Annual Activities Report for 2022

Native Endangered and Threatened Species Recovery
Surveys, Monitoring, and Research on the Hawksbill Sea Turtle (*Eretmochelys imbricata*), Green Sea Turtle (*Chelonia mydas*), and Olive Ridley Sea Turtle (*Lepidochelys olivacea*)

Federal Fish and Wildlife Permit **ES82950**
Hawai‘i Department of Land & Natural Resources Permit **SAP No. SAP 2023-47**

Principal Officer: William G. Gilmartin
Authorized Individuals: Hannah Bernard and Cheryl King

Hawai’i Wildlife Fund
P.O. Box 760637
Pā‘ia, HI, 96779

Introduction

Hawai‘i Wildlife Fund (HWF) initiated its conservation program called the Hawksbill Recovery Project in 1996, in collaboration with the National Marine Fisheries Service (NMFS) and Hawai‘i Department of Land and Natural Resources Division of Aquatic Resources (DLNR/DAR) with the U. S. Fish and Wildlife Service (USFWS). This project aligns with the NMFS/USFWS Hawksbill Recovery Plan of 1998 to continue efforts to monitor, research, and protect hawksbill sea turtles in their nesting and marine habitats, involve and educate the community about the threats and status of sea turtles, and collect and share data for informed management decisions. While HWF monitoring activities originally focused on hawksbills, they can also include occasional green sea turtle (*Chelonia mydas*) nests on the North Shore of Maui and the possibility of olive ridley (*Lepidochelys olivacea*) nesting.

During the span of 26 years (1996 -2022) that HWF has been monitoring hawksbills, 12 nesting hawksbills have been tagged on Maui and 116 nests have been protected and/or monitored, resulting in approximately 10,878 hawksbill hatchlings successfully reaching the ocean. Although only a few hawksbills may nest on Maui each year, this contribution is still critical for the isolated Hawaiian population of hawksbills, with an average of 15–25 known nesting females per year in the state. HWF has also collaborated with NMFS in satellite tracking nesting females to their foraging grounds around Hawai‘i Island, Maui, O‘ahu, Moloka‘i, Kaua‘i, and off Johnston Atoll. In addition to satellite tracking, in-water surveys, and photo-identification HWF has contributed to the database of over 357 hawksbills across the state (now run by Cheryl King http://www.hihawksbills.org), identifying movement patterns and important foraging grounds.

HWF involves and educates thousands of individuals around Maui each year, from residents to international tourists, removing threats to sea turtles and preventing harmful human behavior, while building public understanding of hawksbill and environmental conservation. In late 2021, HWF opened a 5,000 ft^2 educational facility on Maui dedicated to the conservation of Hawai‘i’s native marine life. More than 30,000 people have now visited the Hawai’i Wildlife Discovery Center, which hosts numerous exhibits and videos on Hawai‘i’s sea turtles and other species. HWF continues to nurture invaluable connections with agencies and communities, refine research protocols, collect data and knowledge of individual turtles and their locations, and prove the value of the organization’s collective experience and the work of the Hawksbill Recovery Project.

HWF team did not observe hawksbill turtles nesting during this season, nor find hatchlings from suspected nests, but community members did film a hawksbill nesting in Hāna. Several hawksbill sea turtles left signs of nests and tracks on Keālia Beach and Mahi‘ai area of Waikoloa Beach in Hāna Bay this season, but no females were ever found nesting, nor hatchlings documented.

Several green turtle nests were identified by HWF team and excavated. Green turtles nest far less frequently on Maui and were monitored by HWF under the direction of DLNR/DAR in seven seasons: 2007, 2012, 2014, 2019, 2020, 2021, and 2022 (officially added under the terms of this permit in 2016). One unidentified sea turtle (whose nest looked more like a hawksbill than a green turtle), appeared to false crawl several times on Maui’s northshore at Ka‘ehu Bay, a beach historically used by at least one green turtle for nesting (2012). At least two green turtles nested on Maui this season, one in Mā’alaea zone and the other laid at least two nests on Pohakuloa Beach in Hāna. These three nests resulted in approximately 252 green turtle hatchlings successfully reaching the ocean.

