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Report from the Hawaii Hawksbill Recovery Implementation Group

Technical Report · November 2015

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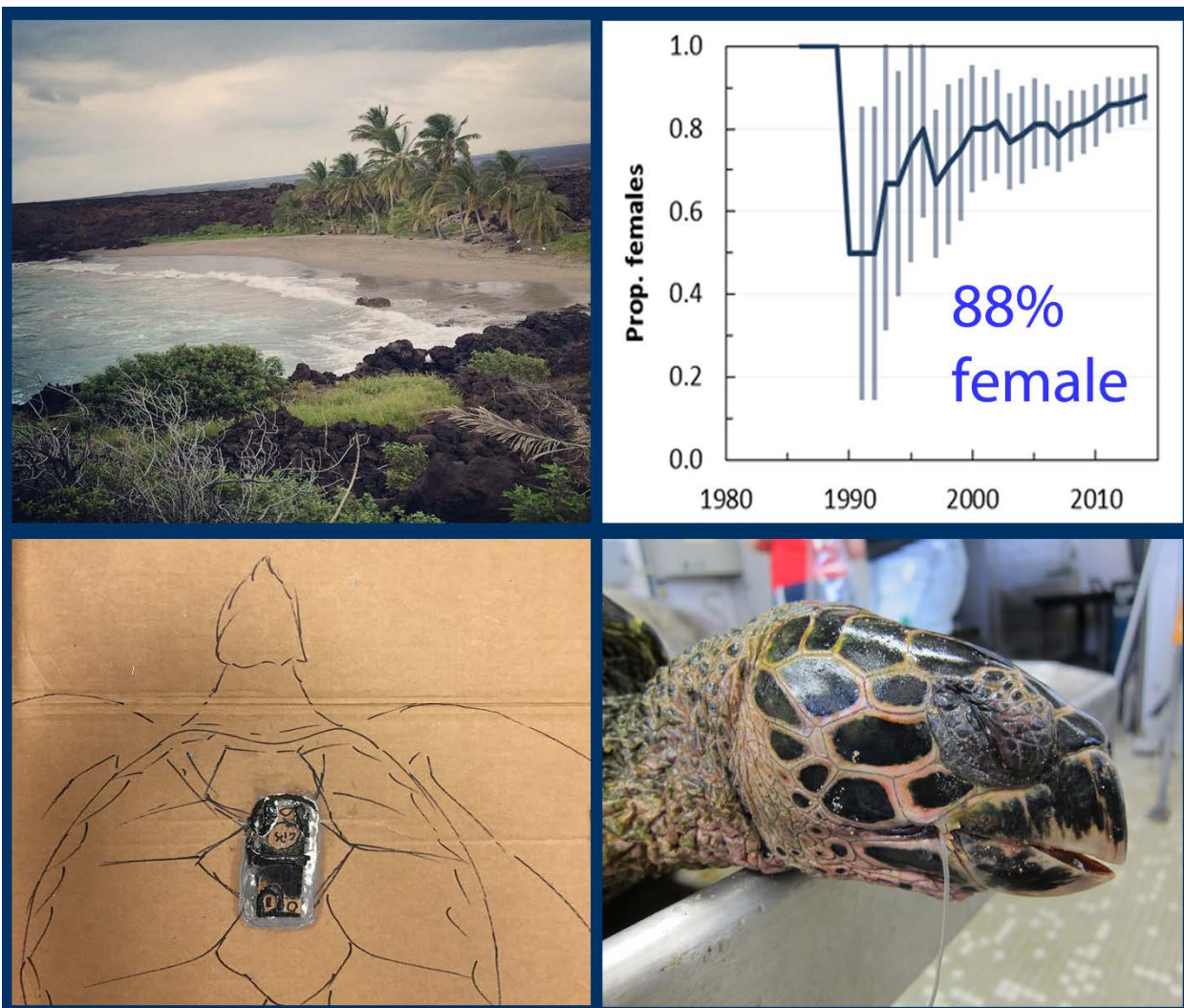
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Clockwise from top left: Pohue nesting beach on Hawaii Island (NOAA/Kyle Van Houtan), Cumulative sex ratio determined from stranding necropsies (NOAA/Shandell Brunson), dead juvenile hawksbill with a swallowed “slide bait” ulua line (NOAA/Kyle Van Houtan), and mock hawksbill satellite biotelemetry attachment from meeting workshop (HWF/Cheryl King).

Hawaii Hawksbill Recovery Implementation Group

23-24 February 2015



NOAA Inouye Research Center
1845 Wasp Blvd, Bldg 176
Ford Island, Honolulu, HI 96814

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MEETING PARTICIPANTS

ORGANIZERS

| | | |
|-----------------|------------|-------------------------|
| Joy Browning | USFWS | Joy_Browning@fws.gov |
| Irene Kelly | NOAA PIRO | Irene.Kelly@noaa.gov |
| Kyle Van Houtan | NOAA PIFSC | Kyle.VanHoutan@noaa.gov |

ATTENDEES

| | | |
|-------------------|----------------------|-----------------------------------|
| Sarah Alessi | NOAA PIFSC | Sarah.Alessi@noaa.gov |
| George Balazs | NOAA PIFSC | George.Balazs@noaa.gov |
| Michelle Bogardus | USFWS | Michelle_Bogardus@fws.gov |
| Shandell Brunson | NOAA PIFSC | Shandell.Brunson@noaa.gov |
| Devon Francke | NOAA PIFSC | Devon.Francke@noaa.gov |
| Skippy Hau | DLNR | skippy.hau@hawaii.gov |
| T. Todd Jones | NOAA PIFSC | Todd.Jones@noaa.gov |
| Kristin Kelly | DLNR | Kristen.Kelly@hawaiiantel.net |
| Cheryl King | Hawaii Wildlife Fund | shezking@yahoo.com |
| Greg Koob | USFWS | Greg.Koob@fws.gov |
| Lauren Kurpita | NPS HAVO | Lauren_Kurpita@contractor.nps.gov |
| Rhonda Loh | NPS HAVO | Rhonda_Loh@nps.gov |
| Jennifer Lynch | NIST | Jennifer.Keller@noaa.gov |
| Summer Martin | NOAA PIFSC | Summer.Martin@noaa.gov |
| Earl Miyamoto | DLNR | Earl.Miyamoto@hawaiiantel.net |
| Shawn Murakawa | NOAA PIFSC | Shawn.Murakawa@noaa.gov |
| Patrick Opay | NOAA PIRO | Patrick.Opay@noaa.gov |
| Frank Parrish | NOAA PIFSC | Frank.Parrish@noaa.gov |
| Susan Pultz | NOAA PIRO | Susan.Pultz@noaa.gov |
| Thierry Work | USGS | Thierry_Work@usgs.gov |

