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From: **Scott Henderson** <rshenders@gmail.com>

Date: Tue, Jan 21, 2020 at 3:01 PM

Subject: Re: Kiholo Kingtides monitoring, Jan 2020 & other projects

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Kiholo Ohana,

Over the last few days I have done more analysis and work-up of Kiholo "King Tides" data to reveal what may be in store for low-elevation properties at Kiholo. The story is told in the attachment below, wherein I overlay Kiholo data onto other parties observational data (tide gauge & satellite) and computer model projection data used by UN's Intergovernmental Panel on Climate Change (IPPC). The plots show that peak King Tide levels at Kiholo could increase by at least 6 inches by year 2050. That level would be about *8 inches higher* than the level that recently overtopped the Porteus house downstairs slab. That level could be attained earlier, by year 2035, if sea-level rise occurs at the trend rate exhibited by by the "Kiholo 16-year trend" line (blue line plot in the attachment). Recent model projections by IPCC also indicate that sea-level increase is

happening at a rate higher than what the RCP4.5 model had predicted. So, we may see very significant sea-level rise (of 6 to 8 inches or more) within 10 to 15 years, and even higher rates of sea-level rise may occur further in the future. The RCP4.5 (mid-range) model predicts that year 2010 sea-level rise will amount to one meter, and high-range models predict over 1.5 meter.

In addition to ice melting and oceanic heating expansion, another significant factor contributing to sea-level rise along shores of the Big Island is isostatic settling or sinking of the island. This has been happening at a rate of 22 cm/100 year over the last 40,000 years (Moore et al. 1996, data from a deep drill hole near Hilo). This equates to 2.64 inches over 30 years, which can increase Big Island sea-level rise levels by an additional 11%.

Climate change and sea-level rise are indeed rapping-tapping upon our door steps and we'll need to start dealing with it pretty soon.

Aloha, Scott Henderson

On Fri, Jan 17, 2020 at 4:36 PM Scott Henderson <rshenders@gmail.com> wrote:

Hi All Kiholo Ohana,

Ted Hardie & myself were at Porteus Kiholo property in time frame of Jan 10 through 12, specifically to monitor intrusion of ground water around the Porteus property during predicted max high-tide heights in range of 2.32 ft to 2.41 ft. Dianne Sutherland reported that Christmas 2019 high tides (predicted up to 2.37 ft) covered the downstairs bedroom slab with about 4 inches of water. At that time there also was big surf in the bay that was over-topping the beach berm.

On Jan 11 (Sat), the morning of the highest tide of 2.41 ft, ground water level did not over-top the downstairs slabs, but came to top edge of the slabs. On that day, surf of 3 to 5 ft height was pushing seawater up & over the beach berms at several locations, possibly contributing to ponded water that surrounded the house & slabs. So, even though the predicted tide height for Jan 11 was higher than the predicted tide height on Christmas, it did not put water onto the bedroom slab. Possibly the surf height on Jan 11 was not as big as surf on Christmas?? Or ocean water temperatures had declined enough to significantly drop sea-level?? Or both?? In the future we'll need to closely monitor & record surf heights in conjunction with water heights on & over the slabs.

Attached is a document that I composed that summarizes some photos and observations that we have associated with Kingtides at Kiholo. Included are six images and notes from from our visit a few days ago.

High surf around Christmas broke a couple planks off the white bridge on the lagoon trail by the big ironwood tree. I put new planks on to fill the gaps. Surf surge on Jan 10-11 covered the a'uwai bridge walkway with several inches of ili ili and cobble and I shoveled and swept it off.

Dianne reported at least one mouse running around on countertops. I put a sticky trap on the counter and got 3 mice in it. Another mouse was found in the downstairs toilet. Dianne said she thought the mice may be getting in via some woodwork pukas in the floor or walls. I looked around and I think she's right....there are oversized gaps around several gas & water pipes where mice could easily enter. Will put filling those gaps on our project list for next month Kiholo visit.

Added some vertical wood trim strips along three stop molding lengths to close narrow gaps between the new window frames and the window frames.

Main gas valve to the house had been inadvertently turned off. Upstairs fridge was pretty hauna and spent a couple hours cleaning it out. Tossed out all bottled goods as they were pretty slimy and in uncertain condition. Put three plastic zip-ties on the valve downstairs to fix it in an open position and maybe prevent it being turned off unnecessarily again.

The new batteries that were installed around Christmas time appear to be cycling well. They display about 12.8 V at max discharge after a night of max lights use and 13.6V to 13.8V after daylight recharge. Good recharge was happening even during the heavy overcast days that we were there.

Kiholo was a good place to be last weekend when Statewide the weather was extremely rainy and windy. Kiholo over our 4-day stay was generally overcast, but with very little wind and cool conditions. Sebastian cleaned up palm fronds & coconuts that had fallen during heavy winds a couple days before we arrived.