Methods

Nest Monitoring: HWF monitors most sea turtle nesting activity that occurs on Maui, including possible hawksbill, green turtle, and olive ridley sea turtle nests. HWF began coordinating Dawn Patrol in 2018 at the request of USFWS. In addition, HWF monitors and protects green turtle nests in west Maui since Skippy Hau of DLNR/DAR retired in 2022. In addition, since 2021, HWF has been invited by the community of Hāna to assist in training local volunteers how to dawn patrol and identify and monitor turtle nests in East Maui.

Olive ridleys do not typically nest on Maui but may be monitored by HWF under the terms of this permit. When tracks or signs of nesting are found by volunteers or reported by the public in any location, HWF staff confirms and protects the nest in consultation with our agency contacts and under the terms of our research permits. This can include taping off the nest in areas with human traffic, screening nests in areas of possible predation, spreading pepper powder to deter predators, or relocating nests that are in danger of being inundated by high tide.

After the first nest of the season is confirmed, HWF staff and volunteers monitor the beach at nesting intervals when the female may return (2 – 3 weeks later). This allows the team to directly observe nesting activity, tag, measure, and identify females, and mitigate disturbance or endangerment of nesting females by monitoring human activity on the beach at night. Nests are checked regularly during incubation for disturbance or erosion and monitored around the clock as the expected emergence date approaches. These observations create opportunities to educate the public about the nests while preventing threats to the hatchlings including predation by invasive species, entanglement in vegetation and marine debris, disorientation, and desiccation.

Following the main emergence, nest excavation is planned and carried out with Hawai‘i DLNR/DAR biologist Jody Kimmel (who succeeded Skippy Hau when he retired last year), with notification of USFWS representatives Bret Wolfe and James Yrigoyen (who arrived on Maui toward the end of the nesting season). All nesting and hatching activities are monitored and documented according to established protocols and in active consultation with DNLR and USFWS. Throughout the season, all participating volunteers are trained for possible scenarios and proper behavior at the nest and provided with brochures and information to distribute to the public.

Personnel and Agency Coordination: HWF staff involved this season included Amanda Lloyd (coordinator), Cristina Ramasco (assistant), and several Hāna residents coordinated volunteers there: Kathy Flanders and Fushia Pua. Excavations were carried out by HWF staff in collaboration with Jody Kimmel and James Yrigoyen. HWF collected samples of dead hatchlings, empty shells, and unhatched eggs and transferred them to MOCMI (Tommy Cutt) to send to NOAA/NMFS/PISC in Honolulu. Live hatchlings found during excavations were allowed to acclimate in a bucket after rescue then released at the high tide line. Nest locations, hatchling numbers, times of activity, and behavior notes were collected in the field notebook, then checked, stored, and shared with the team via email and Google Drive. HWF staff notified and consulted with DNLR and USFWS representatives regarding nesting and monitoring activities via email, text, and phone calls as needed. Human interaction with sea turtles was minimized effectively throughout the season, and no interacion with nesting females occurred at all.

Volunteer Involvement: Trainings were conducted in person in mid-May at the Hawai‘i Wildlife Discovery Center, and on Zoom, to protect our team against the spread of COVID. The occurrence of COVID in our community forced us to cancel our training at the Keālia Pond Refuge Visitor Center. After that, we no longer hosted trainings inside classroom settings. A training video was created and provided to interested volunteers as the season progressed. It included basic sea turtle life history and biology, nest identification and protocol,

and instruction in the usage of two smart phone apps. Clockify was used to track volunteer hours, and Slack was used to facilitate reporting and communications. HWF staff were present with volunteers every night of camping when activity was expected, except in Hāna due to distance. Volunteers are involved in identifying nests during Dawn Patrol every morning on 7 known nesting beaches, and also are involved in nest watch to protect hatchlings. Dawn patrollers also monitored several west Maui beaches and three northshore beaches for green turtle nesting, but no evidence of nesting was observed. Volunteers were trained and managed by staff to stay dark and quiet on the beach and maintain appropriate distance from nesting females and hatchlings if there was activity. Volunteers were also prepared for emergences during the day watches, and in ready contact with HWF staff if this occurred. All volunteers received protocols for nesting patrols and nest watch and had access to additional hawksbill information to release to the public. Volunteers and members of the public present at excavations and emergences received explanations of sea turtle life histories and our responsibilities and practices. They were also instructed in the context of our work, to maintain space from the hatchlings especially as they reached the water, to turn off any lights and flash photography, and to not post the locations of nests to social media.