AGENDA – DAY ONE

February 23, 2015

- | | |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:30 am | Welcome and Introductions (Kelly/Van Houtan/Browning) |
| 9:00 – 12:00 pm | Project Reports – To include: 2014 activities, monitoring results, impediments or challenges, site-specific threats or concerns, and anticipated future project needs |
| 9:00 (brief) | 2013 ESA Hawksbill Turtle Status Review (I. Kelly) |
| 9:05-9:45 | Hawaii Island Hawksbill Recovery Project (L. Kurpita) |
| 9:45-10:25 | Maui Hawksbill Monitoring Project (C. King) |
| 10:25-11:00 | NOAA PIFSC stranding and necropsies (S. Brunson) |
| 11:00-11:30 | NOAA PIFSC research, analysis, and modeling (K. Van Houtan) |
| 11:30-12:00 | Round table updates from stakeholders; Follow-up questions from talks |
| 12:00 pm | Lunch at IRC cafeteria |
| 1:00 – 4:00 pm | Group Discussion – Monitoring, Management and Research Needs |
- Projects should come prepared to discuss management and research needs to address specific threats or recovery goals. [Discussion leads – Kyle, Joy, Irene]
1. Nesting beach monitoring (Kyle) – monitoring opportunities, nest relocation (protocol), predator control, nest excavation, or other methods to bolster assessments, hatchling emergence and reproductive productivity
 2. Terrestrial threats and management (Joy) – habitat quality, predation & predator control, human impacts (beach use, camp fires, fishing, beach debris, vehicular bch driving, lighting, other?)
 3. Marine threats and management (Irene) – fisheries, marine debris, habitat, climate, other?
 4. Challenges (Irene & Joy) – volunteers, community perceptions and buy-in, outreach
- | | |
|---------|-------------------|
| 4:00 pm | Break for the day |
|---------|-------------------|

AGENDA – DAY TWO

February 24, 2015

8:30 am Welcome and summary of Day One

9:00 am Group Discussion continued...

5. Funding and Conferences (Kyle) – What funding opportunities exist (NOAA, USFWS, other?) and how may we promote science and programs
6. Permits (Joy) – Overview of FWS permits

10:00 – 11:30 am Commitments: Meeting Outcome and Tasks – Outline any changes or modifications to existing programs to achieve greatest conservation outcome and secure stakeholder transparency.

Identify future conservation management activities or supporting research (e.g., continue with status quo, implement new protocol, employ experimental strategy, develop materials, publish reports, revise permits or secure new permits, etc.)

1. Hawaii Island Hawksbill Recovery Project (L. Kurpita)
2. Maui Hawksbill Monitoring Project (C. King)
3. NOAA PIFSC (K. Van Houtan)
4. NOAA PIRO (I. Kelly)
5. DLNR (TBD)
6. USFWS (J. Browning)

11:30 – 12:00 am Meeting report

Agree on format our meeting report will take. Review specific To-Do items identified and assigned to each listed project or stakeholder (#1-6).

12:00 pm Lunch at IRC cafeteria

1:00-3:00 pm Biotelemetry Tagging tutorial (optional)

3:00 pm Conclude

EXECUTIVE SUMMARY

The Hawaii Hawksbill Turtle Recovery Implementation Group (Group) serves to prioritize research and management to facilitate conservation of hawksbill sea turtles in the Hawaiian Islands. The Group strives to meet annually to connect field projects, researchers, and managers to discuss progress and explore opportunities to maximize recovery efforts. This is a report of the 2015 Group meeting convened by the U.S. Fish and Wildlife Service (Pacific Islands Fish and Wildlife Office) and NOAA Fisheries (Pacific Islands Regional Office and Pacific Islands Fishery Science Center) staff in Honolulu with active participation from projects from Maui and the Island of Hawaii and other key stakeholders.

The biological data gathered in the 2014 nesting season are as follows. On Maui and Hawaii islands, a total of 13 nesters were identified of which 8 were documented remigrants, 4 neophyte breeders, and one unidentified nester. These females laid a total of 57 confirmed nests with 6,176 hatchlings reaching the ocean. Since monitoring began in 1991, a total of 141 nesting females have been tagged (129 Hawaii, 11 Maui). The National Park Service office based in Hawaii Volcanoes National Park leads monitoring on Hawaii Island and focuses on beach complexes of Apua Point/Halape, Kamehame/Punaluu, and Pohue Bay/Awili Point. The Hawaii Wildlife Fund (a nonprofit) with assistance from the Hawaii Department of Land and Natural Resources (DLNR) monitors hawksbill nesting on Maui, concentrating efforts on the beaches between Maalaea and Makena. Additional sporadic nesting occurs on Molokai and Kauai without regular monitoring. All field projects have logistical challenges including reliable 4x4 vehicles, staff safety at remote sites, recruiting and managing volunteers, community interactions and perceptions, and funding.

Several analyses are emerging from the monitoring data that could help focus and refine conservation efforts. From strandings data, there are two significant concerns. The first is the presence of fishing interactions with stranded hawksbills, and the second is the female-biased population sex ratio. More than half (53%) of the hawksbills stranding in Hawaii had wounds from interactions with coastal fisheries. Though these interactions are not always fatal, their prevalence far exceeds the next most prevalent threat. Both necropsy records and in-water observations indicate the population is almost 90% female. Such a highly skewed sex ratio has obvious consequences for population dynamics, especially in a population that is calculated at around 110 total breeding adults. New analysis also suggest the onset of sexual maturity is 15-19 years, and indicate breeding remigration intervals may be shifting from 3-5 years a decade or more ago to 6-8 years on average today. There is no apparent trend in nesting activity in the last 20 years.

Focus of the Group moving forward is generating meaningful scientific products and shaping permitted activities and management actions to affect positive conservation change. Central to these discussions is understanding the differences between the green turtle population, which has rebounded since federal and state protections in the 1970s, and the hawksbill population which remains low. Action items from various constituents focused on: maintaining and expanding monitoring efforts; mitigating fishery interactions; increasing genetics sampling; addressing nesting areas with low nest viability; assessing if nest temperatures are influencing sex ratios; modifying permits to accommodate additional activities; and collaborating on funding and manuscripts.

DAY ONE – Presentations and Discussions

WELCOME, INTRODUCTIONS, OPENING REMARKS

Irene Kelly PIRO, Kyle Van Houtan, Joy Browning

IRENE - Meeting purpose and goals is to convene core Hawaii hawksbill research programs, key partners, and stakeholders to connect and review projects. Discuss and prioritize actions to help recovery of hawksbills, and explore opportunities for additional projects. Recap of priorities and action item themes from 2012 meeting.

KYLE - This group is not summoned by an ESA process; this is not an official “recovery group” under ESA. But this both allows us more freedom, but restricts us, e.g., in funding.

GREG - Are we just talking about hawksbills in Hawaii, or also in the western Pacific, etc.?