The keiki palms at the lagoon are in steadily declining condition. There are 7 of 10 larger (4-5 ft) Samoan palm left and only 4 small (1-1 1/2 ft) palms left. My guess is that they'll all be maki in another few months. As I've mentioned to some folks, I'm of the opinion that post-1960 salinities in the lagoon increased drastically after the 1960 tsunami created the major pass into the lagoon, and the lagoon palms, especially the young planted palms, simply are not tolerant of high salinity (>20 ppt). I've been party to the planting of over 150 keiki palms at the lagoon over the last 15 years, and the 11 dying keiki still present are the only survivors. So..the 15 year experiment is

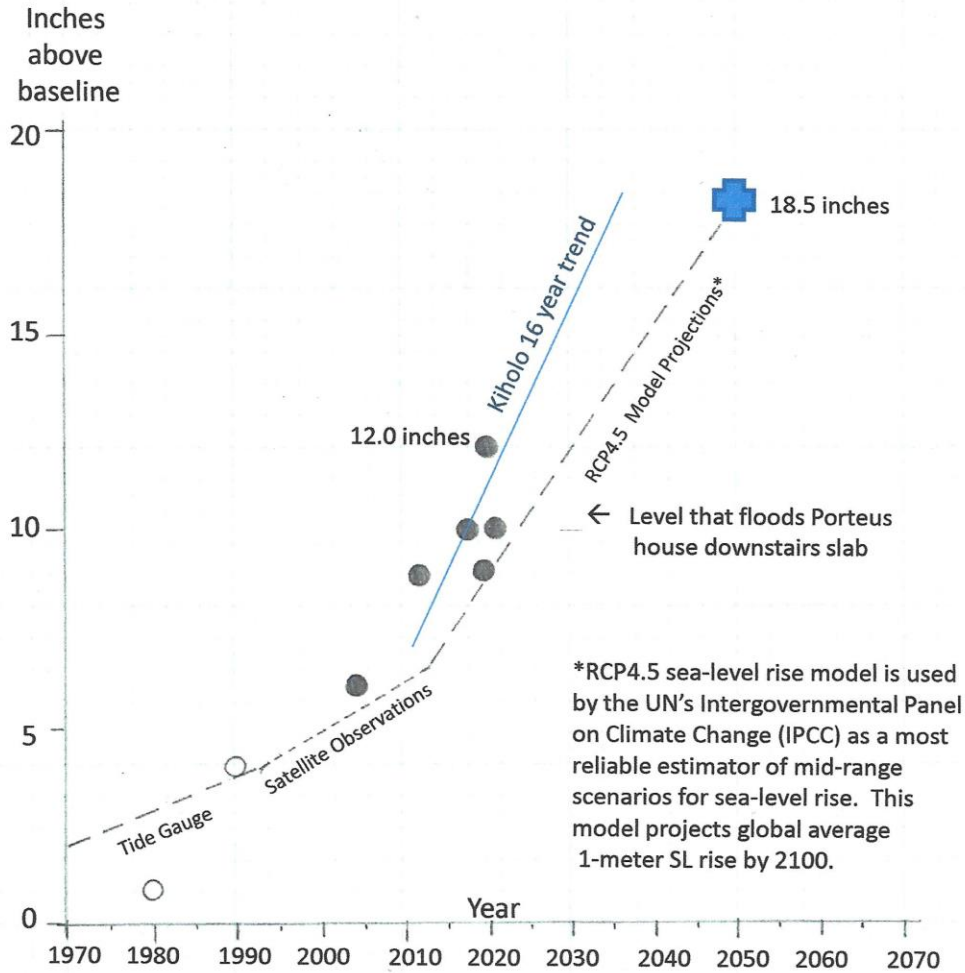
pau. I won't be planting anymore as it just ain't working. Might start to check out salinity of ground/spring water fringing the shore of the 1859 lava flow along the north shore of the lagoon to see if the salinities would be low enough to sustain coco keikis.

I'm working within Hui Aloha Kiholo in generating and moving proposals forward to fence about 125 acres of coastal band at Kiholo to exclude goats and encourage recovery of coastal strand vegetation. Have several feelers out to fence & gate contractors to get preliminary design & pricing info to develop funding needs. I'll be attending the first Hui Aloha Kiholo board of directors meeting of the year at TNC ponds on Feb 13.

Aloha, Scott

Measured, estimated and projected “King Tide” ground-water levels at Kiholo Bay Porteus property

Field data collection & graphic compilation by R.S. Henderson, Jan. 2020.



Baseline = Average pre-1980 Spring Tide groundwater level at Kiholo Porteus property.

Solid dots = Measured “King Tide” ground water level at Kiholo Porteus property.

Open dots = Estimated “King Tide” ground water level at Kiholo Porteus property.

Blue cross = highest “King Tide” ground water level at Kiholo Porteus projected by RCP45 Model data for year 2050.