Additional Activity: Beyond monitoring of nesting and hatching activity, the nesting project includes continuous protection of nesting habitat, including beach cleanups, fence repair, and dune restoration as necessary. During the offseason, HWF checks beach habitats, trains volunteers, and prepares the necessary permits and gear for each nesting season.

Results

Figure 1. Hawksbill nesting activity 2022. One suspected nest by unknown hawksbill female observed on Mahi‘ai, Waikoloa Beach, Hāna Bay (left). Two suspected hawksbill nests identified by Dawn Patrol on Keālia Beach, Natl. Wildl. Refuge (right). Image by Google.

Olive Ridley turtle activity:

No nesting olive ridley sea turtles were reported or observed by HWF in 2022.

Hawksbill turtle activity:

No nesting female handling and observation, tagging or measurements, were carried out by HWF this season as we **encountered no nesting** females of any species. Hatchlings were observed and protected during their emergence and crawl but needed no transportation to the high tide zone.

Dawn patrol volunteers patrolled six known hawksbill nesting beaches on south Maui throughout the season and added the seventh beach in Hāna after notification of a possible nest there. Dawn patrollers and nightwatch also patrolled Ka‘ehu Beach on Maui’s

northshore after a possible nest was found there. HWF staff responded to all crawls, nesting, and hatchling reports. Over 50 volunteers participated in dawn patrol, completing approximately 204 daily patrols from June - July.

A total of three hawksbill nests were identified and monitored in 2022, and one more hawksbill nest may have been laid but was never located. One hawksbill turtle was reported nesting on Mahiʻai Beach (in the Waikoloa area) in Hāna Bay by a community member, and video was provided (Fig. 1). Although it was difficult to be sure from the video, it appeared that she could have been digging a nest, and species ID was indeed a hawksbill. She was observed for less than 2 hours, and this female was never observed again, nor were hatchlings ever observed emerging by the team conducting nestwatch or found during excavation several months later (Table 1). A second hawksbill may have attempted to nest in this same area of this beach on the same day (pers. comm., community members), but no tracks nor hatchlings were found by the team conducting nestwatch and patrolling at night. Several months later, community members may have seen hatchlings on this beach, and a visitor is reported to have taken video, but we have not seen it. This beach was highly eroded during the course of the incubation period of the nest that had been filmed by the community member, and it is possible that this nest was washed out to sea.

Two additional hawksbill nests or false crawls were reported from tracks found by Dawn Patrol at Keālia Beach (Fig.1). The nests or false crawls were found in close proximity (less than 50m), four days apart. Hatchlings were never observed emerging from either nest, nor were nests found upon excavation more than 2 months later (Tables 2, 3). Hence, we believe the Keālia nests were likely false crawls.

Green turtle activity:

Three successful green turtle nests were found in 2022, but the females were not observed. Two of these green turtle nests (likely from the same female) were found during a search of Pohakuloa Beach in Hāna by a team of HWF, Hāna community members and DLNR representative, Jody Kimmel on 9/7/22. This beach is difficult to access, and a rope is used to scale a cliff to reach the site (Fig. 2, Table 2).

Figure 2. Green turtle nesting site in Hāna, 2022. Historical and current green turtle

nesting site, Pohakaloa Beach, Hāna (left). The hard-to-reach beach in Hāna must be accessed using a rope (right).

It is a known nesting beach for green turtles, and is inspected annually (not patrolled regularly) by community and HWF team. The team found one nest ready to emerge during inspection of this beach, and one nest that had likely erupted several weeks previously. A third green turtle nest was found on Māʻalaea Beach by HWF team during a search for dead hatchlings reported to HWF by beachgoers (likely laid by a different female from the Hāna nests). In addition, two suspected green turtle nests or false crawls were found on Kaʻehu Beach (Fig. 3, Table 2) and monitored by night watch and dawn patrol, but no female was ever encountered nor hatchlings seen. No nests were found during excavation (Table 3). It is assumed they were false crawls.

Table 1. Nesting data for hawksbill turtles 2022, one nest reported on Mahiʻai Beach, Waikoloa, Hāna, and two suspected hawksbill nests on Keālia Beach.