KYLE - We are only talking about Hawaii, even though technically there is no such population (in ESA terms) as “Hawaiian hawksbills.” There is currently only one DPS. But we can discuss briefly other regional populations over the course of the presentations. Currently there is little described genetic resolution between hawksbill populations, but they are looking for new markers that may be able to discern population differences.

PAT - However, the DPS designation process is currently evolving, and is being considered more restrictively now. In the past they have split a global populations into 10+ DPSs, they may no longer do this.

MORNING PRESENTATIONS

1. *Irene Kelly*

Pacific Islands Regional Office, Protected Resources

- Overview of 2013 ESA Hawksbill Turtle Status Review
- The most current Status Review of the species was released in 2013. The recommendation of this review was that climate change is an emerging threat to the species.
- Last review was in 2007; As per the ESA, reviews are supposed to be every 5 years
- Collecting essential data to ensure we are climate ready in the future would be prudent so that climate change information can be incorporated into the next status review
- The 2007 Status Review recommendation was to look at discrete population segments (DPSs), this did not occur for the 2013 review likely this is a much larger effort that would require a global review of the species
- NOAA Office of Protected Resources (OPR) leads status reviews together with USFWS, and has resources on this process available online

2. *Lauren Kurpita*

Hawaii Island Hawksbill Turtle Recovery Project, Hawaii Island

- Staff breakdown: Lauren is director @ 25% time, Liz the lead field technician is 100% time, plus many volunteers.
- Volunteers typically work for 3 months, with 7-8 consecutive nights of field monitoring
- Number of volunteers reduced from past levels due to funding
- But the project would like to increase funds and hire more local volunteers

- Monitoring occurs in the southern part of island, over a large area
- Monitored beaches in 3 main complexes from north to south: Apua Point and Halape, Kamehame and Punalu'u, Pohue Bay and Awili Point
- In addition there are numerous, small and isolated pocket beach locations
- Nesting monitoring occurs continuously throughout the entire season (from May - January); field gear is flown at the beginning of the season by helicopter
- 2014 nesting highlights
 - o first nest in May with last nest was excavated 7 January 2015
 - o 4 newly tagged adult females, 11 total females nested
 - o 129 nesting females tagged since 1991 (start of project)
 - o 51 total nests, 25 coming from previously tagged nesters
 - o Approx. 5,934 hatchlings confirmed reached the ocean
- The goal is to identify all nesting individuals through monitoring the beaches at night.
- *Kamehame*, did not consistently monitor due to staff safety concerns and the sandy habitat making it difficult to identify nests, therefore no documented nesting turtles. Previously significant hawksbill nesting beach, but this was the 3rd year in a row with inconsistent monitoring. A brush fire, community interactions, alarming beach erosion, safety concerns - including methamphetamine drug use by beach occupants.
- *Punalu'u*: small nesting presence historically, but also has community problems with drug abusers, poor substrate, and invasive species (plants/animals). But there was a good public outreach event here with a hatchling nest excavation.
- *Pohue*: has had beach erosion, but is a very successful white sand beach for nesting. Even though it is remote, there is public interaction. Nest cages are used here.
- *Humuhumu Point*: is a pocket sand beach with a huge lava crack. A female full of eggs was found dead in the crack in 2008. The crack is checked now consistently. They found a female (T62) wedged in the crack this year and they removed unharmed in 2-day operation using cargo net.
- Project challenges include maintaining reliable vehicles (a lot of driving is required to cover this large area!). They need to secure more funding to grow/expand and experiment with implementing management techniques to improve recovery.
- Total nesting and hatchling production numbers are lower because of partial monitoring at Kamehame.

Comments

IRENE - Is it possible that turtles are nesting on pocket beaches that the project can't access. Could these difficult-to-reach beaches be monitored by air?

LAUREN - Helicopters could work, but costly and limited availability, and much bureaucracy.

RHONDA - Volunteers are NPS staff and many are young college students, so we can't afford to risk an incident happening because it would shut down the volunteer program. We set up "go" and "no go" situations with exit plans for Kamehame, but we still have a limited ability to get volunteers in there overnight safely.

TODD - What percentage of the nests actually hatch and make it to the sea?

LAUREN - It's highly variable and depends on the beach. It ranges from 40-100% success, which we suspect is linked to erosion, beach temperatures, and rain.

PAT - What's the total budget for a year?

RHONDA - \$150-200K in the recent past, but it's currently just under \$100K (with various reasons for the decline). PIRO currently contributes 50%, and the remainder is provided by NPS.

3. Cheryl King

Hawai'i Wildlife Fund, Maui

- HWF is a small nonprofit on Maui founded by Bill Gilmartin and Hannah Bernard 1991
- Projects involve multi-agency collaborations on Maui (Skippy Hau, Glynnis Nakai, Courtney Brown)
- HWF has no staff, only contractors, and many volunteers (mostly retirees)
- They monitor both hawksbills and green turtles
- Difficult to find hawksbill nests without seeing female drop eggs
- Nesting beaches: Hamoa, Koki, Hana Bay, Little beach, Oneloa, Kealia, Kalepolepo, Kawililipoa
- 1993 – a fatality of an adult female occurred from vehicular collision
- 1994 – an adult crossed N. Kihei Road twice; 2 adults were entangled in invasive pickle weed
- 1996 – there were hatchling fatalities, another nesting female struck by a vehicle
- HWF made a 2 mile stretch barrier then got permission to put up a fence to stop fatalities, and it worked! But it took thousands of worker hours.
- Now there's a new recycled plastic fence and they are taking down the old one; the fence entirely prevents females from crossing the road.
- 1991-2014 nesting: 78 nests, 9 individual nesters tagged with migrations to other MHI islands.
- 2014 nesting: 9 green turtle nests, 6 hawksbill nests from two nesters.
- *Kealia*: competition between people and nesters here. This year multiple false crawls. There was a huge construction operation with bright lights and heavy use during July 4th holidays. Saw one female on the beach, but she never returned. Another female was observed on the 4th of July while the beach was hectic and she was also never observed again. 2 months later, they found a nest in the bushes and made a sand path to the water to help the hatchlings when they emerge. But Kealia nests never develop, and this nest was no exception.
- A project was initiated to determine why Kealia nests don't develop (except 6 nests from 2 nesters did develop in 2009). This project involved relocating nests from Kealia to another beach down the road, but this was unsuccessful. There was no development inside the shriveled eggs.
- *Kawililipoa*: a nester was found entangled in items from the homeless camp site trash. They moved the nest down the beach to "the hatchery," which is nice area but highly vegetated high up beach. A second nester attempted to nest there, but was discouraged and eventually nested on the sandy beach below the high tide line. They moved her nest to "the hatchery" as well.
- A technique they use for nests laid in vegetation is to make a sandy pathway for hatchlings to more easily reach the ocean.
- 242 live hatchlings made it to the ocean safely in 2014.
- HWF wants to know about the developmental stage of the eggs from these beaches so they can understand why the turtles didn't survive and whether any of it is attributable to handling the nests.

