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Sent: Saturday, April 3, 2021 12:06 AM

To: Rebecca Most <rmost@TNC.ORG>; Scott Shenders <rshenders@gmail.com>; Marc Rice <mrice@hpa.edu>; Laura Jim <laura.jim@hpa.edu>

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Subject: A Sampling of What We've Learned in 35 Years- Like the Herbivorous Honu, Please Digest Slowly but Surely at Your Own Pace.

Hello and Aloha, Rebecca, Scott and All- Over the many years we've generated a Lot of informational reports, data, and publications about turtles foraging, basking, and sheltering in underwater refugia in West Hawaii. Kiholo was our first HPA/MTRP-NOAA study site starting in 1987. And always our most favorite. Since 1987 we've watched (documented) a skyrocketing of the population based on catch per effort and other observations- including onset of basking at Kiholo in the early 1990s. Also, just for the sake of history, please know that I visited Kiholo by boat for a few days in 1973 to tag a handful of turtles- [1973- Kiholo Bay, Hawaii, Marine Turtle Tagging Data Collected by George Balazs](#). And then went back in 1980-81 (Mahalo Forever to Mr. Bobby Hind) before making contact with Mother-Load Partner HPA and Marc Rice.

I've selected below an assortment of what should be some of the most important papers/reports/presentations for everyone to browse and become familiar, as their time allows. If there's any problem opening and/or downloading the links to PDFs, please let me know. It should be seamless. And then below the links you will find what we are calling "Big Ticket Items"- 18 bullets of prominent findings Marc Rice and I feel are important for you to read and digest.

[Wibbels et al. \(1993\) Sex Ratio of Green Turtles Inhabiting the Hawaiian Archipelago. J. Herpetology.](#)

[Balazs, Rice, Murakawa and Watson \(2000\) Growth rates and residency of immature green turtles at Kiholo Bay, Hawaii. 16th Symposium Proceedings Supplement in ISTS-18.](#)

[2000- Kiholo Recovery Summaries for Inconel Tags 8702, 8707 and 8709.](#)

[Harrington, Rice and Balazs \(2002\) Habitat use of mixohaline fish ponds by green turtles at Kiholo Bay, Hawaii. ISTS-20.](#)

[Rice, Balazs, Kopra and Whittow \(2002\) Ecology and behavior of green turtles basking at Kiholo Bay, Hawaii. ISTS-20.](#)

[Balazs and Chaloupka \(2004\) Spatial and temporal variability in somatic growth of green sea turtles resident in the Hawaiian Archipelago. Marine Biology.](#)

[Arthur and Balazs \(2008\) A comparison of immature green turtle diets among seven sites in the main Hawaiian Islands. Pacific Science.](#)

[Lee, Rice and Balazs \(2014\) A novel use of an ancient Hawaiian fishpond by green turtles. ISTS-34.](#)

[Seaborn, Moore and Balazs \(2005\) Depot fatty acid composition of immature green turtles residing at two near-shore foraging areas in the Hawaiian Islands. CBP.](#)

[Wabnitz et al. 2010. Ecosystem structure and processes at Kaloko Honokohau, focusing on the role of herbivores, including the green turtle in reef resilience. MEPS.](#)

[Marc Rice and Laura Jim 2/9/2020 Diet Workshop Presentation \(Shown by Thierry Work\)- Growth Rates of Green Turtles \(Chelonia mydas\) at Several Sites on Hawaii Island from 1995-2018.](#)

Big-Ticket Items in a Nutshell learned from 35 years of HPA/MTRP-NOAA Turtle Studies at Kiholo Bay, in Combination with Similar Studies at other Turtle Foraging Locations Along West Hawaii

-Most of the turtles encountered and tagged consisted of green turtles of juvenile and subadult size classes (<81 cm carapace length).

-Kiholo Bay is developmental benthic habitat with no adults that attracts new recruits as juveniles from high seas pelagic habitat.

-Several green turtles tagged as juveniles and subadults have subsequently been resighted by divers on Maui.

-One of the juvenile hawksbills tagged at Kiholo Bay in 1989 was resighted 20 years later as an adult nesting at Punaluu Bay, Kau, in East Hawaii.

-Most of the turtles at Kiholo Bay and other West Hawaii study sites are highly fixated on their residential foraging and resting areas; movement of more than a few kilometers is uncommon.

-The number of green turtles at Kiholo Bay has increased substantially over the years since the initial HPA/MTRP tagging trips in 1987.

-The same green turtles captured and tagged have been recaptured repeatedly many times over the years.

-Green turtle growth rates were found to be exceedingly slow, i.e. 1-2 cm a year in carapace length.

-Relocation and feeding of three green turtles showed that the reason for their slow growth is nutritional.

-There is indication that the rates of growth have slowed over the decades and at least one West Hawaii foraging pasture studied using Ecopath/Ecosim Modelling (at Kaloko-Honokohau) has reached carrying capacity. Indirect evidence suggests the same for other green turtle foraging pastures studied in West Hawaii.