Date	Nest	GPS points	Observed activity	Time	Returned to water
9/19/22	Nest 1 Mahiʻai, Hāna	20.76274, -155.98530	Turtle observed on beach	4:05pm	4:30pm
8/22/22	Nest 1 Keālia	20.47759, -156.29396	Tracks observed False crawl	6:30am	unknown
8/26/22	Nest 2 Keālia	20.79583° -156.48861	Tracks observed False crawl	~6:40am	unknown

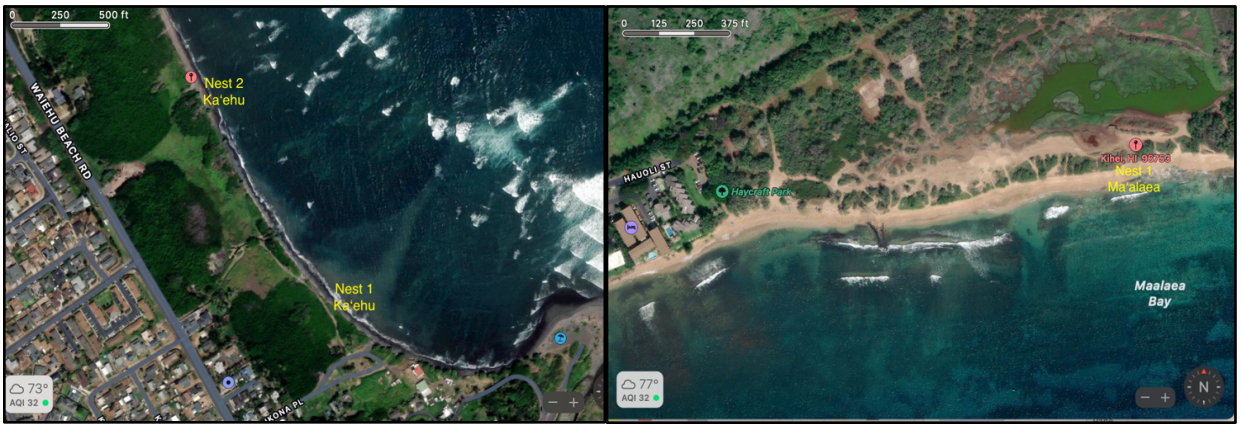

Figure 3. Green turtle nesting activity on Maui's northshore and Māʻalaea, 2022. Two suspected nests identified by Cheryl King on Kaʻehu Beach (left). One green turtle nest found on Māʻalaea Beach near Haycraft Park by HWF staff during a search for dead hatchlings (right). Image by Google.

Table 2. Nesting data for green turtles 2022, two nests found on Pohakuloa Beach, Hāna, two nests found at Kaʻehu Beach, and one nest found on Māʻalaea Beach (Haycraft Park area).

Date	Nest	GPS points	Observed activity	Time	Returned to water
Unknown	Nest 1	20.70683 , -156.99376	Nest found	unknown	unknown

(Early June)	Pohakuloa, Hāna				
Unknown (July)	Nest 2 Pohakuloa, Hāna	20.70652, -156.99399	Nest found	unknown	unknown
Unknown (Early June)	Nest 1 Māʻalaea	20.79726°, -156.49912	Nest found	unknown	unknown
~Aug 7	Nest 1 Kaʻehu Beach	20.91388, -156.9744	False crawl	unknown	unknown
Unknown ~Aug 27	Nest 2 Kaʻehu Beach	20.91384, -156.49119	False crawl	unknown	unknown

Hatching: All hawksbill nests and the green turtle nests at Kaʻehu were marked and monitored within the first few days of nesting. The hawksbill nests at Keālia were treated with pepper powder, but not screened, as we did not know where the nest center was located. The green nests at Kaʻehu were not screened or treated with pepper powder per the terms of our permit. The green nests in Hāna were not monitored as we were not aware of them until we did an inspection of Pohakuloa Beach on September 7. The green turtle nest at Māʼalaea was not monitored at all as we were unaware of it until we found it during a search for dead hatchlings on August 2. Dead hatchlings were reported to us by Dawn Patrol and MOCMI staff who had found or heard of 9 dead hatchlings in the area near Haycraft Park, both makai and a bit mauka in the "salt flat" area of this beach in late July. On August 2, Cheryl King, A. Lloyd, and H. Bernard searched the area for hatchlings and a potential nest and found a nest that morning. Due to the reports of the dead hatchlings, which were possibly one to two weeks previously, we immediately excavated the suspected nest, after consulting with our agency partners.