Comments

IRENE - Are the eggs fertile or infertile in those Kealia nests that are shriveled with no development?

GEORGE - It's very rare to have infertile eggs, based on research that has been conducted, so Hawaii would be an outlier if there was a high incidence of infertile eggs.

JENN - I usually look to moisture content as a culprit when the eggs are shriveled.

4. Shandell Brunson

NOAA Pacific Islands Fisheries Science Center, Turtle Research Program
Hawksbill Sea Turtle Strandings in the Hawaiian Archipelago, 1982-2014

- Our strandings analysis hasn't changed much since I last presented in 2012.
- There have been 6711 total strandings; 1.3% (87) are hawksbills, 97% are greens
- Over time, strandings of juveniles, subadults, adults and also hatchlings has increased
- Increases could be from more people reporting strandings, more threats, more turtles, etc.
- Oct/Nov is the peak for hatchling and subadult stranding events.
- Jul/Nov is the peak for adult strandings, Apr/Jun is the peak for juvenile strandings.
- Here are case study examples of strandings (through these, we see multiple THREATS)...
 - o Net entanglement, people identified it as a hawksbill in water, then released it
 - o Big Island fishing gear turtle, fishers worked with partners here, it ended up dying
 - o Waianae, Oahu, fishing gear, this one died
 - o Wailua, Kauai, internal pathology (heart, embolism), this one died
 - o Waimea, Kauai, alive but later died at IRC, had an injured flipper (small 9.2cm) and small pieces of plastic in intestines
- Ranked prevalence of threats (hi-lo): fishing gear, amputated flipper, emaciation, internal pathos, vehicle strike, ingested plastics, external trauma, fell into crevice, shark attack, tsunami, vegetation, human take
- Ranked cause of death (hi-lo): fishing gear, emaciation, internal pathos, fell into crevice, vehicle strike, external trauma, tsunami, ingested plastics
- Stranding sex ratio: high proportion of females (87.8%), which we should discuss (are there potentially issues with nest temperatures on black sand beaches?)

Comments

CHERYL - Can we see photos of the ingested plastics for the recent stranding?

KYLE - Yes, we have the plastics still (and terrestrial beetles – invasive sugar cane pest). We don't have great digitized photos yet though. There is the issue of pesticides to think about with turtles eating items at the surface that come from plantations.

JOY - There are no longer sugar cane fields in that location on Kauai, so it is most likely Monsanto plantations there.

EARL - What types of fishing gear are the worst? There are 20+ types of recreational gear. We should figure this out in order to target the appropriate sector of fishermen.

KYLE - It's mostly the Ulua-type hooks, crab and lobster pots, and monofilament entanglements

EARL - It would be good to know about the location of all strandings and then look at the types of fishing occurring there. We can also get an idea of which gear types are not catching turtles.

KYLE - I agree, but our numbers are so low, we run into problems there.

5. Kyle Van Houtan

NOAA PIFSC Turtle Research Program

Research, analysis, modeling, collaborative efforts

- *Tagging:* We tagged a hawksbill nester on the Big Island (just Argos locations). She traveled to Penguin Bank and spent 4 days there breathing above 300-600 ft depths, offshore habitat there is interesting for an adult hawksbill.
- *Tagging:* In the Marianas, on Tinian Island we tagged a sub-adult turtle. It traveled down to Cocos Lagoon on Guam, where there is a high density of turtles.
- *Tagging:* The depth profiles from tagged turtles in the Marianas show hawksbills going deeper than greens during the day. Will we see that here if we tag more in Hawaii? Must use GPS tags

- *Climate sensitivity*: Big picture, turtles are more like fish than other long-lived large vertebrates – they are more vulnerable to changes in the climate.
- *Population trends*: Why has the population of nesting Hawaiian hawksbills not increased over time like it has for green turtles? Has the population always been small? Or do hawksbills face different current threats? We'll never know the past accurately, but monitoring now indicates that the numbers are NOT increasing. There's no apparent trend (but keep in mind monitoring effort issues).
- *Historical ecology*: NWHI records typically show a lot of greens and "some" hawksbills, but there was one ship record with "a lot" of hawksbills (shells).
- *Neophyte breeders*: shows that if we were perfectly monitoring (though we never are), the 2003-2004 season had low recruitment of new breeders and high survival of previous breeders (only 20% of nesters were new). Neophyte breeders have been around 30-70% of breeders since 2005 (but monitoring has also been increasing).
- *Remigration intervals*: on Maui and the Big Island, the years between nesting events is increasing. Data seem to show that the remigration interval used to be shorter (3-7 years) and now it's longer (6-12 years). This could be due to effort issues – we could be missing nests or nesters – but if that's real, why? Is the environment becoming poorer somehow?
- 96% of Hawaiian hawksbills breed on Big Island.
- *Population sex ratio*: to compare to strandings, American Samoa strandings are 59% female; Maui in water observations are 90% female.
- *Population size*: approximately 65 – 145 adults estimated (incredibly small population!). This is not good if Hawaii population is indeed spatially isolated.
- *Foraging ecology*: we have been looking at what the hawksbills are eating all over the Pacific. The diet includes algae, seagrass, sponge, coral, and mangroves.
- *In-water observations*: Cheryl's work on Maui shows 90% of the time they are foraging in coral cavities. They are omnivores eating red and brown algae and sponges.
- *GI tract content*: samples from W. Pacific and S. Pacific indicate that hawksbills eat a lot of encrusting sponges growing on reefs. Protein sponge has more energy; turtles don't retain much energy from silica sponge but they eat them.
- *Life history*: we have been collecting carapace keratin samples for different analyses. One involves morphometrics from the tortoise shell trade, where we calculate the number of hawksbills harvested over 150 years. One involves using the posterior marginal scutes for aging the turtles (growth lines are visible after polishing, with roughly 8-12 visible lines per year). We microsample the tissue along the growth lines, then analyze it for its radioisotope composition. Bomb ^{14}C is used to age turtles with a known death date. We are seeing that hawksbills first breed at 15-19 years.

Comments

JENN - Is there a reason you are not using the humerus bone for ^{14}C aging project?

KYLE - Bones never contain a complete record (due to resorption) and so the earliest material is always lost. For scutes, we only choose turtles with essentially zero tissue loss.

SHAWN - We do plan to compare scute results with humerus results, and we have that set up.

MICHELLE - I would expect a later age at maturity with those longer inter-nesting intervals you mentioned. A younger age at maturity seems to conflict with longer remigration intervals, so I'm trying to reconcile those two ideas.

KYLE - By comparison to other species, hawksbills are known to mature earlier. Our results are from turtle specimens from 1950-1990. Remigration intervals increase after 2005, and very recent by comparison. If there is an environmental decline behind the remigration intervals, it could affect growth and maturity as well.