-Many of the turtles captured or found stranded and dead do not have a robust body condition, i.e. they have reduced body fat and muscle mass.

-With few exceptions there appears to be relatively less algae along West Hawaii of the types commonly eaten by green turtles than at other locations throughout the Main Hawaiian Islands.

-There is a paucity of alien algae along West Hawaii, including at Kiholo Bay, of the type consumed by green turtles at other locations throughout the Main Hawaiian Islands.

-Basking out of the water on the shoreline commenced in the early 1990s; more turtles exhibited this behavior at Kiholo and Puako than at any other location in West Hawaii.

-In the late 1990s green turtles began extensive use of the fishponds at Kiholo by entering and exiting through the auwai; the reasons for this use include both foraging on vegetation and shelter for resting.

-Grazing in the fishponds appears to have increased in the last 10 years; the target species ingested is *Ulva flexuosa*.

-Some of the turtles tend to remain in the fishponds for extended periods of time, not going in and out daily.

-No outbreaks of fibropapilloma tumor disease in turtles have occurred at Kiholo Bay or anywhere else in West Hawaii; a single turtle with tumors found at Kiholo Bay was relocated to Oahu where the disease commonly existed.

Respectfully with Aloha, George
www.GeorgeHBalazs.com

From: Rebecca Most <rmost@TNC.ORG>

Sent: Monday, March 29, 2021 6:22 PM

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Subject: RE: Honu Heros article

Aloha Scott,

Mahalo piha for your update, and I look forward to seeing your report.

I deeply appreciate the attention you have given this important issue, and am also very curious why the numbers in the lagoon have changed over time, as we are not seeing a similar situation in the fishpond. I wonder if data can be collected by the NOAA team to investigate diet and growth rates, and highlights the importance of long term monitoring to understand if this is a cyclical pattern, perhaps they reached a "carrying capacity" for the space/food resources in the lagoon, or perhaps the pulse of juveniles turtles grew to an age where they feel like socializing with their adults and making the journey to breed?

Please let us know how we can support the conversation and deepen the understanding, as the health and abundance of all the creatures at Kiholo is of course near and dear to our hearts. Kiholo is lucky to have you watching out and look forward to further discussion with the group. Please let me know if you'd like help connecting with the NOAA team, as their database might reveal clues.

And Aloha George! I heard about the turtle incidents by a presumed monk seal to the south of Kiholo, very interesting behavior. From your experience, is this a common occurrence? I believe I've heard of other incidents of monk seals harming and drowning turtles across the state, but wasn't sure how often that type of behavior occurred. We do spot monk seals from time to time, my best estimate is they show up for a few days/week about once a year. It is always a blessing to see them at Kiholo, and along our shores.

Hope you all are well, and happy to discuss anytime.

Becca

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From: honu world <itsahonuworldinhawaii@hotmail.com>

Sent: Friday, March 26, 2021 8:08 PM

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Subject: Re: Honu Heros article

Very Cool, Scott, Thanks So Much for sending over the article. I think there's many folks over the many years, in many different ways, that have been and continue to be Honu Heros. But just didn't get the publicity off-and-on that Marc and I were so fortunate to receive. Here's hoping that Kiholo, and other places special like Kiholo, can be conserved as honu habitat for decades to come- providing for an array of appropriate uses to benefit all of Hawaii's (and Hawaiian) communities.

May I ask please-- including all your/our friends and colleagues receiving this message-- How often do you see monk seals at Kiholo? Ever? Every week or so? Or? I ask because recently there's been an uptick in attacks by monk seals on juvenile honu-- for 'deadly play', or for food, know one knows for sure which- at a few places on the Kona/Kohala Coast. Any insights based on sightings you folks may have made?

With Aloha and Appreciation, George
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From: Scott Henderson <rshenders@gmail.com>
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Subject: Honu Heros article

Hi George & Marc,

In my Kiholo files, I came across a 2008 Hawaii Trib article that serves as a well-written summary of work that you guys did at Kiholo from about 1987 to 2008. I cut & pasted it into an 8 1/2 X 11 format and scanned it so it could be easily reproduced (attached below). I use it as a handy reference for some of your past monitoring & research work on honu at Kiholo. In it I attached a couple photos that show basking turtles and your remote camera/telemetry apparatus at the lagoon. In reviewing my past Kiholo lagoon pix and informal notes, I believe that numbers of honu basking on the lagoon shores increased steadily from the mid-1990s to their highest numbers in the early-2010s, and since then have slowly declined to the very low basking numbers that we see today.

I've been composing an informal report on my initial run of Kiholo honu counts in Feb-Mar that includes some of my musings on what's happening with Kiholo honu. Some of those musings were formed of course as a result of our Feb 24 interactions at Kiholo. Will send you a draft for your review & comments when I'm pau.

Judy & I got J & J vax 10 days ago. No side-effects whatsoever. Hope all is well on your fronts.
Aloha, Scott