The hawksbill nests in Hāna were not screened nor treated with pepper powder, per the terms of our permit (powder and screening treatment follows known depredation events) and because we did not know exactly where the nest was. As the date of emergence approached, the nests were monitored 24/7 (Table 4). Camping overnight in Hāna was organized by the family who resided closest to the nest with support from additional community members. Camping at other nest sites (Kaʼehu and Keālia) was coordinated by HWF and occurred for approximately 10 nights to bracket first emergence (~day 60) and excavation at day 70. Both sites hosted 3 – 20 campers per night for a total of approximately 1800 hours during camping, night patrolling and nest watching.

Excavations: All excavations were completed with HWF staff and Jody Kimmel or James Yrigoyen, first thing in the morning except for Nest 1 at Māʻalaea. As described above, this nest was excavated after 9 hatchlings had been found dead over the course of a week or more in the area where we found the nest.

Table 4. Emergence data for 2022, all hawksbill and green turtle nests.

Date laid	Species/ Location	Date of first Activity	Time of Depression	Time of First Emergence	# in First Emergence
Unknown (Early June) Nest 1	Green (*C. mydas*) Māʼalaea	~July 31 Likely earlier	unknown	unknown	Unknown But likely >70
Unknown (Early June) Nest 1	Green (*C. mydas*) Pohakuloa	unknown	unknown	unknown	Unknown But likely >80

Unknown (Early July) Nest 2	Green (*C. mydas*) Pohakuloa	unknown	unknown	During excavation ~6pm	96 during excavation
~Aug 7 Nest 1	Green (*C. mydas*) Ka'ehu	No emergence	none	none	none
~Aug 27 Nest 2	Green (*C. mydas*) Ka'ehu	No emergence	none	none	none
8/21/22	Hawksbill (*E. imbricata*) Keālia	No emergence	none	none	none
8/26/22	Hawksbill (*E. imbricata*) Keālia	No emergence	none	none	none
9/19/22	Hawksbill (*E. imbricata*) Hāna/Mahi'ai	No emergence	none	none	none

Table 5. Excavation data and final hatchling success for 2022.

Excavation date/ Species/ location	**total eggs**	**empty shells**	**unhatched**	**dead in nest**	**pipped dead**	**pipped live**	**live in nest**	**hatchlings to water**	**success %**
8/2/22 Green Nest 1 Mā'alaea	108	75	33	11 (dead on beach) + 2 dead in nest	0	0	3	62 Assumed not observed	0.574074
9/7/22 Green Nest 1 Pohakuloa	109	101	6	9	2	0	0	92 Assumed not observed	0.844036
9/7/22 Green Nest 2 Pohakuloa	108	96	11	0	1	1	97	96 Observed	0.888888
10/2/22 Green Nest 1 Ka'ehu	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/2/22 Green Nest 2 Ka'ehu	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/29/22 Hawksbill Nest 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Keālia									
10/29/22 Hawksbill Nest 2 Keālia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/25/22 Hawksbill Nest 3 Hāna/Mahi‘ai	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	325	272	50	20	3	1	100	250	0.76899

Photo Documentation of Permitted Activities

Figure 3. HWF & DLNR staff and Hāna community members searching for green turtle nest at Pohakuloa, Hāna on 9/7/22.

Figure 5. Left, green turtle crawling to ocean after emergence from nest. Right, HWF staff and community members watch over hatchling crawling to ocean, Pohakuloa Beach, Hāna, Maui, 9/7/22.

Figure 6. HWF & DLNR staff excavate green turtle nest at Pohakuloa Beach, Hāna Maui, 9/7/22.

Figure 7. Suspected hawksbill nest 1 at Keʻalia, Maui, 10/29/22.

Figure 8. Above, campsite for nestwatch, suspected hawksbill nest 1, 10/29/22. Below, evidence of severe seasonal beach erosion at suspected hawksbill nest 2 site, Keālia

Figure 9. Suspected hawksbill nest site 2 Kealia, nestwatch team.

Figure 10. Left, green nest 1. Right, green nest 1 during excavation Ka‘ehu, Maui 10/2/22.

Figure 11. Top, Green turtle nest 1 Māʻalaea, Maui, 8/2/22. Bottom, public camping site near green turtle nest in area where dead hatchlings were found.