OPEN FORUM FOR OTHER STAKEHOLDERS

Earl Miyamoto

State of Hawaii Department of Land and Natural Resources (DLNR)

- He has been doing a lot of outreach, including 5 events already this year since January.
- He focuses on turtles and seals, and how to reduce and mitigate nearshore fishery impacts that includes collaboration with PIFSC Barbless Circle-hook program and PIRO's Fishing Around Sea Turtles program.
- Slide-baiting is a big activity on the Big Island. The target is ulua (giant trevally). Fishermen lodge a line in the reef, stand at a high point on land, then slide bait down throughout a period of time.
- He goes to fishing tournaments to reach out to concentrations of fishermen.
- He teaches how to differentiate between greens and hawksbills in classrooms but there's really not enough time to do this with fishermen during fishing tournament outreach events.
- He has not yet been invited to Maui tournaments but hopes this may change in the future.
- DLNR currently hiring three outreach people on Kauai, Maui and Island of Hawaii.

Jennifer Lynch

National Institute of Standards and Technology (NIST)

- The purpose of NIST specimen bank is to understand health and contaminants and facilitate long-term science.
- The bank has samples from marine mammals, seabirds, sea turtle eggs, and coral reefs.
- Collecting in Pacific since 2010, low on hawksbills, interested in collecting more.
- They have 2 hawksbill samples from Palmyra; 2 from the Marianas islands.
- Samples from 6 hawksbill necropsies from the Main Hawaiian Islands.
- Samples from 12 nests from the Big Island project.
- Have been analyzing turtle samples for perfluorinated compounds (PFCs)
- Besides PCBs – PFCs are the highest accumulated organic compounds, immunosuppressive, absorbed from food (sponges, crustose coralline algae).
- Hawksbills in Juno beach (Florida) have incredibly high PFC levels
- So far, there are detectable levels of PFOS in Hawaiian turtles; we will look at spatial differences.
- We also have mercury data from blood. We don't have a large sample size yet, but initial results seem to show similar levels between hawksbills and greens in CNMI and Palmyra (hawksbills there may be eating more algae, placing them on a similar trophic level with greens).

- BREAK FOR LUNCH -

DAY ONE AFTERNOON DISCUSSIONS

NESTING BEACH MONITORING

Kyle Van Houtan (moderator)

Are there additional ways to support current monitoring efforts?

Are there new areas to monitor?

We need a central database of all hawksbill nesting throughout Hawaii

Current annual hatchling production may not be enough to produce one breeding adult

Skippy (Maui) and Don (Kauai) have part time hawksbill nesting efforts

EARL/JOY - on Kauai, we need to have instruction for volunteers to know what to do with turtles because they were established as monk seal volunteers.

KYLE - we should get an idea of all nesting records since 1980s.

EARL - There was a 2013 record of a hawksbill nesting on Kauai, but the nest was in the high water mark zone being washed out, so it was relocated.

There are no nesting records from Lanai.

MICHELLE - we are working with a group called Palama Lanai which deals with protecting species, so we could train them to do some hawksbill work as part of their program.

CHERYL - I'm glad to hear that you're working with that group because I wanted to go to Lanai to help clean up marine debris (it is terrible there), but the Palama Lanai group didn't want help. They said they had it covered and would be repurposing employees from closed hotels to beautification projects.

KYLE - If 6,000 hatchlings reached the ocean this year... that might not even yield a single breeding adult. Given this, we need information on every nest on every beach and island.

MICHELLE - If turtles have 5 nests per year and we record roughly 2 per year, could we (on the Big Island) figure out how many nests we are missing?

KYLE - That assumes there are turtles wandering to other beaches to nest.

LAUREN - They could be wandering based on data we've seen for remigration intervals.

KYLE - Are there beaches you would want to monitor if you could, Lauren?

LAUREN - Yes! Our ability has been limited by vehicles. We need vehicles.

RHONDA - I would say our main issues are - 1) vehicles, 2) safety, and 3) budget for managing large volunteer corps. Hope to get money this round of grants to buy one vehicle, which will bring our total to 2 four-wheel drives. Donated vehicles go through RCUH.

NEST RELOCATIONS

Kyle Van Houtan (moderator)

Kamehame is a historically significant nesting area, but the habitat is declining and may disappear soon
Viable eggs in doomed nests could be relocated from Kamehame to a proximate (< 20 km) area

How could such a translocation take place?

What would be a viable long-term habitat alternative?

GEORGE - At Kamehame beach, we have to keep in mind that the island is changing. It's very dynamic with volcanism, tsunamis, and earthquakes. Beaches are going to change.

KYLE - So it's impractical to have monitoring at Kamehame, but its importance is also declining?

LAUREN - I still think Kamehame is important. It's small, but there are a lot of turtles trying to nest. The beach reaches carrying capacity, turtles dig up other nests, nests can get washed away. The substrate higher up is not good for nesting, there's no place to translocate nests to higher grounds

or elsewhere at Kamehame, but we could translocate to Keaho (inside national park, an underutilized nesting beach). Trying to drive and hike eggs would take too long. Instead we should get a handle on interesting interval, then have a helicopter scheduled to relocate nest.

RHONDA - Or we could use a boat since there's really only one helicopter to use for conservation work on the island and it's frequently busy. We don't have boat. We could get small grant from Disney to try out whether it's feasible to translocate. We don't have to relocate nests to inside the park, but it seems easiest logistically.

JEN - Eggs would only last about 8 hours from the time you dig up the nest to relocate it.

KYLE - What does FWS think of this idea?

JOY - If they can provide enough information to prove it's an option, it could work. The species is so endangered that it's worth taking some out-of-the-box risks. However, if it cannot be shown to be beneficial to population, it won't go forward.

TODD - These nests will be inundated if left at Kamehame, correct?

JOY - Yes. That is a good reason for relocating.

JEN - I'm thinking big-picture and outside the box here. We lose a lot of turtles in the hatchling to juvenile phase. Should we be focusing our energy on increasing hatchling to juvenile survival? There's a model for kemp's ridley with translocations from the Rancho Nuevo, Mexico beach to an island off Texas. They did head-starting, so there's a good model out there to consider. Why are we not talking about that here?

KYLE - Head-starting is an extremely controversial topic. High hatch year mortality is a given with sea turtles, it is part of their life history approach by comparison to marine mammals for example.

PAT - It is still unclear to me... how many hawksbills were here to start with? I have nothing against the projects here, but we still don't have an answer to that question. Are we trying to quadruple the numbers artificially?

GEORGE - How many hawksbills were here when Captain Cook came?

KYLE - We addressed this in a 2012 paper ([link here](#)) that showed there was extensive local harvesting historically and nesting in the NWHI.

EARL - For translocations, you should consider working with Coast Guard because it has infrastructure that could be helpful, and it has proven successful for monk seals in this regard.

