻi Islands/Oceania on O`ahu.

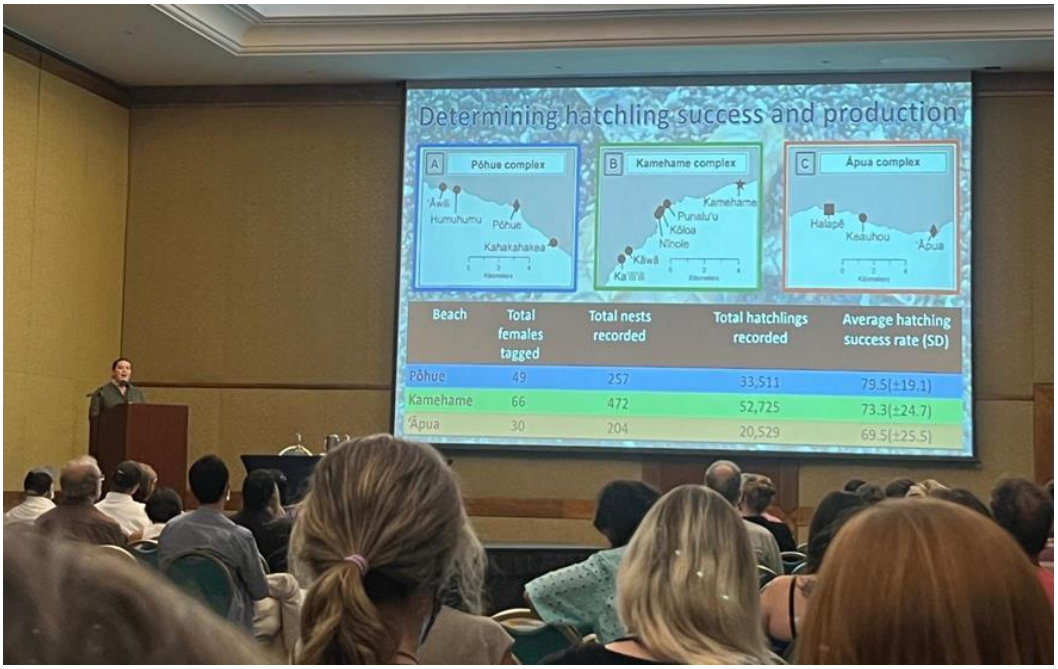


**Figure 8**. Sea Turtle Recovery Technician giving an oral presentation at the 41st International Sea Turtle Symposium in Cartagena, Columbia.