Conclusion

During the 2022 nesting season, one hawksbill attempted to lay one nest that we know of on the east shore, and two nesting green turtles laid two successful nests on the east shore and one nest on Maui's central, west shore (Māʻalaea). None of the nesting green turtles were seen nor tagged. The hawksbill turtle was observed and filmed by a community member, for less than 2 hours. The act of nesting was not observed. All these nests were excavated, but we could only obtain information from the three green turtle nests. Both green turtle nests in Hāna had high hatching success 84 - 88%, but the green turtle nest in Māʻalaea was less successful (57%). The green turtle nests in Hāna were on a remote beach (Pohakuloa), with no apparent human interference. However, the hatchlings from the nest in Māʻalaea were likely influenced by lights and/or beach fires as this is a camping beach with signs of major encampments near the nest in the area where the dead hatchlings were found (Fig 11).

There were several nests of both green and hawksbill turtles that we assumed to be false crawls. It is unlikely that the green turtle false crawls on the northshore at Kaʻehu were from the same female as the Māʻalaea nest due to the great distance (~38nm) and timing, but it is possible. Although nesting numbers for both green and hawksbill turtles are low on Maui, this legacy project has protected more than 11,681 hatchlings over the past 26 years.

The locations of the nests in Hāna on Maui's east shore were beaches not commonly frequented by tourists, but more typically accessed by residents. The Mahiʻai section of Waikoloa in Hāna Bay is also driven on by 4W drive vehicles. But Hāna coordinators worked with the community to reduce the impact of driving on this beach. Both areas are not threatened by light pollution and frequent, public camping access.

All nesting beaches contain human or natural impacts that cause challenges for hatchlings to overcome to ensure their survival. Our team of volunteers and staff are essential in the success rate for these critically endangered hawksbill hatchlings and green hatchlings. In this nesting season, we lost our project manager mid season, and saw a reduction from the last two "COVID"-influenced years in volunteer involvement in south and central Maui, with ~100 core

local and visitor volunteers who committed >2000 hours for dawn patrol, night watch, and day watch. However, we saw an increase in involvment in Hāna community members and strengthening of that community-based monitoring effort. HWF has been able to manage this program for 26 years through the committed staff, countless volunteers, and supportive partners that allow the project to happen.

We look forward to continuing the ongoing communication and collaboration between Hawai‘i Wildlife Fund, Hawai‘i Department of Land and Natural Resources Division of Aquatic Resources, U.S. Fish and Wildlife Service, and our community of volunteers and the County of Maui for our camping permits. We will continue to share our data and plans, collaborating with our partners and communicating as nesting events occur through email and text. These ongoing conversations will allow HWF staff and volunteers to be readily prepared for each threat and contingency that may be encountered during the nesting season.

HWF will also continue its sea turtle education programming through social media, special events, Ho‘okipa Honu Watch, distributing information, and answering questions during excavations and nest watches. This allows us to address potential anthropogenic threats, build the understanding of sea turtles, awareness of their recovery program in the community, and sign-up new volunteers. HWF continues to recruit new interns and volunteers and pursue additional funding sources for next season to prepare, monitor, and preserve habitat and hatchlings for the critically endangered hawksbill and green sea turtle populations. With community awareness, new and remigrating females, and increased hatchling success, the hawksbill population is at least monitored on Maui. These efforts continue to protect these females and their nests for we hope to see an increase in successful hatchlings and newly mature females coming to nest. Despite no nesting occuring there in 2022, we still recommend further examination of the nesting beach at Kawililipoa. Since this is one of the most important nesting beaches for Maui hawksbills in terms of frequency of nesting, we must prioritize a plan to work with DLNR and USFWS and the homeowners to address the habitat and lighting issues.

Since the beginning of systematic nest monitoring on Maui in 1996, hawksbill nesting numbers have remained low compared with Hawai‘i Island. Green nesting, though far less common in the Main Hawaiian Islands than French Frigate Shoals, does still occur on Maui. Range of nesting activity on Maui for hawksbill nesting = 0-4 nesting females and 0-12 nests annually with 21 known nesting years since 1996. Green turtle nesting on Maui is less frequent with 2022 adding the 7th known nesting year since 1996 and ranging from 0-3 nesting mothers and 0-5 nests per year.