NEST EXCAVATION

Kyle Van Houtan (moderator)

Procedures used at nesting excavations should follow the details specified on permit

Default method should be: at night, with red lights, no flash photography, and immediate release

But public excavations are a great benefit for local education and the community

CHERYL - Excavating nests on Maui usually happens at 5-7pm and the word gets out and then there's a whole crowd around. I would prefer to do it with just a few people at 10pm with red head lamps and less petting of hatchlings, etc.

GEORGE - We don't know if there's a problem with the people being there.

SKIPPY - I think the crowds should not be told that sharks are waiting to eat the hatchlings in the early evening because we don't know that to be true.

IRENE - This 6pm vs. 10pm issue seems to cause friction. Could we come to a consensus about what time we should be doing these releases?

JOY - I like the way the Big Island does 1-2 public excavations and then leaves the rest for late night hours. It's great to see adult men getting excited about the release of turtles. They jump out of their way in the water. We target youth typically, but it's great to see grown men excited.

KYLE - The “pet the hatchling” thing is not permitted. Maybe there could be a public version for education, and a private version.

CHERYL - I’ve never supported people touching the hatchlings.

RHONDA - We get a huge amount of support when we can get people to witness releases, so we want flexibility on the timing

GEORGE - There are different crowds on Maui (tourists) vs. Hawaii (locals).

CHERYL - If you had to put money on survival, would you think day time or night time would be better for release? We sometimes tell spectators to come back later for an evening release, and they do come back to watch.

MARINE THREATS

Irene Kelly (moderator)

Is resource limitation a significant concern for hawksbills in Hawaii?

In the 2012 meeting, a captive study was proposed to examine resource requirements

Now that the IRC Facility is on line, the infrastructure to accomplish this study is in place

IRENE – With regards to getting information during the pelagic juvenile stage, how big are those small satellite tags for hatchlings? What’s the feasibility for satellite tagging?

TODD - They are not ready (not small enough) for hawksbill hatchlings yet. We could do some studies on resource use of turtles in captivity; the Hawaii population could be impacted by resource-limitation. We could come up with estimates of how many resources the population would need to survive. Then we would ask whether the habitat has sufficient resources to provide for the entire population. Perhaps we could bring in hawksbill turtles to study growth and resource use and then release them with tags on them. We started with a green turtle pilot project at Sea Life Park and here at IRC, and we will also add Waikiki Aquarium. If it’s successful, we would like to move forward with hawksbills, and there could be a windfall of other research we could perform with those turtles.

IRENE - From a permit perspective, do you (Joy) want them to perfect method with greens first?

JOY - It is easier now that research could be performed at the IRC facility and since Todd has done the same studies with leatherbacks. Now caring for the animals is under NMFS control. Permitting-wise we could probably move forward now on hawksbills.

TODD -The mass of a tag must be less than 5% animal biomass (see [this paper](#)), but can make buoyancy neutral. Radio tags are light enough to do with leatherbacks, but hawksbills are smaller.

KYLE – We released some satellite-tracked drifters in Dec 2013 in the MHI that can be used to understand hatch-year hawksbill migrations.

TODD Mortality is extreme on first days, then of course first year, could use radio tags to understand frenzy stage mortality.

KYLE – Hatch year mortality overall abundance is >95 %, but that could be normal/natural. A more significant concern is the overall abundance. Under 10,000 hatchlings in a year (here 6,000) means most likely a breeding adult will not arise from this year’s nest production.

JENN - About strandings, what is the size range?

SHANDELL - generally above 35cm is the beginning of juveniles we see, in the nearshore recruits.

KYLE - Missing from this discussion is that the Hawaii-based LL observers have never taken hawksbill.

FRANK - How does this match up with genetics? Does this mean they are mixing globally?

TODD - Genetics researchers have not yet found the genetics resolution to determine this.

FISHING INTERACTIONS

Irene Kelly (moderator)

*More work will be done to understand the specific gears that hawksbills are most prone to
The fishing community wants to fish, and not catch turtles, and not lose their gears or hurt turtles
More work can be done to reach out, educate fishing community and develop good will*

EARL – In the monk seal program, every fishery interaction is kept on file, and every gear it is connected to is tracked and recorded. For monk seals, primary interactions are with *ulua* hooks, and so we promote barbless circle hooks. This could be beneficial for turtles too, as J hooks can snag in the flipper. What we emphasize and want to avoid is ingestion of a hook. We use this as part of education and training with fishermen, even with *keiki*. We teach them how to make barbless hooks by smashing barbs down. We get the parents this way, through educating the children. Last year, with Kurt Kawamoto we gave away 1000s of barbless hooks, and all tournaments now have a designated barbless circle hook category.

EARL - Fishermen becoming more conscious of their impacts and barbless hooks are good for low impacts to fish in terms of catch-and-release by not damaging their mouths (and impairing their ability to feed). Most fishermen are concerned about long term fishing access. I spend lots of time out with fishermen at night out at fishing sites, and many fishermen say they interact with turtles all the time. Fishermen don't want to be criminalized for getting turtle off their hook. We approach this with what's good for fishermen, losing \$5 of gear because had to cut line as a turtle was hooked is not something that they want to do.

EARL - Using barbless maybe better for fish than for turtles, but also affects mindset of fishermen to think more long term, and their thinking about what they can do to help. Big island is focal point for *ulua* fishermen. One thing that would help is to be careful about how depicting data trends on strandings. Monk seal hookings may be increasing in the MHI, but this is because the population is growing. So if you normalize by population size, then the rate is actually declining.

KYLE - we will work with you on how we represent the data, so that we are not being unnecessarily inflammatory. We can send you the manuscript ahead of time, for your coaching.

LAUREN – There are plenty of *ulua* fishermen along the Kau coast where our project is focused.

EARL - turtles are becoming more and more of an issue now, whereas we have been focused on monk seals.

TODD - But we are going to be challenged to do this as a rate over time for fishing related strandings because of the small numbers of hawksbills.

KYLE - hooking hawksbills is always going to be a low probability event for fishermen, the question is how we can identify specific gears to reduce what level there is.

EARL - fishermen are different and they want to be armed with whatever they can to reduce interactions with turtles.

CHERYL - We need to establish a priority for helping turtles that have obvious known internal hookings. How do we help this animal? How can we be better organized to assist this turtle?

JOY/KYLE - Habitual bait feeders with hawksbills is a problem.

TODD - with regards to permits, this may be a gray area, FWS versus NMFS. With costs as well, who will pay for all of it.

FRANK - the monk seal program has been effective in tracing interventions back to survival and population growth.

KYLE - I like what Frank says, but we will be challenged to do this for hawksbills, because we do not know every member of the population. For monk seals, they do a true population census.

TODD - It will be a challenge for NMFS to handle this responsibility alone, private groups, like the Maui Ocean Center should be involved in some greater capacity.

CHALLENGES MOVING FORWARD

Joy Browning (moderator)

DLNR needs help in crafting clear messages for outreach to the fisher community

Beach lights on Maui is a significant concern for both hawksbill and green turtle nesting

We need to begin channeling our discussion into action items for each group to focus efforts

IRENE - We have some hawksbill turtle brochures and educational placards for fishermen, and they could help. There does exist conflict between fishermen at hawksbill nesting beaches, especially during the tournaments given lighting and camping.

EARL - I would love to help out. This would have to be next year, as the fishing tournament season has already begun. We need the headway to work with them ahead of time. Please be clear with the message ("no white lights at night") that is helpful. Clear messaging, help us be clear.

CHERYL - the light bulbs campers have now are extremely bright, brighter than ever before.

IRENE - We are talking about prioritizing around nesting beaches, the important ones.

EARL - We do really nothing on Maui, unless invited and only rarely. Maui I am unfamiliar with, the folks, the culture. We spend a lot of time on the Big Island.

CHERYL - We need help on Maui, not just perhaps with tournaments, but just camping fishing and at nesting beaches.

EARL - We are hiring an outreach person for Maui, someone with cultural connections especially over Hana way. They do not like monk seals over there.

LAUREN - Where are your operations on the Big Island based?

EARL - Any place they would cover, Hilo and Kona. It is based around fishing tournaments

MICHELLE - Is there a specific approach we should have based on age demographic and threats? It seems the nesters are not inclined towards fishing interactions, but the juveniles are.

SHANDELL - We see the most fishery interactions with juveniles.

KYLE - we have so few data on threats, maybe we see more juveniles have fishing threats because there are more juveniles to being with. Having said that, nesters have been known to feed on fish scraps in charter boat harbors.

MICHELLE - the issue with lights is a general concern, with several species, not just hawksbills. And with HDOT on Maui, this is a major concern that the state would be incurring light pollution in such a situation.

FRANK - We should be careful to get ahead of any potential effort to put streetlights on N. Kihei Rd.

EARL - Fishermen are going to fish, but they may be amenable to reduce their lighting.

KYLE - We should start to connect some of these challenges to actionable tasks that we can outline, for progress to be made. Tomorrow we will start to stake these out, so reasonable to think about it now everybody.

MICHELLE - For Kealia Refuge, how far down to the water is part of the refuge?

JOY - For all beaches in Hawaii, it is the mean high water line

KYLE - Is Jared Underwood the current refuge manager for Kealia? He should connect with Cheryl

MICHELLE - Yes, Jared is the interim manager of the refuge

IRENE - What about the native Hawaiian community? How can we craft our message so that it is savvy for that community?

KYLE - I would recommend working with local kupuna, not the historical legends as a resource for that.

EARL - Maui is a particularly challenging place because of the different enclaves and differences between localities. They do not always get along. But what we have found is that they do not differentiate between greens and hawksbills.

MANY PEOPLE - that is a troubling concern ☹

DAY TWO

NOAA IRC, Meeting room 2192

WELCOME, OPENING REMARKS

Kyle Van Houtan (moderator)

Summary from Day One -

- There are approximately 100 breeding adults in this population
- The sex ratio is extremely female skewed, at almost 90%.
- Both of these statistics are globally unprecedented, or nearly so.
- Fisheries threats are the greatest mortalities, but there are many types and we need to be specific and then work to craft outreach materials addressing the key problems
- We have a great group of people here, let's have each other's backs, help each other out, work together and get stuff done
- Is genetic inbreeding a factor? This often manifests in morphological abnormalities and infertility, which are both observed in this population.

Comments

MICHELLE - We have a bright and talented group of people focused on this issue that bring lots of resources to the table.

JENN - We need to determine if infertility is assessable. Ask Dutton? Get to the bottom of this issue.

DISCUSSIONS TO ADVANCE RESEARCH AND MANAGEMENT

GENETICS AND POPULATION SIZE

The population is so small, and there may be ~ 10 breeding males, inbreeding could be a concern

More genetics research is required to understand skewed sex ratios and population size

Recommendation - Figure out how to get genetic samples taken from nesters on NPS project

LAUREN – We do not think there are fertility issues on Hawaii, but have had the random nest that has 0% hatching, and morphological issues (carapace deformities, bilateral asymmetry).

KYLE – As a group, maybe we should consider resubmitting a previous proposal for nuclear DNA research to NOAA SAIP RFP to understand total breeding population size (how many females, how many males). In-water observations and strandings have some biases, but if we can take out adults we still have highly female biased sex ratios. For this to be viable we must have DNA from mom and DNA from nest remains. Limiting factor is paired mom and hatchling study to get to male contribution, recognizing that more data can be gleaned from this effort.

JENN – can also get mother's DNA from sacrificed fresh viable egg, should consider that too.

LAUREN – we have been taking/collecting specimens (eggs/hatchlings) for long time, but need to take genetic samples from females.

KYLE – I agree! Only less than ten nesters have been sampled thus far.

SEX RATIO AND BEACH TEMPERATURES

Are there regions in the population where more males are being produced?

Historically, cooler beaches in the NWHI or in the northern MHI could have produced males

But MHI nests can incubate up to 70 days and so may produce some males.

Recommendation - consider shading nests that are monitored at current nesting beaches in the MHI

JOY – We may need to consider a temperature controlled breeding program to promote production of males. The biased sex issue needs to be addressed for this population to be sustained into the future.

MICHELLE – Need to establish or understand pivotal temp, and determine if this is a closed system.

JOY – where do we prioritize? Determine sex ratio? More tags? Wait? This population is at a point where we should act. We have enough preliminary data to suggest that management action needs to happen now.

SHAWN – We can provide Hobo data loggers to projects to get more data on nest temperatures. Lauren has not had data loggers for 2 yrs, and even then just had a few.

CHERYL – Can also get beach temp outside of nests. Just put data loggers in the sand. Maui has white sand and so might be producing males? Look at beaches for example that hatch after day 68 (for example) to give us ball park of how many nests might be producing males. Naturally shaded nests on Maui tend to hatch around day 68.

LAUREN – at Kamehame there's a cave where there are nests laid, they all hatch very late.

JOY – Let's start with nesting beach shading and management intervention using (based on) data loggers. Need to start building our protocol and methodology. Can Kyle look at nest hatch dates and climate to try to come to some understanding of potential male/female production?

KYLE – Sure, let's all work together on this. I would love to look at those data, but I don't have them, the projects do. Shawn is currently compiling our archived nest temperature data. Makes a lot of sense to start nest level analysis vs climate and can also compare data logger data from NWHI with climate and SST over time.

JOY – Do we have any funding needs for data loggers? Do we need to find funds? FWS is willing to consider purchasing data loggers. Need cost estimates (Shawn say, \$150 ea). If less than 2K they may be able to assist. Want to know what the cost needs are - trucks, data loggers, volunteer supplies, etc.

SHAWN – These are relatively inexpensive and funds are not the limiting issue

MICHELLE – However, we have funds that could be easily applied to this purpose. Let's talk.

SKIPPY – where are loggers being placed in the nest, in the center? Green nests on Maui hatched very quickly (day 50). Are you seeing similar early hatching in other locations or variability?

JOY – Kahuku green turtle nest hatched day 80 and day 55, so wide range.

PROJECT FUNDING OPPORTUNITIES

The Big Island Project desperately needs reliable, effective 4x4 transportation

Most projects need some extra funds to support needed research

USFWS has some funding opportunities and they are willing to help applicants prepare proposals

MICHELLE – Can the NPS apply for PMRS to obtain a funding for truck? Are UTVs feasible?

LAUREN – Where we need to go requires the highway transit, UTVs cannot work.

RHONDA – PMRS is a way to identify needs. If there is a proposal for identifying a project it could be funded but it competes with other projects. NPS won't allow us to purchase a vehicle, we can only rent via GSA. Federal agencies are reluctant to loan vehicles.

JOY – How many vehicles do you need at on the Big Island project?

LAUREN – Ideally we would have three.

PAT – 7a1 aspect might be an avenue to get fed military to provide vehicles, but unclear if RCUH can accept from military.

RHONDA – Need to be donated via RCUH because Park cannot accept directly.

IRENE – Suggest that HWF and NPS develop itemized spreadsheet to track and identify who is funding what. This way various donors have an understanding of their contributions, and gaps are more obvious.

MICHELLE – I am happy to review pre-proposals to help projects rank higher for FWS funding opportunities. Next round of funding for FWS is FY15, but small amounts. Next round for large scale funding is for FY16. Internal timeline for reviewing projects is during summer 2015 for 2016 funding allocation. Keep in mind that these hawksbill projects would be competing with other projects where total populations are ~10 individuals (flowers, birds, etc.). Proposals should stress urgency and consequences of failure to act. Show how important the project is for the survival of the species or changing the trajectory of the species. Limited to 1 page for preliminary pre-proposals. In kind support is always possible as well.

JOY - Provide brown bags at FWS to help educate and share info more widely to reach folks that will be on selection committee.

PERMITS, ADDING PERMITTED ACTIVITIES

*FY 2015 partnership between PIFSC and HWF to put GPS tags on 10 hawksbills (> 50cm) in Maui Nui
FWS ESA 10a1A permit modifications should be consistent across all projects and sent in soon*

CHERYL – what other samples can be taken that we aren't already doing?

JENN – I am willing to help with blood work to get sex.

KYLE – Maui in-water capture activities will begin this spring (March, May) Shawn and I will go and work with the HWF team.

JOY – Please get permit modification requests to me ASAP, within 4 weeks preferably, if we need to have new activities this upcoming nesting season. If changes are similar across the board (between different requesting groups) then they can streamline changes in permits and associated BiOps etc.

JOY - PIFSC permit modification should include aquarium work and the bringing of small # of hatchlings (20) to do feeding/growth study. Permit should address all the locations where you're doing actions on. KYLE – we should probably have a separate conference call or meeting to work through these details.

SEVERAL - What other activities besides data loggers might permit amendments include? 1) Genetic work - biopsies, taking of fresh eggs for genetic DNA work (unless nester is missed). Estimate the total number of nests and assume one egg per nest. 2) Relocation of nests from one beach to another (e.g. Kamehame to other beach). Need to define the process (via truck, coast guard, timing, how your ensuring stability of nests, etc.).

IRENE – I can help to get coastguard contact info to Lauren & Rhonda from monk seal folks.

RHONDA – not sure we want to invest huge management intervention money and time, but would be good to know that it's a possibility to move nests if necessary, via pilot study perhaps, to assess cost and logistics to determine what its relative value is.

CHERYL – can we study hatchling magnetic field based in HI?

KYLE – Hawaii is different than the North Atlantic where those studies were conducted. It would be difficult to replicate, not enough spatial resolution here given the potential closed system. Regarding hatchling rearing studies, it will be necessary to find an appropriate location for release of juveniles.

Hopefully they can be reared to 20 cm (min) so sat tags can be deployed. Can drifters help to identify a location? Drifters released to date have provided an indication of passive drifting thus far.

ACTION ITEMS FOR THIS UPCOMING YEAR

MICHELLE, CHERYL, SKIPPY, LAUREN, RHONDA - convene to agree upon best practices for nest excavations and hatchling release.

TODD, JOY, LAUREN, CHERYL - convene by 9 Mar 2015 to discuss permit modifications: (i) captive feeding/growing study of green turtles and hawksbills (to include aquarium); (ii) genetic sampling (biopsies); (iii) fresh egg collection for DNA; and 4) data loggers. Joy requests all 3 permit modifications (PIFSC, Hawaii, Maui) to come through at same time.

LAUREN - Deploy data loggers; discuss and obtain methodology for taking fresh eggs for DNA studies; permit modification for DNA sampling.

CHERYL – Develop hawksbill versus green turtle identification sheet with Irene & Earl

IRENE – work with Earl to ensure they have information they need to work with and speak with fishermen; draft meeting report w/Kyle & Joy; revise brochure (check on printing timing); coordinate a 6mo touch base with team members; decide products (manuscripts) that PIRO wants and prioritize for recovery discussion (skewed sex ratio, small pop size, strandings, etc.); draft Terms of Reference for this group.

PAT, MICHELLE – to work on vehicle and see if 7a1 rule can be applied or via military donation of vehicles

MICHELLE – Be POC for discussions with groups on Lanai regarding turtles (Cheryl will provide Michelle with FYI when going over to Lanai to do surveys). Provide technical assistance for funding related proposals (pre-proposal review) and advocate.

JENN – maintain specimen bank and add samples; provide egg content for storage; NIST can provide equipment for sample storage; get paper out for contaminants threat for greens & HB; contact Dutton to see if banked samples can be used for fertilization test; look into possible histology for sexing of dead hatchlings, discuss with Shawn based on her work with greens.

TODD – foraging paper manuscript this FY

KYLE – Take up Joys' suggestion for brown bags at FWS to build internal support, support others work with analytics; will work on a number of manuscripts - 1) nest/climate analysis; 2) cryptic neonate life stage based on stranding database and drifter data; 3) working with Lauren and Cheryl on population viability of population manuscript; 4) carapace scute manuscript. Work with Cheryl on in-water capture and deployment off GPS tags. Continue collecting data for stable isotope analysis.

SHAWN – compile all nest and beach data logger data. Reviewing device inventory to assess need or costs for more. Draft a methodology for data loggers for FWS permit modifications.

SHANDELL – finalize and get stranding manuscript submitted. Include in data collection a summary of type of material causing stranding (active gear, marine debris, ghost net, ID type of fishery based on gear, etc.). Run manuscript past state folks as well as monk seal to ensure that fishery induced strandings are described in such a way as to not cause problems for other species management efforts or affect other's efforts. Talk to Sarah re - end note library for HB bibliography.